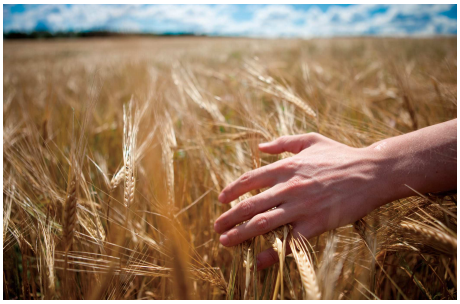
Agricultural Policies in Selected APO Member Countries: An Overview through Transfer Analysis




ASIAN PRODUCTIVITY ORGANIZATION

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This report is a synthesis of the study that has been jointly conducted by the secretariat of the Asian Productivity Organization (APO) and the Kyushu-University Asia Center over the past several years. The authors include several international experts, as well as six national experts. Many other individuals from the APO Secretariat, universities, and government offices also contributed to various parts of the task. The study has been supported by a three year Grant-in-Aid for Scientific Research (Kakenhi) beginning in 2008.

Although the study owes greatly to the kind support, advice, and contributions from the national experts and member governments, the final report including PSE tables has been drafted, compiled, and edited under the guidance of the chief international expert. As country specific assumptions and different data sets have been applied for individual countries, the cross-country comparisons of estimated PSE indicators should be interpreted with full caution. If any errors, misinterpretations, or overstatements are included in the report, it is the sole responsibility of the chief international expert.

The views expressed in this publication are those of indivisual authors who contributed to relevant sections and do not necessarily reflect the official views of the APO or any APO member or its government.

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ERRATUM

Correction to *Agricultural Policies in Selected APO Member Countries: An Overview through Transfer Analysis,* Part Three: Synthesis, page 43.

Figure Correction

Figure 17. Replace with the new Figure 17 below.

Corrected Figure 17

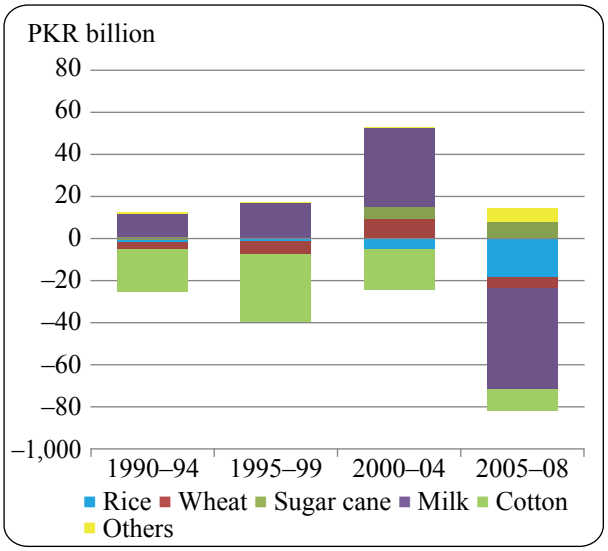

Figure 17. PSE composition by commodity: Pakistam

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FOREWORD

In agreement with economist Paul Krugman, it is our conviction that "in the long run, productivity is almost everything." Our well-being, wages, employment, and competitiveness are all dependent on the extent to which we can increase our productivity. The APO, a unique regional organization concerned solely with productivity, has been working hard on this over the past 50 years. Many programs have been implemented to improve and share knowledge, technology, and management tools that can help raise productivity, especially in the industry and service sector. Posters containing phrases such as "kaizen" or "5S" are seen everywhere in Asia and elsewhere on the walls of factories and offices, while countless quality circles and middle managers are engaged in continuous discussions on how to raise productivity on their sites.

Agriculture is somewhat challenged on the productivity front. It is vulnerable to unpredictable weather and climate change while tied to land owned by a patchwork of numerous small farmers. Low profitability and high risks in the sector discourage investors. It is governments, not farmers, that act as the main promoters of productivity increases in agriculture. The APO's agricultural programs have therefore focused on the activities of the public sector such as agricultural research and extension services, rural credit provision, irrigation, resource management, and agrifood marketing. These activities should have a significant impact on agricultural productivity in the long run.

This report is a synthesis of a pilot study conducted to examine agricultural policies in selected APO member countries more broadly using new analytical tools. The OECD methodology was applied to six member countries for this purpose. Producer support estimates (PSE) and related policy indicators were measured, and the results confirmed that PSE indicators can offer valuable insights on the general magnitude, trends, composition, and transformation of policy support. Although further studies of policy–productivity linkages are required, I am convinced that this report will provide policymakers with a rare, comprehensive overview of agricultural policies, their results in the field, and new analytical skills required to extend their reach to the farmers who need various forms of support.

Ryuichiro Yamazaki
Secretary-General
Asian Productivity Organization
Tokyo, May 2013

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We would like to extend our deep appreciation to the OECD secretariat for providing technical support that was vital for this publication.

We also appreciate the generous funding from the Ministry of Education and Science in Japan, which has provided us with a three year Grant-in-Aid for scientific research. Special contributions have been made to this report by the following international and national experts who jointly drafted the synthesized parts and country chapters, as well as computing complicated PSE indicators.

The chief international expert has undertaken the responsibility of compiling the final report by harmonizing various draft papers and PSE tables, which sometimes required minor modifications of the original drafts. In this regard, it is the sole responsibility of the chief international expert if there are any errors, misunderstandings, and improper use of terms.

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ACRONYMS

AoA	Agreement on Agriculture (WTO)
APO	Asian Productivity Organization
BERNA	Padiberal Nasional Berhad (Malysia)
BOT	Budgetary and other transfers
BULOG	Badan Urusan Logistik Nasional (Indonesia)
CIF	Cost Insurance and Freight
CSE	Consumer Support Estimate
CSEpc	CSE per consumer
EFC	Excess Feed Cost
FAO	Food and Agriculture Organization of the United Nations
FOB	Free on Board
FTA	Free Trade Agreement
GAO	Gross Agricultural Output
GFR	Gross Farm Receipt
GSSE	General Services Support Estimate
GVAA	Gross Value-Added of Agriculture
GVAW	Gross Value-Added per worker
ICT	Information and Communication Technology
MPD	Market Price Differential
MPS	Market Price Support
MTX	Net Import Tax
NAC	Nominal Assistance to Agriculture
NPC	Nominal Protection Coefficient
OECD	Organisation for Economic Co-operation and Development
OTC	Other Transfers to Consumers
PASSCO	Pakistan Agricultural Storage and Supplies Corporation
PEM	Policy Evaluation Model
PFP	Partial Factor Productivity
PO	Value of Payments on Current Output
PSE	Producer Support Estimate
PSEpw	PSE per agricultural worker
PYC	Payment to Consumers from Taxpayers
PYP	Payment to Producers from Taxpayers
ROC	Republic of China
ROK	Republic of Korea
TCT	Transfer to Consumers from Taxpayers
TFP	Total Factor Productivity
TPC	Transfer from Producers to Consumers
TPT	Transfer to Producers from Taxpayers
TSE	Total Support Estimate
TSEpw	TSE per agricultural worker
VP	Value of Production
WTO	World Trade Organization
XTX	Net Export Tax

EXECUTIVE SUMMARY

Convinced that policies should play key roles in raising agricultural productivity in the long-run, the Asian Productivity Organization (APO) has conducted a pilot study on the basic agricultural policies and productivities of member countries. The APO selected India, Indonesia, Malaysia, Pakistan, Republic of China, and Thailand as pilot cases for this study and applied a methodology developed by the Organization for Economic Co-operation and Development (OECD), called Producer Support Estimates (PSEs), so as to capture and analyze recent policy changes and draw policy implications.

Although, the selected countries are diverse in many aspects, all of them have been making efforts to reform their agricultural policies in response to recent economic development and globalization trends. The World Trade Organization (WTO) and Free Trade Agreements (FTAs) have forced these countries to reduce border protections and make the agriculture sector more competitive. Both consumers and producers have been increasingly vocal about the policies that would affect them. A number of positive steps have been taken to reduce government interventions while the basic objective and structure of agricultural policies has remained intact for food security or social reasons. Throughout the examined period, price support policies combined with border measures have been the core of these policies, followed by input subsidies.

Estimated PSE indicators for the selected countries have revealed many interesting features about their agricultural policies. The overall level of assistance to agriculture has been low but volatile and, unlike the OECD countries, it has sometimes turned negative. In many cases, the measured Total Support Estimate (TSE) to agriculture was below 2% of the GDP and the national average %PSE was less than 15%. The volatility and negative figures have been attributed to the combination of predominance in price support policies and the turbulence in financial and commodity markets. In spite of this heavy reliance, the price policies in the selected countries seem to have been serving their original purpose – stabilizing the market and protecting producers and consumers against disturbances – rather than income support.

In some countries, government services and non-market measures have been playing an important role. The General Services Support Estimate (GSSE) was the largest component of TSE in Thailand and Malaysia. It has gained momentum in the ROC since the negotiation for WTO entry started in the late 1990s. In India, Malaysia, and Thailand, transfers from non-market measures including input subsidies and GSSE counterbalanced the negative transfers to producers generated by market support policies.

Producer support, whether it is positive or negative, has concentrated on a few key commodities. Rice has been the leading commodity in the national PSE for many countries but other commodities have often taken the top position in specific periods: milk for Pakistan and India, cotton for Pakistan, meats for the ROC, and rubber for Thailand. The percent PSE of each commodity has shown its own distinct feature. Three different groups have been identified for rice %PSE: high for importers, low or negative for exporters, and high fluctuation for the rest. Milk %PSEs of the six countries have moved proportionately to one another, however, the absolute levels of each varied. No similar patterns among countries appeared for meat %PSEs, as they are affected by religion and animal diseases.

GSSE is considered the most important TSE component for productivity growth because it includes expenditures on research, extension, and rural infrastructure. The study has found that GSSE per agricultural worker tends to increase in proportion to agricultural labor productivity. The effectiveness measured by Gross Value Added of Agriculture (GVAA) per GSSE has shown no significant difference among countries and has been rather stable over the examined period. GSSE composition sometimes differs by country. In India, the share of public stock holding is relatively high, while infrastructure comes first in ROC and Indonesia.

One prominent advantage of the PSE methodology is that the estimated indicators allow us to have a clear idea of who receives transfers, from whom, and how much, as a result of particular or overall agricultural policies. The study has revealed, through transfer matrix analysis, that in India, both the producers and the consumers were the net recipients, leaving the taxpayers as the only net payers. Although, the producers were taxed by market support policies, they received more subsidies (input subsidies) from the taxpayers than they pay to consumers. The net receipt of producers has been positive at the expense of consumers in the ROC for all examined years, as is the case in developed countries. The situation in Pakistan, and to a lesser extent Thailand, is exactly the opposite – producers are taxed while consumers benefitted on average. The main reason for this would be that these two countries are leading exporters of rice and some commercial crops. In India, Pakistan, and Thailand, the payments of taxpayers including the GSSE, outnumbered the payments from the producers and consumers. This means that government expenditures, rather than transfers from consumers or producers, are critical in these countries.

The validity of the PSE policy analysis is clear from the above observations. However, the task is not yet finished. The most important question remains unanswered – how can we elaborate them for productivity growth? Estimated PSE indicators still have limitations. They alone would not be able to show much information about the issue of policy choice for better agricultural productivity. Linkage between policies and productivities will have to be further tested by using complementary analytical tools such as the policy evaluation model or by prudent assessment of individual policies. PSE indicators should provide useful inputs for these works.

With huge potential for contributing to policy considerations and agricultural development in member countries, it may be worthwhile for the APO to make further efforts to continue, improve, and elaborate the study. Close cooperation with member governments and international organizations, such as OECD, should help overcome probable technical problems.

PART ONE: BACKGROUND, RATIONALE, AND ANALYTICAL FRAMEWORK

INTRODUCTION

The Asian Productivity Organization (APO) initiated a regional pilot study on the basic agricultural policies in 2004. It was felt that agricultural policies should play key roles in raising productivities in the long-run and that globalization and the WTO regime were having a significant impact on the policies and performance of the agricultural sector within member countries. The study attempted to examine the possibilities of using the methodology developed by the OECD, called the Producer Support Estimate (PSE), to analyze the evolution of agricultural policies and agricultural performance in member countries. International and national experts discussed the first preliminary pilot study in the symposium held in 2005. The APO Working Party Meeting in early 2007 acknowledged the need for this kind of analytical survey to further improve the methodologies and discuss possible future action to make such policy studies more regularized as a part of productivity indicator surveys.

A sample standard template to compute PSE indicators was proposed and tested so that national experts in developing member countries would complete computation tables once the appropriate data was inserted. A training course was organized in February 2008 consisting of 14 participants from 8 member countries. The course revealed that the APO had to address a number of technical and practical problems if it wished to launch such a comprehensive policy study on a more regular and consistent basis. Many experts felt that they had difficulties in collecting appropriate budgetary data or in computing price differentials. They also pointed out specific problems associated with policies that are unique to developing countries. Others hinted at difficulties in referring to policy implications and the risk of political repercussions unless the results were carefully presented. The modified PSE template still looked imperfect. Taking account of these views and lessons, the APO decided in 2008 to conduct another pilot agricultural policy study focusing on six countries and appointed national experts. The chief international expert and the Kyushu University Asia Center offered technical support including detailed consultation with appointed national experts and further improvement of the PSE template. Throughout 2009–2010, a series of consultation meetings were held among international and national experts to examine the PSE estimates. The expert meeting organized in February 2011 at the Meiji University in Japan, decided that the final report should be published after updating the data from 2008 to reflect a price hike in international commodity markets.

This report consists of four Parts and Annex tables.

Part One gives general information on the study including rationales and the overall framework of the study. Part Two describes the basic concept, methodologies and process of PSE analysis that was developed by the OECD and used in this study as a central analytical tool. This part has been written to provide government staff and researchers of APO member countries with practical knowledge on how to conduct PSE measurement and analysis. If readers are mainly interested in the outcome of this study, this part may be skipped.

Part Three is the synthesis of six country studies. By examining the main findings of policy descriptions and estimated PSE indicators for the selected countries, it attempts to analyze the size, direction, and transformation of agricultural policies, discuss the possible linkage to productivity, and summarize key findings and messages for APO member countries. Part Four contains five country papers prepared by the national experts. The Annex shows more detailed statistical data on agriculture and productivities and estimated PSE indicators.

RATIONALE: WHY AGRICULTURE POLICY ANALYSIS IN THE APO

Why Agricultural Productivity Matters

Before moving into the details of the study, it may be worth briefly explaining the rationale behind the study, i.e., why the APO, a regional "productivity" organization, would conduct a policy study for agriculture. Two justifications may be required. First, why agricultural productivity matters for the development of the national economy, and second, why policies, rather than productivity tools or management skills, matter for the improvement of agricultural productivity.

Productivity is a simple concept by nature – defined as a ratio between output and input. It may be measured physically, monetarily, or both, such as the number of cars produced per worker or a crop yield per hectare of land. The concept can be further extended to highly aggregated levels, for instance, GDP per capita, gross agricultural output per farmer, or Total Factor Productivity (TFP). Productivity matters for individual factories or companies because higher productivities mean that they can get more output for a given set of inputs or that they can produce a given output for lower costs. It also matters for nations because "a country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker" (Krugman 1990). In other words, to increase a company's profit or national income (GDP), we have to advance our ability to raise productivity. But the question remains: how can we do it?

It should be relatively easy to conceive the answer in context of the industrial sector at the micro level. Growth in productivity can be achieved through the use of more capital and labor, high-quality inputs, better management, and new technology. Output per factory worker will rise if companies introduce powerful machines, train their workers, or improve their management skills. Market forces always press hard on industrialists to search for the tools and ways to raise their productivity. Productivity organizations, such as the APO, can assist private sectors through the development and dissemination of productivity tools, the training of trainers, and observation missions. Applying productivity tools such as "Kaizen," "Five Ss" or "quality circles" at the factory/office levels have proved effective in raising the productivity of industrial sectors in Japan and nearby Asian countries. Observation missions must have inspired the participants to follow or modify the state-of-the-art knowledge and techniques used in the visited sites. Training courses and seminars may ignite a change in the mindset of company's executives geared towards higher productivity.

There is little doubt that increased capital investments, better quality of inputs, and technological progress in industrial sectors are the keys to increasing productivity.[1] These factors set in motion and

[1] See for example, Dale W, Jorgenson, "The explanation of Productivity Change", Fifty Years of Economic Measurement: The Jubilee of the Conference on Research in Income and Wealth, 1991 University of Chicago Press.

amplify the benign cycle of higher productivity, higher profits, more capital investments, more innovations, and higher economic development. For this reason, the term "industrialization" has long been a synonym of economic development since the Industrial Revolution in the late 18th century. Guided by profits and market forces, private sectors can lead productivity growth in the industrial sector.

What about the agriculture sector? Do we have to pay much attention to it even if the task for raising its productivity looks far more difficult than in other sectors and the sector is contributing far less to the development of national economy? The answer is "Yes," for the following three reasons.

The first reason is the one which classical economists pointed out in the early 19th century. The development of industrial sectors may not be sustained unless food prices and wages are kept low, either through productivity growth in domestic agriculture or through imports of food from more productive countries. Working behind this logic is the 'law of diminishing return' in agriculture. Economic growth induced by the benign cycle of increased productivity, profits, and capital investment in industrial sector would eventually halt because food costs, and thus wages, would reach the point that all profits of industrialists disappear. This view, called the 'Ricardian trap,' should still be valid for many developing countries in Asia whose industrial sectors have to rely at least partly on lower wages of labor for their growth. To keep food prices low, countries may resort to food imports as Singapore and Hong Kong did. However, for many large developing countries resorting to this can lead to choking off their rural sector, the main stay of the nation, leaving the majority of rural people further impoverished.

The second reason is the necessity for a balanced structural adjustment among economic sectors. The gap in the productivity and income between rural and urban sectors widens as the economy grows because resources including labor and land cannot shift quickly enough to high productivity sectors. In many of the rapidly growing economies in Asia, the agriculture sector now makes up only 10–20% of total GDP while offering 40–60% of national employment. In other words, income per agricultural worker, or labor productivity, is less than half of other sectors. The faster the economy grows, the larger the gap expands, and thus the more social justice and stability would be challenged.

To secure balanced development, agricultural productivity and income have to increase in tandem at least at a speed comparable to other sectors. Some economists claim that agricultural productivity has risen faster than other sectors in many countries (Martin and Mitra). Other economists suggest that improvements in agricultural productivity stimulated by government investment and appropriate price incentives have contributed directly to economic growth, poverty reduction, and stability (Timmer). The necessity for balanced growth is a common but very serious political challenge that many emerging economies in Asia are now facing. National leaders and politicians are paying much more attention to the development of the rural sector elsewhere, as seen recently in Indonesia, Thailand, and PR China, to name a few.

The third reason is the positive externality and/or public goods that the agriculture sector provides in society. Through its activities or even its mere existence, the agriculture sector contributes to national food security, conservation of the ecosystem, water retention, rural viability, cultural heritage, etc. (OECD 1994). Productivity increase in agriculture should enhance national food security, reduce motives for deforestation or depletion of wetland, or help rural communities to continue traditional cultural activities. Even where a nation's comparative advantage shifts from agriculture to manufacturing or service sectors, it would be worth retaining a minimum level of agricultural activity if it provides public goods that are not accounted for in market prices for food.

Why Government Policies Matter

Even though we admit that agricultural productivity matters for the development of national economy, why should we bother analyzing policies for the sake of increasing productivity? Could the private sector take a leading role in productivity growth as in the industrial sectors? There are several reasons as to why government policies have to be highlighted.

First, private sectors in Asian agriculture are composed predominantly of small family farms who have limited capacity to invest in infrastructure or basic research. Small family farms have been often considered as "mere entities" rather than "entrepreneurs."[2] For most of these farmers, agriculture is a 'way of life' rather than a business. They are often bonded to small, fragmented pieces of land where economy of scale hardly works. Their economic size is too small to generate sufficient savings to launch large scale investments or area expansion. Complicated land ownerships hamper the acquisition of farmland.

Second, small farmers or even land owners seldom venture into long term capital investment because of high risks in agriculture. Flood, drought, pandemics of pests, and diseases could ruin all the personal stocks and assets of farmers. Bleak future return to investments in agriculture arising from deteriorating terms of trade with other sectors and low income elasticity of food is another reason for the low investment. In fact, the real term international commodity prices of food have witnessed a continual downward trend from the 1950s to the early 2000s.

Third, required investments often fall into the category of public or semi-public goods for which market mechanism cannot function well. Irrigation systems, rural roads, disease control, and agricultural researches all have, in part, the nature of non-rivalry and excludability, which makes private investments less attractive because outsiders can benefit as well.

Therefore, in the agriculture sector in Asia, it is the government that acts as a major promoter for productivity or as the "entrepreneur"[3] who takes risks, invests in "new combinations," induces innovations, and expands the production frontier outwards. In order to raise agricultural productivity, governments spend a large sum on irrigation, drainage, and rural roads, as well as the provisions of various services such as research, training, agricultural extension, and animal health. The best example of successful agricultural productivity growth, the Green Revolution of the late 1960s to 1970s, may not have visited Asia without the efforts of governments and international communities.

In addition to these productivity enhancing measures, governments also offer other agriculture related policy measures to producers and consumers, mainly for social (equity) reasons. Market support measures are commonly used including government procurements, minimum support prices, import and export duties, and quantitative trade restrictions. The stable supply of basic foods at reasonable prices is always a priority for the policy makers, especially in developing countries. Grants or subsidies for fertilizers/seeds and concessional loans are other types of assistances aimed to support farmers. In recent years, many governments have launched or strengthened policies on environmental protection and food safety. These policies, supported by consumers, must have a significant impact on the levels and quality of agricultural productivity.

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[2] Tohata Seiichi, Evolution Process of Japan's Agriculture, 1936.

[3] Joseph Schumpeter, Theory of economic development, 1912.

In short, we cannot overlook the role of governments in productivity growth and national welfare because government policies should have a significant impact on agriculture and the development of national economies in the long-run.

What Need to be Done for Analyzing Agricultural Policies and Productivity

Theoretically, we can consider three major channels through which policy measures affect agricultural productivity at the national level: substitution effects (changes in relative prices of various inputs or outputs), wealth effects (capitalization of support), and technical progress. Agricultural policies, such as subsidies targeted for a particular input, cause changes in the relative use of various inputs, modify technical or allocative efficiencies,[4] and alter not only the Partial Factor Productivities (PFP) of individual inputs but also the Total Factor Productivity (TFP). Similarly, price support on particular commodities should have a positive or negative impact through the changes in relative prices of commodities in relation to agricultural production and consumption. TFP may improve or deteriorate if the output of productive commodities has increased or decreased as a result of changes in relative prices to other commodities.

Public investments or subsidies for irrigation, land consolidation, and rural roads are capitalized in farmland and help raise the productivity of farms. Knowledge and skills provided by training, education, and extension services are capitalized by farmers and rural communities as human capital or social capital. There should be little doubt that well-targeted government support for Research and Development or infrastructure would accelerate technical progress, shift production functions, and result in higher TFP and PFP, as has been proven by the Green Revolution.

However, efforts to prove the direct relationship between policy support measures and productivity at the national level has not been easy. Relating theories for measuring agricultural productivity to empirically observable productivity factors requires many assumptions and longer term reliable data to link productivities to individual policy factors. Most of the productivity analysis use either the growth accounting techniques, the production function framework of TFP and PFP or the index based TFP, but these method have many limitations and shortcomings.[5]

The Growth Accounting Techniques calculates the TFP index through detailed compilation of inputs and outputs. This method is not effective in establishing a link between policies and inputs/output because policy parameters are not incorporated in the accounting. In the production function framework, production growth is determined by the changes in volume of individual inputs and technical progress expressed as an upward shift of the production frontier. Though clear in theory, this approach has difficulties in quantifying and choosing proper policy variables which by nature have strong correlations with input variables. If proper policy variables cannot be chosen, one option is to regard the output residual that cannot be attributed to inputs as technical progress induced by government policies. But there is no guarantee that this residual only represents net policy effects.

[4] Output growth based on technical efficiency is explained by the optimum use of inputs. In the production function framework, technical efficiency is maximized when the difference between potential and actual use of inputs is minimum. Further, technical efficiency is also observed when there is allocative efficiency. This would mean that even while operating on the potential production function, the combination of input use can change for ensuring cost minimization. To this extent, policies that influence output and input prices can influence allocative efficiency.

[5] See Ruttan 2002.

The index based TFP as represented by Malmquist approach has more constraints for policy-productivity analysis. In addition to the difficult tasks of choosing and quantifying policy variables, this approach requires the task of selecting and estimating sensible input and output indexes that properly reflect changes in weights, quality, and prices.[6] We also encounter the difficulties arising from the correlation between the policy variable and the weights. Policies cause changes in relative prices among outputs/inputs, which directly affect the weights used for both indexes. These difficulties are further compounded in the agriculture sector because of poor data availability and complex policies.

These observations indicate that it may be prudent to examine policy variables more carefully in the first instance. Once we accumulate sufficient knowledge and well quantified data on policies, we may go onto the next step, which includes more comprehensive production index analysis, production function analysis, or use of other econometric models. This study will thus focus on the quantification of policy transfers and examine their relation with traditional partial productivity indicators such as labor productivity and land productivity.

Rationale for the Agricultural Policy Study

Policies are complex everywhere but perhaps agricultural policies are the most complex and opaque ones as we see in the OECD policy studies. They may be more obscure in developing countries. The WTO's Trade Policy Reviews (TPR) reveals that for rice alone, most Asian countries provide various types of support to farmers through state procurement, minimum support prices, public stock holdings, fertilizer subsidies, concessional loans, discount sales to consumers, export taxes, licensing for trade, etc. The complexity blurs to what extent producers or consumers are supported or penalized as a whole by these measures. Producers may appear to benefit from the minimum price support and fertilizer subsidies but they might be paying de facto net taxes if export controls or overvalued exchange rates result in negative price gaps between local and international markets. Discounted rice prices for disadvantaged consumers may not be the discount in a real sense if domestic market prices are kept above the international prices through import control or the inefficiency of market intervention agencies.

The PSE methodology developed by the OECD is considered to effectively address these issues and provide useful information for policy making if modified and carefully applied to the situation in APO member countries. Its main outputs, PSE indicators, visualize both the magnitude and directions of policy transfers between key players distinguished by their type of policies. The PSE indicators may become good benchmarks for policy reviews and offer the opportunity to conceive a better set of policies for sustainable development of agriculture and economy. Once PSE indicators are well measured, then we can start analyzing the impact of policy measures on the long-term productivity growth in agriculture, initially by simple correlation analysis, followed by applying more sophisticated econometric models of causality.

[6] This task alone needs a tremendous effort as seen in the past APO productivity surveys (APO 2001).

OUTLINE OF THE STUDY

Country Studies

The study is essentially a synthesis of six individual country studies[7] whose main findings are reported as country papers in Part Four. Considering the geographical balance, data availability, and willingness of national experts, India, Indonesia, Malaysia, Pakistan, Republic of China (ROC), and Thailand have been selected. Each country study has been conducted by a national expert along with a common guideline and standard structure. It consists of policy descriptions and quantitative analysis, which are complementary to each other. The descriptive part illustrates how and what sorts of national policies have been applied to the nation's agriculture sector over roughly the last two decades. It focuses on the policy changes in the last two decades and the actual operation mechanism of the major policies, especially price support policies. The information derived here offers useful insights and criteria for the PSE computation and analysis.

The quantitative analysis uses the same basic concept and methodology of support indicators that the OECD developed in the early 1980s,[8] although some modifications have been made to accommodate the specific conditions and unique policies of developing countries. It rests on the presumption that national policies affecting agriculture accompany or generate monetary transfers between producers, consumers, and the government either explicitly in the form of subsidies or taxes, or implicitly through price differentials between domestic and international markets. The core task is the estimation and analysis of the gross policy transfers and related indicators.

The major findings of the country studies are summarized and compared in the synthesis of the Part Three. The estimated PSE indicators for six countries are the important yardsticks of policy analysis.

Scope of Policies

In principle, all national policies that apply exclusively or mainly to agriculture are included in the study irrespective of the agencies in charge. For instance, fuel subsidy or tax exemption is not included if it applies to other sectors as well.[9] Price support for rubber or investment in irrigation is included even if the ministry of agriculture is not the agency in charge. Support to 'upstream industries' (e.g., fertilizer manufactures) and 'downstream industries' (e.g., food processing sectors) is excluded unless explicitly stated that payments/supports are made to pass on to farmers or consumers. However, in reality, the effects of these policies can hardly be separated from the prices of farm products in which they are capitalized in a form of reduced production/marketing costs. In this sense, PSEs and CSEs estimated in this study should be interpreted as "nominal" and "gross" values, which may include the effects of policy support to input industries such as high tariffs on fertilizer to protect manufacturers, or concessional loans to marketing and processing industries.

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[7] Pakistan is not included in Chapter 4 of this report but PSEs and related indicators have been measured for all six countries including Pakistan.

[8] The basic OECD concept and methodology remain unchanged but the definition of the PSE, policy classification, and operational assumptions have been modified from time to time to accomodate the specific conditions of developing countries.

[9] There are some grey areas to be determined case by case. One example is fuel subsidy for irrigation in India. It has been counted as PSEs because agriculture is the largest beneficiary, although fuel subsidy may be applicable to other sectors (e.g. poor households).

Another basic rule for policy coverage is that only the policies implemented by central governments are included. For practical reasons, expenditures of "states," provinces, or local governments are disregarded even though they offer substantial financial supports to producers. Issues of state expenditure in India or rural development categories in Thailand are briefly touched upon later in the box articles.

Commodity Coverage

Nine commodities (rice, wheat, maize, oilseeds, sugar cane, beef, pigmeat, poultry meat, and milk) were selected as standard commodities for which PSEs and CSEs are estimated, though production may be virtually nonexistent in some countries (e.g., wheat in Indonesia). If the accumulated share of the nine standard commodities in the gross agricultural output of the nation (GAO) is below 60%, additional commodities are selected, for example: cassava, coconuts, cotton, rubber, bananas, mangoes, pistachios, goat and sheep meat, tobacco, or pepper.[10] The additional commodities often have a significant importance in the national economy and trade, as in the case of palm oil in Malaysia.

Period Covered

The policy descriptions may go back 30 years or more but the PSE indicators and related quantitative analysis cover the period from 1990 to 2008. Descriptive parts can refer to the policies in 2008 and 2009 when many member countries took specific policy measures to mitigate the influence of the volatile international market.

Modifications of the OECD Methodology

The study has computed PSE indicators based on the OECD methodologies with some modification in the actual implementation. In light of the difficulty in collecting detailed data or estimating precise parameters, practical approaches have been taken. For instance, minimum support prices in one representative state have been used as a proxy for national average farm gate prices.

Modifications were made in four major areas to make measurement tasks simpler and to better reflect the policies and data availability of developing countries. First, excess feed costs and price levies are disregarded because APO member countries seldom apply those measures to protect feed products including coarse grains or to adjust price support levels. Second, the number of policy categories is reduced because some OECD policy categories such as 'payments on the past production' are non-existent in APO member countries. Third, non-commodity specific expenditures paid to the producer are allocated to individual commodities by their shares in the gross value of output[11] because price support policies are commodity specific in the selected countries. Fourth, a standard computation template (the Template) has been developed so that non-experts including ordinary government staff can compute PSE indicators once they enter the appropriate data in the spreadsheets of the Template.

[10] The coverage may fall below 60% because a large number of products are produced rather evenly, as in the case of India.

[11] This had been the routine procedure that OECD used to apply until 2007. Current OECD's PSE manual does not suggest such allocation by commodity, treating it as another important policy classification to gauge policy reform.

PART TWO: METHODOLOGICAL FRAMEWORK FOR AGRICUTURAL POLICY ANALYSIS

METHODOLOGY FOR MEASURING THE OECD PRODUCER SUPPORT ESTIMATE

Governments provide support to agriculture in the form of transfers through a wide variety of policy measures. They may provide direct payments to farmers; maintain domestic prices above those at the country's border through tariffs, quotas, and export subsidies; purchase commodities from farmers for stockpiling and preferential distribution; grant tax or credit concessions; provide services to farmers (such as training, advice, and information services); or fund agricultural research facilities. Policy makers, researchers, academics, and other stakeholders are interested in knowing how these transfers associated with a particular policy measure are calculated, presented, and used in analysis, how the different transfer values are combined to calculate a total level of support, how to evaluate changes in composition and level of support over time and between countries, and how to estimate policy impacts.

For nearly 25 years, the OECD has made an important contribution to addressing such issues by developing a set of indicators designed specifically to monitor and evaluate the level and composition of support provided to agriculture. While initially calculated only for OECD countries, the analysis has been used subsequently for a number of non-OECD countries including Brazil, China, Chile,[12] Israel, Russia, South Africa, and the Ukraine.[13] The results are the only available source of internationally comparable and transparent information on support levels in agriculture. By using a consistent methodology, they provide a sound basis for international policy dialogues. The data also serves as an input into econometric modeling, to assess the effectiveness and efficiency of policies, and their effects on production, trade, income, and the environment.

The detailed manual for calculating, interpreting, and using the OECD's Producer Support Estimate (PSE) and related indicators of agricultural support was published in 2008. The PSE Manual contains a complete and comprehensive explanation of the methodology employed by the OECD to calculate indicators of agricultural support including mathematical equations, detailed empirical examples, and the procedure for calculating indicators of support for the OECD as a whole. It was produced to help agricultural policy makers, researchers, and students have an in-depth understanding of the methodology. It contains sufficient information to enable the indicators to be replicated elsewhere.[14]

The technical and descriptive parts of this chapter are based on The PSE Manual, containing a partial and simpler explanation of the methodology using descriptive text, diagrams, and a few summary equations. This is accompanied with some observations on the experience of using the PSEs in OECD countries.[15] The aim is to provide an introduction to the main concepts underpinning the indicators, the process of calculating transfers, and the general procedure followed to estimate the most widely used indicators that measure the level and composition of support. Its central focus is helping the reader to correctly interpret the results.

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[12] Chile and Israel joined the OECD in 2010.

[13] The estimates for the European Union include countries that are members of the EU but not the OECD.

[14] The PSE Manual, indicator database, and other publications relating to the indicators are available at www.oecd.org/tad/support.

[15] See for reference, the annual report Agricultural Policies in OECD Countries: Monitoring and Evaluation and the bi-annual report Agricultural Policies in Non-OECD Countries: Monitoring and Evaluation, various years.

The names, abbreviations, and definitions of the indicators of agricultural support are listed in Box 1. The indicators estimate the size of transfers caused by agricultural policies and express their levels in relation to key economic variables. All of the indicators are calculated on an annual basis for each country. Some are also calculated for individual commodities or groups of commodities, which helps evaluate the structure of support within a country.

General Rule for the Measurement of Policy Support

A number of important general rules, as stated in the OECD manual, guide the measurement of the indicators. Rules 1 to 3 determine the scope of policy measures to be considered in estimating agricultural support and provide criteria for identifying agricultural policies in a complex mix of government actions. Rules 4 to 6 help define the method for measuring support and are important for interpreting the indicators.

Rule 1: generating transfers to agricultural producers arising from a policy is the key criterion for inclusion of policy in the measurement of support

This rule establishes two requirements. First, the policy must deliver a transfer. This can be explicit or implicit, and in the form of money, goods, or services. Agricultural policies that do not generate transfers are not included. Regulations would be a prime example. Second, policies must deliver transfers to agricultural producers. Policy measures that result in transfers from producers, such as taxes on inputs or the cost of purchasing tradable permits, are not considered. Also not included, are policy measures implemented by an agricultural ministry but targeted at non-agricultural activities, such as forestry or fisheries.

Rule 2: the nature, objectives or impacts of a policy measure are not a basis for inclusion

This rule complements the first in that the stated objectives or impacts of a policy measure are not used criteria to determine the inclusion or exclusion of a policy measure in the estimation of agricultural support. It also means that the government body responsible for the policy measure does not determine the decision to include it or not. Policy measures supporting agriculture may be under the responsibility of many different government ministries and not just the ministry formally responsible for agriculture. For example, agri-environmental payments received by farmers may be implemented by ministries responsible for environmental issues.

Rule 3: general policy measures available throughout the entire economy are not considered in the estimation of agricultural support, even if such measures create transfers to or from agriculture

This rule restricts the range of policy measures only to those supporting agriculture. For example, a tax concession that is available to all small businesses or to all self-employed people in an economy would not be included because it is not specific to or primarily directed at agriculture even though it may benefit farmers. The term “agriculture” designates primary agricultural producers as an economic group. Moreover, policies such as tax concessions on fuel purchased by farmers is included if agriculture is the main beneficiary or if there are specific provisions benefiting farmers.

BOX 1 Names and Definitions of the Indicators of Agricultural Support

The individual indicators are listed below in a manner to show three distinctions between them. First they are listed in separate tables according to the ***intended recipient*** of the transfer – producers individually, producers collectively, consumers, and all recipients. Then within each of these four tables, indicators are separated according to their purpose, either to measure the level or to measure the composition of support. A further distinction is made in relation to the unit of measurement: those expressed in monetary terms are listed first, followed by those expressed in a percentage or ratio.

Indicators of Support to Producers

Level of support	Monetary	***Producer Support Estimate (PSE)***: the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policy measures that support agriculture, regardless of their nature, objectives or impacts on farm production or income.
	% / ratio	***Percentage PSE (%PSE)***: PSE transfers as a share of gross farm receipts (including support). ***Producer Nominal Assistance Coefficient (producer NAC)***: the ratio between the value of gross farm receipts (including support) and gross farm receipts valued at border prices (measured at farm gate). ***Producer Nominal Protection Coefficient (producer NPC)***: the ratio between the average price received by producers at farm gate (including payments per ton of current output) and the border price (measured at farm gate).

Indicators of Support to General Services

Level of support	Monetary	***General Services Support Estimate (GSSE)***: the annual monetary value of gross transfers to general services provided to agricultural producers collectively (such as research, development, training, inspection, marketing and promotion), arising from policies that support agriculture regardless of their nature, objectives and impacts on farm production, income, or consumption. The GSSE does not include any transfers to individual producers.

Indicators of Support to Consumers

Level of support	Monetary	***Consumer Support Estimate (CSE)***: the annual monetary value of gross transfers from (to) consumers of agricultural commodities, measured at the farm gate level, arising from policy measures that support agriculture, regardless of their nature, objectives or impacts on consumption of farm products.
	% / ratio	***Percentage CSE (%CSE)***: CSE transfers as a share of consumption expenditure (measured at farm gate) net of taxpayer transfers to consumers. ***Consumer Nominal Assistance Coefficient (consumer NAC)***: the ratio between the value of consumption expenditure on agricultural commodities (at farm gate) and that valued at border prices (measured at farm gate).

Together, these rules mean that a policy measure is included in the measurement of support if it generates a transfer to agriculture, whether to agricultural producers individually or collectively, and agriculture is the only, or the principal, economic group that receives the transfer.

Rule 4: transfers generated by agricultural policies are measured in gross terms

This rule means that no adjustment is made in the support indicators for costs incurred by producers in order to receive support, such as the costs of increasing production or reducing production to meet compliance conditions attached to certain payments. The only costs taken into consideration are specific contributions that producers make to finance the transfers they are receiving e.g. to contribute to stock-holding, marketing measures, or export subsidies. It also emphasises that the indicators reveal the effort made by governments as implied by their agricultural policies rather than their effect. The indicators are not intended to and do not measure the impact of policy effort on production, trade, income, or the environment. The actual impact of policy measures on such factors will depend on, among other things, the basis upon which support is provided (such as per tonne of output, per land unit, or per farm), the level of support, and the responsiveness of farmers to changes in support.

Rule 5: transfers to individual producers are measured at the farm gate level

This rule follows the requirement to only measure support that is provided to primary producers of agricultural commodities. The word "consumer" in this methodology is understood as a first-stage buyer of agricultural commodities post-farm gate, such as flour mills, sugar refineries, and dairy factories.[16]

Rule 6: policy measures supporting individual producers are classified according to implementation criteria

This rule recognizes that a large variety of policy measures are used to support agriculture but with different bases upon which the support is provided. This is why the classification system has been developed and can help analysts to examine the effects of policy measures on production, trade, income, and the environment, recognising that different policy measures will have different impacts. Policy measures included in the PSE are classified according to implementation criteria, i.e., the conditions under which the associated transfers are provided to farmers, or the conditions of eligibility for the payment. The various categories and sub-categories (defined in Box 2) have been constructed to identify the implementation criteria that are considered to be the most significant from an economic perspective and that reflect policies applied in OECD countries. The categories identify the ***transfer basis*** for support, for example, output, input, area/animal numbers/receipts/incomes, non-commodity criteria, and other criteria.

[16] However, price differentials are often measured at wholesale levels because of data availability. In this case we assume that the farm gate price would be affected by the same amount or same proportion.

BOX 2 Names and Definitions of the PSE and GSSE Categories

PSE Categories

A.	***Market Price Support (MPS)***: transfers from consumers and taxpayers to agricultural producers arising from policy measures that create a gap between domestic market prices and border prices of a specific agricultural commodity, measured at the farm gate level.
B.	***Payments based on output***: transfers from taxpayers to agricultural producers from policy measures based on current output of a specific agricultural commodity.
C.	***Payments based on input use***: transfers from taxpayers to agricultural producers arising from policy measures based on on-farm use of inputs:
	C.1. Variable input use: transfers reducing the on-farm cost of a specific variable input or a mix of variable inputs.
	C.2. Fixed capital formation: transfers reducing the on-farm investment cost of farm buildings, equipment, plantations, irrigation, drainage and soil improvements.
	C.3. On-farm services: transfers reducing the cost of technical, accounting, commercial, sanitary and phyto-sanitary assistance, and training provided to individual farmers.
D.	***Payments based on input constraints***: transfers from taxpayers to agricultural producers for the use of less input such as fertilizers, water and farmland, or for the use of farm resources to produce specific non-commodity outputs. Payments for set aside program may be included if conditional to environmentally good practices.
E.	***Payments based on overall farming incomes***: transfers from taxpayers to agricultural producers arising from policy measures based on the farming incomes. This includes direct payments at flat rate to all qualified producers or disaster relief payments.
F.	***Miscellaneous payments***: transfers from taxpayers to farmers for which there is insufficient information to allocate them among the appropriate categories.

GSSE Categories

G.	***Research and development***: budgetary payments financing research and development activities improving agricultural production.
H.	***Agricultural schools***: budgetary payments financing agricultural training and education.
I.	***Inspection services***: budgetary payments financing control of quality and safety of food, agricultural inputs and the environment.
J.	***Infrastructure***: budgetary payments financing improvement of off-farm collective infrastructure.
K.	***Marketing and promotion***: budgetary payments financing assistance to marketing and promotion of agro-food products.
L.	***Public stockholding***: budgetary payments meeting the costs of storage, depreciation and disposal of public storage of agricultural products.
M.	***Miscellaneous***: budgetary payments financing other general services that cannot be disaggregated and allocated to the above categories due, for example, to a lack of information.

Concept of Transfers

The concept of "transfers" presumes both a source and a recipient. The indicators identify three economic groups: taxpayers (government), consumers, and agricultural producers who are viewed from two perspectives – as individual entrepreneurs and as a collective (Figure 1). The arrows represent the flow of transfers from one group to another arising from policy measures that support agriculture. The acronyms are explained in the following sections.

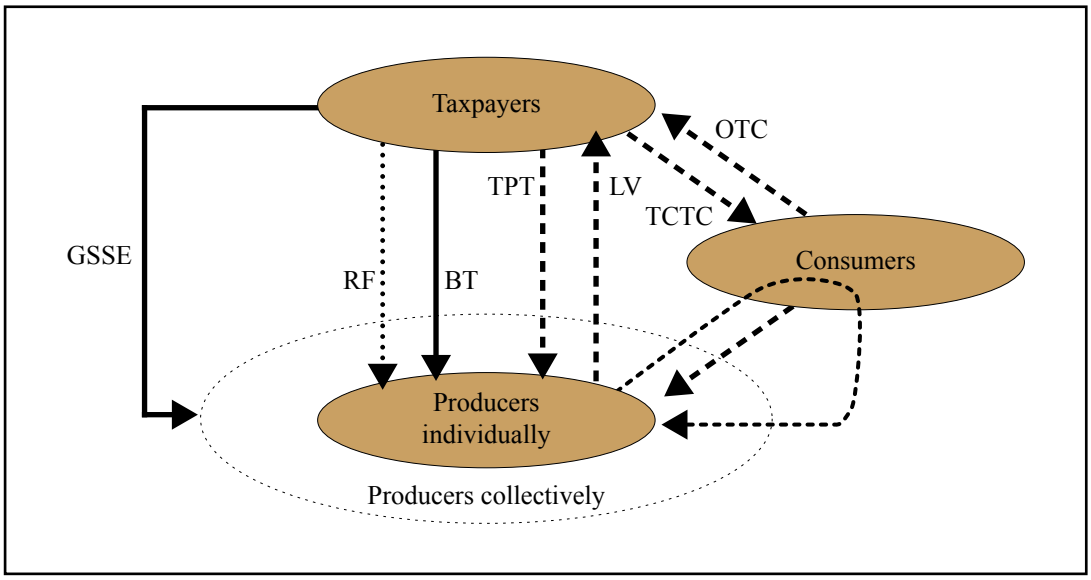

Figure 1. Flow of transfers estimated in the OECD indicators of agriculture support

The "transfers" include more than just explicit *budgetary transfers* (BT) to farmers, such as payments based on area farmed or the number of animals kept. The indicators also include the value of transfers from policies that provide implicit budgetary support through tax or fee reductions that lower farm input costs, e.g., for investment credit, energy, and water (*revenue foregone*) (RF). Importantly, the transfers include *market price transfers* arising from policy measures that create a gap between the domestic market price and the border price of a commodity, including import measures (e.g., tariffs, tariff quotas, and licensing), export measures (e.g., export subsidies, export credits, and quantitative restrictions) and domestic price support measures (e.g., production quotas, administered prices, and intervention purchases). These are represented by the three different line styles: solid lines represent budgetary transfers; the dotted line represents revenue forgone transfers; and dashed lines are market price transfers. The procedures for estimating the value of transfers from these three types of measures are discussed in the following section.

An important distinction between the indicators is made on the basis of the recipient of the transfer. Transfers to producers individually are captured in the PSE. These transfers require that an individual farmer takes actions to produce goods or services, to use factors of production, or to be defined as an eligible farming enterprise or farmer, in order to receive the transfer. The GSSE captures the value of transfers to producers collectively, i.e., services such as education and research that benefit agriculture but whose initial incidence is not at the level of individual farmers. The CSE captures the value of transfers to consumers. While including transfers to consumers to compensate them for paying higher domestic prices than border prices and consumption subsidies in cash or in kind, the CSE is often negative given that market price support generates a transfer from consumers to producers. The Total

Support Estimate (TSE) represents the sum of all three components, adjusting for double-counting given that some market price transfers are accounted for in both the PSE and CSE. It can be calculated either on a source (tail of arrow) or a recipient (head of arrow) of the transfer basis.

ESTIMATING THE MONETARY VALUE OF TRANSFERS ARISING FROM POLICY MEASURES

Once policies have been identified for inclusion in the indicators of support, the next step is to estimate the monetary value of the transfers associated with these policies. The measurement of *budgetary transfers* is an accounting task, requiring the appropriate use of information obtained from official sources, such as national budgets and annual reports of relevant paying agencies. Budgetary information is used to calculate the value of budgetary payments received by producers, the value of on-farm services provided to producers (e.g., salary of extension advisors), the value of general services provided to producers collectively (e.g., salary of researchers), and the value of transfers to consumers. Appropriate use involves:

- Identifying budgetary transfers that support agriculture in all government institutions at both national and sub-national levels, and not only the national ministry responsible for agriculture.

- Using values associated with actual expenditure as opposed to budgeted expenditure, although budgeted expenditure may be used when actual expenditure data are not yet available.[17]

- Excluding general administration costs associated with the design, implementation, and evaluation of policies.

- Excluding budgetary expenditures associated with policy measures accounted for in the measurement of market price transfers such as intervention purchases and export subsidisation.

Typical forms of support based on *revenue forgone* include tax concessions, preferential lending, debt concessions, and administered prices for input and services such as energy, irrigation water, and transportation. Measuring the value of these transfers is an empirical task involving the establishment of an appropriate reference level against which the actual (advantageous) situation can be compared. For example, transfers associated with preferential lending can be measured by multiplying the amount of credit provided by an interest rate differential, which is the gap between the preferential, and a reference interest rate. Alternatively, when governments provide budgetary expenditure to compensate banks for lost interest in the provision of preferential loans, this can be used as a measure of the policy transfers.

[17] Sometimes governments announce sudden write-offs of outstanding debts or huge capital investments. Then we face the problem of how to allocate them over years. If detailed data is available, annual allocation should be done. Otherwise, a case-by-case approach may be taken, which involves one of two options: to leave as it is or as allocation by equal instalment.

Market price transfers arise from policy measures that create a gap between the domestic market price of a commodity and the border price of a commodity.[18] This gap is defined as the Market Price Differential (MPD) and is the building block for estimating price transfers that flow between producers, consumers, and taxpayers. In general, policies affecting market prices are implemented by governments with the intention of increasing the price received by producers of a commodity, creating a positive MPD. The benefit of calculating the value of market price transfers through a MPD is that it captures the combined impact of a potentially complete set of price support policies on market prices in a single measure.

Figure 2 illustrates the transfers arising from policy measures that induce a positive MPD using a partial equilibrium framework and by assuming that markets are competitive. Panel A presents the case of an imported commodity. In the absence of these policies, an equilibrium occurs in the domestic market at the import price (MP) at the border, with the difference between domestic demand (QC1) and supply (QP1) met by imports. Policies that increase the domestic market price are now introduced (e.g., a tariff). Producers benefit from a higher price, encouraging them to produce more (QP2); whereas consumers respond by reducing consumption (QC2). A domestic market equilibrium is reached at price DP, resulting in a positive MPD and a fall in the volume of imports. Panel B exhibits the case when the commodity is exported. The introduction of policy measures that increase the domestic market price results in an increase in exports to QP2 – QC2.

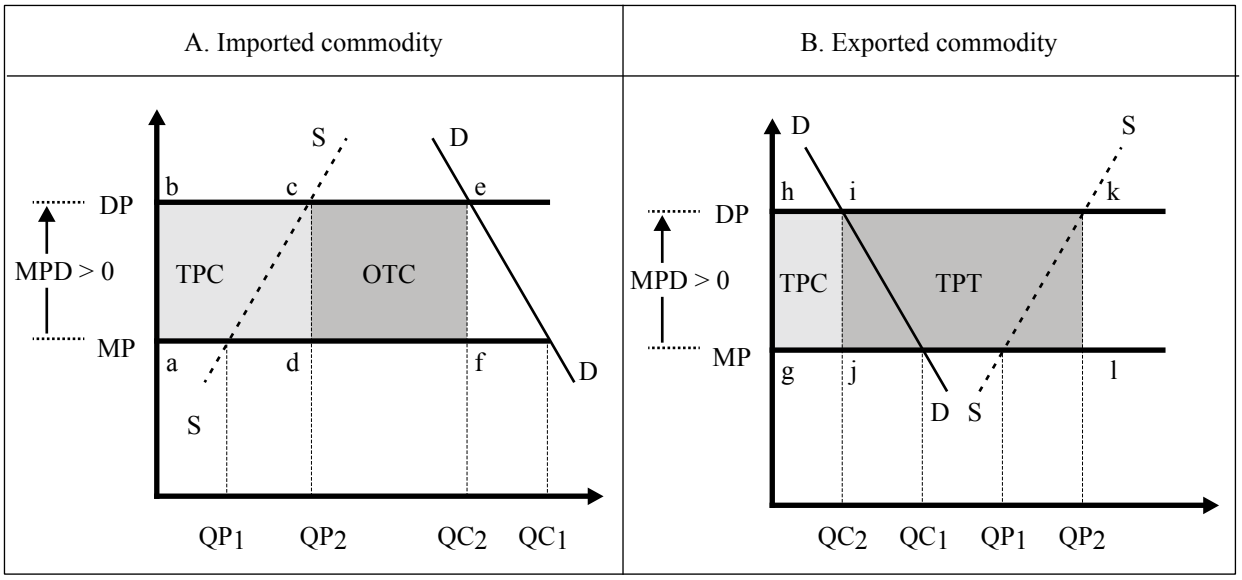

Figure 2. Price transfers associated with policies that raise domestic market prices above those on the world market

In the import situation, policies that increase domestic market prices create:

- *Transfers to Producers from Consumers* (TPC) for *i* commodity, with the value to rectangle *abcd*:
  $TPC_i = MPD_i \times QP_i$

[18] Policy measures that raise the price received by producers for a commodity without changing the market price (i.e. without changing the consumer price) are included elsewhere within the PSE under category A2.

- *Other Transfers from Consumers* (OTC), for *i* commodity with the value corresponding to rectangle *dcef*. These transfers are due to the fact that consumers pay the higher price (DP) for all consumption, whether the commodity is produced domestically or imported:

$$OTC_i = MPD_i \times (QC_i - QP_i)$$

In the export situation, policies that raise domestic market prices create:

- *Transfers to Producers from Consumers* (TPC), for commodity *i* with the value corresponding to rectangle *ghij*:

$$TPC_i = MPD_i \times QC_i$$

- *Transfers to Producers from Taxpayers* (TPT) for commodity *i*, with the value corresponding to rectangle *jikl*. These transfers represent the part of producer price support borne by taxpayers in the form of budgetary outlays on export subsidisation, food aid, or public stockholding:

$$TPT_i = MPD_i \times (QP_i - QC_i)$$

Having established the price transfers that occur, these have to be added up appropriately. The value of price transfers to producers is called Market Price Support (MPS). MPS is defined as: the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policy measures that support agriculture by creating a gap between domestic market prices and border prices of specific agricultural commodities.

Although this APO study has decided to disregard Excess Feed Cost (EFC) for practical reasons, theoretically it should be counted if feed crops are subject to policy interventions. EFC is a component accounting for the price transfers that go from livestock producers to cereal producers as a result of policies that alter the domestic market price for feed crops, and is accounted for only in the calculation of MPS for livestock commodities. A general formula for the calculation of *transfers to producers* through policies that affect market prices for commodity *i* can be expressed as:

$$MPS_i = TPC_i + TPT_i - EFC_i = (MPD_i \times QP_i) - EFC_i$$

Using this formula, MPS values are estimated for individual commodities constituting a representative sample of agricultural production within a country. A standard set of commodities is considered first. MPS values are then calculated for additional commodities as necessary to ensure that the sum of the value of production of the individual commodities for which MPS is calculated, represents in principle at least 70% (in this study 60%) of the total value of agricultural production on average over the preceding three years. The first step in carrying out these estimations is to determine whether there are policies in place that create a price gap between the domestic market and the border prices of the commodity in question. If there are no policies in place that create a price gap, the MPD is set to zero. If there are however, then a MPD is estimated for that commodity.

The common approach to calculating a MPD for a commodity is to estimate the difference between a producer price, i.e., a price received at the farm gate level, and a border price for that commodity that has been adjusted to make it comparable with the farm gate price. Adjustments are made because between the farm and the border, the commodity may have gone through the value added chain and it is essential to compare "like with like." These adjustments involve a reduction from the border price marketing margins (transportation and processing costs) that may be applicable, weight adjustments so that prices

are comparable on a quantity basis, and adjustments for quality differences if appropriate. These adjustments are particularly important for commodities that are subjected to a significant degree of processing before being traded at the border, such as livestock commodities, sugar, and wine grapes.

The appropriate border price for a given commodity is determined by the net trade position of that commodity and the availability of data. If the country is a *net exporter* of the commodity on average for three years, the most appropriate border price is a Free on Board (FOB) unit value. In the case of a large exporter of a commodity, if exports account for a significant share of domestic production and no export subsidy or other export enhancing measure is applied, the MPD is assumed to be zero. If the country is a net importer of the commodity, and if imports are regular and of a reasonable quantity then the most appropriate border price is a Cost Insurance and Freight (CIF) unit value for imports into that country. However, if imports are irregular and/or of insignificant quantity, or if they vary in quality from one year to the other, or are very different from those produced in the country, then other price sources need to be investigated. Alternatives include a CIF price of a major importer, particularly if it is close by, or a FOB price of a major exporter with the cost of insurance and freight added.

Once MPS values have been calculated for individual commodities, a national (aggregate) MPS (=MPSc, suffix 'c' stands for 'country' or national) can be derived. This procedure is called "MPS extrapolation" and is based on the assumption that the ratio between the national MPS and the total value of production is equal to the ratio between MPS and the value of production for the commodities for which MPS has been calculated.

$$MPSc = \frac{\sum MPSi}{\sum VPi} \times VPc$$

However, this MPS extrapolation has not been applied in this APO study for three reasons. For one, the share of MPS commodities (standard commodities, selected commodities, and other commodities for which MPS are measured) in the total value of national agricultural output is relatively high for India, Malaysia, Pakistan, and Thailand. Secondly, very few effective MPS policies apply for other numerous residual products, such as perishable vegetables and minor tropical fruits, pulses, and nuts. Finally, the levels of support, if existing, are considered much lower than those of staples or strategic products.

CALCULATING AND INTERPRETING INDICATORS THAT SHOW THE LEVEL OF SUPPORT

Three main indicators are used to show the level of support to ***individual producers at the national (aggregate) level***: %PSE, producer NAC, and producer NPC. These are the most commonly sought after and used indicators. The first two are derived from the PSE indicator, which is found by adding the value of Budgetary and Other Transfers (BOT) to producers to the country (aggregate) MPS.

$$PSEc = MPSc + BOTc$$

Monetary Values

This *monetary* value can be expressed in either national currency or in a common currency, such as United States dollars. A PSE of USD100 million signifies the monetary value of gross transfers from

consumers and taxpayers to producers from policy measures supporting agriculture. It may seem reasonable to conclude that farm incomes increase by this value, but this is not the case. The PSE does not represent additional farm income due to support policies. The PSE shows the policy effort to provide support, while producer income is an effect of support (and of other factors). The extent to which gross transfers are translated into farm income can vary significantly according to the types of policies used to support agriculture but it will always be lower than the increase in gross transfers. OECD analysis estimates that of each extra dollar transferred though MPS, as little as 25 cents is actually retained by farmers as "income," with much of the increase in receipts paid to input suppliers or capitalised into land values. It is also misleading to suggest that aggregate producer gross receipts would decline by the value of PSE if all agricultural policies were removed. The PSE captures support provided to producers in current world market conditions. These conditions in particular world prices are affected by current agricultural policies and would change following the removal of all agricultural policies.

Because *monetary* indicators such as the PSE are influenced by the size of the agricultural sector as a whole, the relative importance of commodities within the sector, and the rate of inflation, they cannot be used to compare levels of support over time between countries and among commodities within a country.

Percentage Values and Ratios

Comparisons are however, possible using *percentage/ratio* indicators to analyze the level of support as they relate policy transfers to some other monetary base. The %PSE, producer NAC, and producer NPC, show the importance of producer support relative to producer receipts or border prices. It should be noted that border prices vary between countries as a reflection of transport and other costs, so it is not a homogenous "world price."

The %PSE is calculated by expressing PSE transfers as a share of Gross Farm Receipts (GFR):

$$\%PSEc = \frac{PSEc}{GFRc} \times 100 = \frac{PSEc}{PSEc + VPc - MPSc} \times 100 = \frac{PSEc}{VPc + BOTc} \times 100$$

GFR is calculated by adding the value of transfers to producers (PSE) and the value of production (VP), and subtracting market price transfers to producers (MPS), as this is included in both the PSE and VP values. It can also be calculated by summing the value of production, budgetary and other transfers to producers.

A %PSE of 20% means that the estimated value of transfers to individual producers from consumers and taxpayers is equivalent to 20% of gross farm receipts. A %PSE of 0% indicates that the estimated value of transfers to individual producers is zero.

The producer NAC is calculated by the ratio between the value of gross farm receipts and gross farm receipts valued at border prices (measured at the farm gate), which is obtained by subtracting MPS from the total value of production, and is sometimes referred to as market receipts:

$$producerNACc = \frac{GFRc}{VPc - MPSc} = \frac{PSEc + VPc - MPSc}{VPc - MPSc}$$

The producer NAC is mathematically related to the %PSE and can be alternatively derived as:

$$producerNACc = 1 + \frac{\%PSEc}{(100 - \%PSEc)}$$

A producer NAC of 1.2 indicates that the estimated value of transfers to individual producers from consumers and taxpayers increases gross farm receipts by 20% above what they would be if production is valued at border prices, i.e., with no transfers. A producer NAC of 1 indicates that the estimated value of transfers to individual producers is zero. A producer NAC of 4 indicates that gross farm receipts are four times, or 300%, higher than if production is valued at border prices.

The producer NPC is calculated by the ratio between the price received by producers, including payments per tonne of current output, and the border price, measured at the farm gate. As prices and quantities cannot be aggregated for different commodities, the producer NPC for a country is calculated using the value of transfers based on commodity output:

$$producerNPCc = \frac{(VPc + POc)}{(VPc - TPCc - TPTc)}$$

In this equation, PO represents the value of payments on output. A producer NPC of 1.2 for a country means that domestic producer prices are on average 20% above border prices for the same commodities. A producer NPC of 1 indicates that prices received by producers are on average, the same as border prices. A producer NPC of 4 indicates that farm gate prices are on average four times, or 300%, higher than border prices. This figure shows the level of domestic market protection provided to agricultural producers. The denominator of the producer NAC and producer NPC are often very similar and become identical when there are no levies of excess feed cost adjustments. The producer NPC shows the extent to which transfers based on commodity output (PSE category A) increases gross farm receipts while the producer NAC shows the extent to which transfers arising from all policy measures increase gross farm receipts.

Interpretation of Indicators

While percentage/ratio indicators provide information on the level of support to individual producers and how this level changes over time, they alone do not offer an explanation as to why these changes have occurred. One misinterpretation of this kind is to conclude that a change in the %PSE accordingly implies a change in policy settings. As seen above, support, in particular MPS, is measured against current market conditions. When border prices change due to variations in world market prices or exchange rates, domestic producer prices may not follow suit because policy measures that prevent them from doing so are in place. Consequently, the MPS component of the PSE will change. Such variation in the PSE is nevertheless an appropriate reflection of the nature of market price support policies. It indicates that these policies, e.g., the border regime in place, insulate domestic markets from changing world market conditions and provide support that varies over time in relation to world prices.

The percentage/ratio indicators are also affected by changes in the Value of Production (VP). A fall in output value (and volume) may have various causes, for example: natural factors, such as weather changes or a climate-related disaster, or an outbreak of animal disease. A reduction in the output value may also theoretically reflect policy developments. This fall may, for example, be associated with the

reduction in the level of support as a result of policy reform and/or a change in the composition of support, such as a shift away from payments directly coupled with output. In this respect, a reduction in the value of support (PSE) may not always lead to a smaller %PSE if the fall in the value of production is greater than the reduction in support.

It would be equally erroneous to conclude that an unchanging %PSE necessarily implies no change in policies. In fact, the policy settings may change but the overall amount of policy transfers to producers, as measured by the PSE, may not. For example, in order to improve agri-environmental sustainability, the government may introduce new payments to producers. However, this increase may be offset by a reduction in MPS if supported prices are cut simultaneously, with the result being that the PSE value remains unchanged. The %PSE alone is not sufficient to indicate progress (or lack thereof) in policy reform, particularly when the reform is characterised by re-instrumentation of support (towards less production and trade-distorting forms) rather than by a reduction in the support levels.

To help interpret changes in the level of producer support from one year to another, one can undertake a contribution analysis, which identifies the principal elements of producer support and estimates how changes in these elements contribute to the overall change in the PSE and the MPS. The principal elements taken into consideration may include changes in world market prices, exchange rates, volumes of production, and policy settings.

Total Support Estimate

The final indicator used by the OECD shows the level of support to the agricultural sector. The %TSE measures the value of the Total Support Estimate (TSE) representing the sum of transfers to agricultural producers individually (PSE) and collectively (GSSE), as well as subsidies to consumers (TCT), as a percent share of a country's gross domestic product (GDP). Expressed as such, it gives an indication of the financial cost (or imposed burden) of policy measures supporting agriculture on the economy as a whole.

$$\%TSEc = \frac{PSEc + GSSEc + TCTc}{GDPc} \times 100$$

CACULATING AND INTERPRETING INDICATORS THAT SHOW THE COMPOSITION OF SUPPORT

When the indicators were first developed in the mid-1980s, the vast majority of support was provided through policy measures such as import quotas, high tariffs, export subsidies, and deficiency payments, which created transfers to producers based on commodity output (MPS). Since then, agricultural policy in OECD countries has increased in complexity. Increasingly, policies deliver transfers not on the basis of commodity output but rather on other bases, such as farmed area, overall farm income, or other non-commodity criteria. Many policies now provide transfers on the basis of a mixture of "current or past prices and production," often with constraints imposed on the conditions under which farmers are eligible for payments. In addition, the OECD analysis has shown that it is not exclusively the level of support that determines the effect of policy measures on such factors. It was revealed that the type of policy measure and the conditions attached to the granting of support also have significant impact on

them and that these effects can vary widely between policy measures. Consequently, analyzing the composition of support has become an equally important issue in the monitoring and evaluation process.

There are two ways in which the composition of producer support is shown. The first way shows the share of support that falls into each of the PSE categories. The PSE category values can be expressed as shares of the PSE, with the sum of the category shares equalling 100%. Alternatively, they can be expressed as shares of gross farm receipts, summing to the %PSE. This latter approach is more advantageous as it shows both the level and composition of support together.

Some policy measures deliver support directly related to the amount of a specific commodity produced (market price support and payments based on specific commodity output) or variable inputs used. As shown by the results of the OECD's Policy Evaluation Model (PEM) on decoupling, these policy measures are the ones that potentially (*ex ante*) have the strongest influence on production incentives, although this effect is weakened in those countries that place constraints on output produced, inputs used, or adopted farm practices. Policy measures that are designed to deliver support based on the current parameters, such as area planted or animal numbers, and those that require commodity production, have a potentially somewhat weaker influence on production incentives. Those that provide support based on non-commodity criteria, such as reforestation, reduced agro-chemicals, or other environmentally friendly practices, have potentially the least or even a negative influence on production incentives. Clearly, the actual impacts (*ex post*) will depend on many factors that determine the aggregate degree of responsiveness of farmers to policy changes.

The OECD has recently introduced further breakdown of policies and labelling (see the OECD manual) in order to analyze recent policy reform, especially when concerned with decoupling income support from commodity production and cross compliance (e.g., requirements on producers to respect environmental and animal welfare regulations in order to receive income support). However, these detailed breakdowns find little specific relevance in APO member countries, as direct payments to producers are rare and if there are any, they are rather simple. In this APO study, a simplified policy classification is used. It has only six categories with no labelling, i.e., market price support, payments based on output, payments based on input use, payments based on input constraints, payments based on overall farming income, and miscellaneous payments.

As for the PSE, the policies that are combined to calculate the GSSE are grouped into categories of expenditure, which can be separately totalled to show the composition of support to general services. Unlike the PSE, GSSE policy measures are grouped according to the nature of the service rather than by implementation criteria. There are seven categories for these policy measures: research and development, agricultural schools, inspection services, infrastructure, marketing and promotion, public stockholding, and miscellaneous.

Changes in the composition of the GSSE can reflect developments in agricultural policy reform and other factors. For example, across the OECD, the share of public stockholding in the GSSE has fallen, reflecting the reform movement away from policies that provide price support for producers. The share of inspection services, although fairly low in most countries, has generally increased, reflecting greater public policy focus on food safety and the rising costs of maintaining sanitary and phyto-sanitary standards given the increase in trade and the strengthening of trade rules. A number of countries are spending more money on infrastructure to improve the efficiency of the sector in response to increased competition.

There are two ways in which composition of total support can be calculated. The first shows to which economic group the transfer is provided. In this case, the TSE can be separated out into three components: the PSE, the GSSE, and Transfers to Consumers from Taxpayers (TCT). The TCT measures the value of transfers received by consumers and does not include transfers from consumers in terms of higher prices: an exclusion which separates the TCT from the CSE. When interpreting policy developments, the share of the GSSE in total support (the %GSSE) is emphasised, this shows the importance of transfers that are not received by individual farmers within the value of agricultural support. An increase in the %GSSE would indicate that transfers to general services are an increasingly important form of transfer to producers.

The second shows the economic group from which the transfer originates (or bears the cost), i.e., from consumers, producers, or tax payers. The transfer from consumers is mostly positive in OECD countries but may become negative in developing countries due to export restriction measures. The transfer from producers is just opposite, mostly negative in OECD countries but may turn to positive in developing countries. The transfer from tax payers, i.e., budget revenues, is normally negative. A part of the transfers from consumers are received by government in terms of tariff revenue, which offsets some of the taxpayer cost.

In relatively wealthy countries, such as OECD members, consumers have traditionally assumed the largest share of the cost of total support. Policy reforms have almost always emphasised a desire to reduce the consumer cost of agricultural policies and to offset the reduction in producer returns by increasing budgetary payments. This would be shown as a decrease in the value of transfers from consumers and as an increase in transfers from taxpayers. In developing countries, however, producers have often been penalized by trade restricting measures in the form of foregone loss, generating transfers from producers to consumers. In this case, policy reform should mean reduced transfers to consumers, which would entail reduction in negative magnitude of the %PSE. In both cases, policy reform may lead to the convergence in magnitude of the %PSE towards zero. Analysis of the composition of total support reinforces the changes that are seen in the composition of producer support.

LIMITATIONS

Unlike OECD countries, availability and quality of data and information in developing countries is far from perfect. Policy names or budgetary items frequently change, while price data is available only for specific types of products or specific sites. Transportation costs or marketing margins should substantially differ by region, especially larger countries like India and Indonesia. Even for a single commodity like rice, the quality and types marketed differs by traders, by region, and by season, which makes the estimation of proper quality difference factors extremely difficult. For instance, “Basmati” rice is traded at a price that is 3–4 times higher than ordinary rice. Buffalo milk contains two times more fat than cow milk. Sensitivity tests indicate that estimated PSEs are very susceptive to these factors because price support is the most popular policy in the selected countries and their PSEs are measured through price differentials between the local and international market. Thus, the estimated PSE indicators in this study should be interpreted as a very rough indication of agricultural policy trends.

No single indicator can capture all aspects of agricultural support. Each serves a purpose, highlighting a different dimension of the support framework. The indicators are interlinked, mutually reinforcing each

other and when analyzed together, they provide a comprehensive and comparable picture of the level and composition of support. Attention to the underlying concepts and to the overall policy context is essential in interpreting the indicators. All dimensions of the indicators, i.e., the levels, the composition in terms of support categories, the recipients and sources of the transfers, and the factors driving annual and long-term changes, should be considered when used in evaluating developments in agricultural support.

As discussed above, PSE indicators are computed on the basis of a given set of definitions and assumptions. They also rely on the accuracy and relevance of the data used and the coefficients adopted. Naturally, statistical data and coefficients can include some bias and errors. Policy coverage, data availability/accuracy, and the manner that price differentials are estimated vary by country. This is particularly the case in developing countries. In addition, we know that an indicator can only tell us one aspect of the various natures of policies. For instance, a high %PSE alone cannot tell us whether it is attributable to trade restriction or payments for environmentally beneficial practices. Furthermore, national average figures may convey misleading messages on the agricultural assistance in a country. If an estate crop is predominant in a country's agricultural production and subject to a heavy export tax, the national average of %PSE would become negative, no matter how other commodities are protected. We have to be very careful about the interpretation of PSE indicators, in particular when a cross country comparison is to be made.

Another important point is the implication for trade. First, PSEs cannot tell the degree of market openness. For instance, even if national average %PSE is very high as a result of high protection of domestic production, it is possible for this country to be a world leading food importer if the domestic production is too small compared to imports. The percentage PSE does not represent the ratio of agricultural support to consumption values, but to the production values instead. In this regard, it is misleading to interpret that the agricultural policy of a country with higher average %PSE is more 'trade distorting' than others.

Second, we should know that PSE indicators are not the tool for trade negotiations. The WTO uses the Aggregate Measure of Support (AMS), not PSEs, as the benchmark for reduction commitment. Although both indicators were developed to gauge the size of assistance to agriculture, they in fact employ different scopes of policies, methods, and working assumptions for actual computation. PSEs are broader and more theoretical, while the AMS is narrower and more realistic. PSEs do not take into account the trade impact of each policy in aggregation, whereas the AMS differentiates policies under amber, blue, and green lights according to the possible magnitude of trade impact.

PART THREE: SYNTHESIS

INTRODUCTION

Sustained improvement in agricultural productivity is a major challenge for most Asian countries. Still being a main stay of national economies, the agriculture sector can have significant multiplier effects in terms of employment generation, income earnings, and industrial production. Recent price instability in international agricultural commodity markets has reminded us of the importance of a stable supply of food through the increased capacity of domestic agriculture. Therefore, the issues of sustainable agricultural development and food security have become central to the agricultural policy framework of these countries.

Various policy measures have been applied to increase agricultural productivity at the farm level. These policies cover a wide range of measures that provide farm inputs, physical infrastructure, credit, information, marketing networks, etc., all of which aim at reducing production constraints. In addition, conscious efforts have been made to increase investments in R&D, education & extension services, and institutional infrastructure to provide impetus for sustainable agricultural growth. However, complications arise when we discuss the market price support measures that are often more important than other policies for the general public and policy makers in APO member countries. Market price support may have a positive, negative, or neutral impact on agricultural production and productivities depending on the level of supported prices and the manner in which they are implemented.

This chapter is the synthesis of the major findings of six country studies, which have reviewed recent trends of agricultural policies, computed the indicators of agricultural support, and attempted to discuss their relation to productivity trends. As the type and mode of operation of agricultural policies differ significantly between these countries, common indicators for agricultural support such as PSE, CSE, TSE, and producer NPC have been computed based on the OECD methodology.[1] These indicators not only estimate the gross policy transfers to the agriculture sector but also identify the sources and the recipients of the transfers, broadly categorized as policy makers, producers, and consumers. The changes over time in these support measures have been assessed and related to the policy changes at both a country and a commodity level.

This synthesis has the following structure: Section 2 discusses the recent trends in agricultural productivity in APO member countries; Section 3 presents an overview of the agricultural economies of the selected countries; Section 4 analyzes the estimated PSE indicators for the selected countries; Section 5 discusses derived PSE indicators and productivity issues; and lastly, Section 6 summarizes the study's major points and challenges.

Annex tables attached to this report show more detailed figures for the estimated PSE indicators. They include national average %PSEs, %CSE, and commodity specific %PSEs for rice, poultry meat, and milk, producer NAC, TSE tables, and a transfer matrix for the selected countries.

[1] PSE indicators have been computed based on the OECD methodology with some simplifications to fit developing countries. The chief international expert integrated all PSE tables prepared by the national experts and partly modified to make them consistent amongst the countries. They are not subject to the periodic governmental peer review undertaken by the OECD, but have been peer reviewed by the experts involved in this APO exercise.

RECENT TREND OF AGRICULTURE PRODUCTIVITY IN APO MEMBER COUNTRIES

Agricultural productivity is affected by many economic and non-economic factors that vary by countries, sub-sectors, and period of time. The significance of traditional factors like land, labor, and capital in determining productivity has been studied extensively in measures of partial factor productivity (PFP) such as labor productivity and land productivity. PFP measurement, though much simpler than TFP, involves a number of conceptual and practical denotation issues.[2]

Despite these issues, it still may be useful to review some simple productivity indicators in the APO member countries as a first step. Figure 1 and Table 1 illustrate the trends of agricultural labor productivity in the APO member countries measured as the gross value added per agricultural worker (GVAW).[3] The data suggests a wide variation between countries both in terms of agricultural labor productivity and its growth rate. Japan's GVAW is 20 times higher than Nepal's. Agricultural labor productivity has increased in the Republic of Korea (ROK), Japan, and the ROC (and Singapore) much faster than in other countries. Several factors have contributed to these trends.

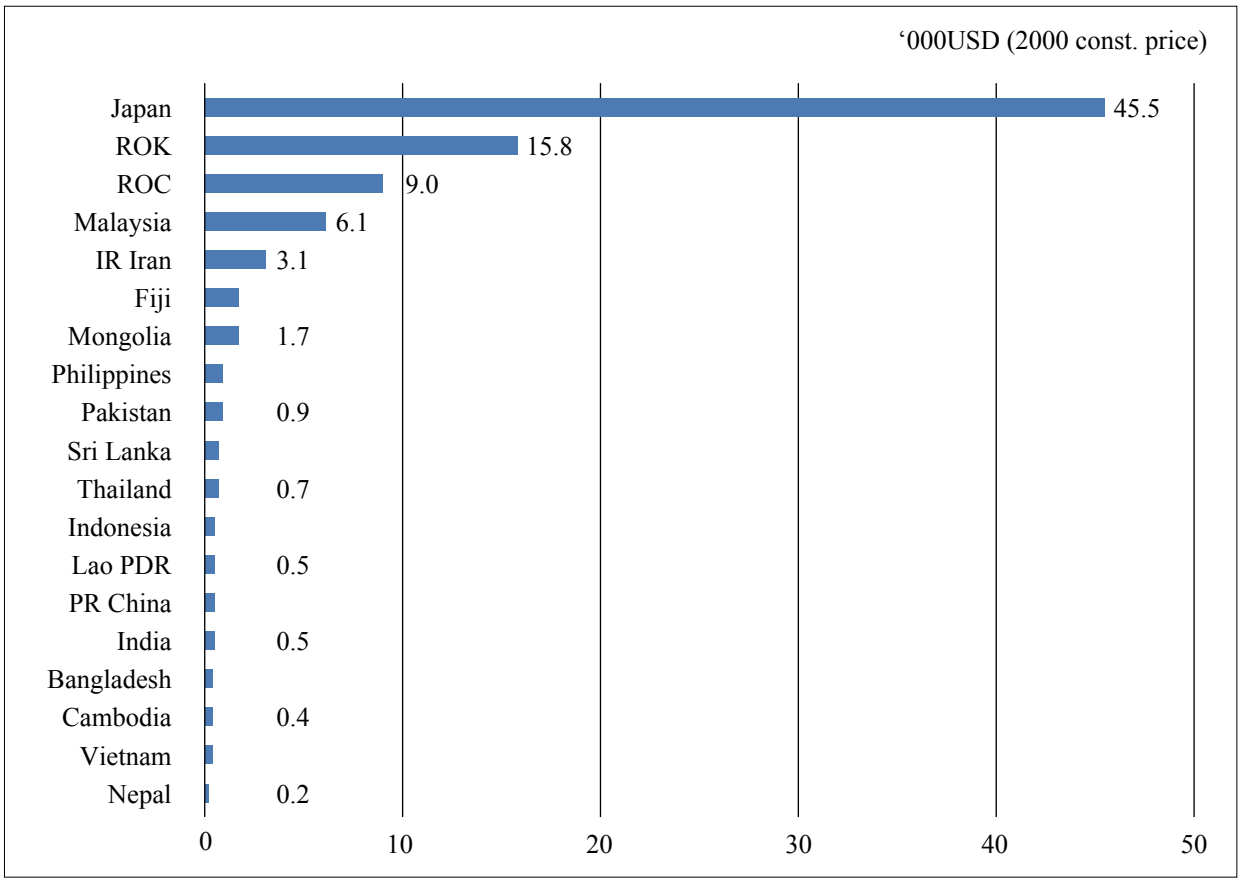

Figure 1. Agricultural value-added per worker in 2007

Source: World Bank, World development Indicators accessed July 2010 (figure for Malaysia was recomputed) and ROC statistical yearbook 2009.

[2] In precise terms, most of these indicators are rough estimates of PFP. Real PFP should be computed through production functions by excluding the impact of other input factors. Quantification of precise labor input or valuation of agricultural capital pose many practical problems in the actual measurement. See 'Capital requirement for developing countries 2050' (Schmidhuber et. al).

Table 1. Average annual growth rate of value added per worker in Agriculture (%)

	1970–80	1980–90	1990–2000	2000–07
Bangladesh	–1.1	0.4	3.0	1.9
Fiji	0.4	0.4	–0.1	–0.6
India	–0.2	1.8	1.4	1.4
Indonesia	3.1	1.0	0.8	2.0
IR Iran	4.7	3.0	2.1	2.7
Japan	5.0	4.0	3.7	4.2
ROK	0.9	7.7	6.4	4.8
Malaysia	7.8	–1.5	0.6	3.4
Nepal	–1.5	2.5	–0.2	–0.2
Pakistan	–0.1	2.7	2.3	–0.2
Philippines	2.0	–0.6	0.5	2.1
ROC	..	4.7	1.0	0.7
Sri Lanka	0.9	1.4	1.7	0.5
Thailand	2.0	1.5	2.3	1.9
Vietnam	..	..	2.7	1.5
(ref.) PR China	0.1	3.7	3.3	2.8

Source: same as Figure 1.

Firstly, the number of agricultural workers (including those self-employed) has declined in the ROK, Japan, Malaysia, and the ROC (the first group of countries) as their economies grew quickly in the 1960s–1990s, resulting in higher labor productivity. In other countries, the number of agricultural workers has increased in parallel with agricultural outputs thereby resulting in a slower growth of labor productivity. Between 1980 and 2008, the economically active population in agriculture has declined by 3/4 in Japan and the ROK, and by 1/2 in ROC, while it has increased by 50% in India, Indonesia, the Islamic Republic of Iran (IR Iran) and the Philippines, and it has nearly doubled in Cambodia, Lao PDR, and Nepal (Table 2). Secondly, agricultural production in the first group of countries has shifted to higher value commodities including livestock and horticulture products in the course of high economic growth. This is a reflection of the consumers' growing demand for those products and the capacity of their farm sector to respond.

Thirdly, agriculture has an increased dependence on capital inputs such as farm machinery, greenhouses, and irrigation facilities, not only in the first group but also in some countries of the second group. Annex Table A-10 and A-11 show that the first group expanded irrigated areas as early as in the 1970s–80s and advanced mechanization in the 1980s–1990s. In recent years, investments in machinery and irrigation have been advancing in the second group as well. Although no reliable international statistics are available for smaller machinery, we can reasonably assume that farmers are now more frequently using cultivator-tractors, water pumps, sprayers, motorcycles, and pick-up trucks.

[3] The term 'agricultural worker' is not explained in detail but considered as a synonym of 'economically active population in agriculture' used in the FAOSTAT. 'Agriculture' includes hunting, forestry, and fishing sectors. 'Economically active population' and 'employment' by sector and by occupation are defined precisely in the ILO statistics. ILO data may not be equal to that in the FAOSTAT.

Table 2. Economically Active population in Agriculture (2008)

	Number (mill.)	Index (1980=100)
Nepal	11.3	208
Pakistan	24.9	181
Vietnam	29.3	166
IR Iran	6.6	153
Indonesia	47.9	150
India	261.6	148
Philippines	13.3	145
Fiji	0.1	130
Bangladesh	35.6	129
Sri Lanka	3.9	126
Thailand	19.4	116
Mongolia	0.22	97
Malaysia	1.6	80
ROC	0.5	42
ROK	1.4	27
Japan	1.6	26

Source: prepared from the FAOSTAT data accessed July 2010.

Besides labor productivity, another important productivity indicator is land productivity measured at crop yield per hectare. The FAO indicates that in the period of 1961–99, 78% of incremental cereal production is due to the increase in crop yields.[4] Cereal yields in Asian developing countries rose from 0.7–1.4 tons in the early 1960s, to 2.0–4.7 tons in recent years (Table 2). The Green Revolution visited Pakistan, India, Indonesia, the Philippines, and Sri Lanka in the late 1960s and 1970s, and Vietnam and Lao PDR in the 1980s. The combination of high yield varieties, increased fertilizer inputs, and expansion in irrigated areas resulted in a significant jump in land productivity, specifically in cereal yields. Fertilizer consumption per hectare increased from below 10kg/ha in the early 1960s, to 100kg/ha and above in the early 2000s. Similarly, the share of irrigated areas to gross area under cultivation rose in many countries including Bangladesh, India, Pakistan, the Philippines, and Thailand (Annex Table A-11).

A closer look at the data in Table 3 reveals a recent deceleration of growth in cereal yields in several countries. India's growth in cereal yields slowed from 3.0% per year for the ten year period of 1975–85, to 1.2% for the years of 1995–2005. Indonesia and the Philippines witnessed a similar deceleration from 3.9% to 1.2% and from 3.6% to 2.9% respectively, in the same ten year periods. The growth in yield in Pakistan and Malaysia exhibits mixed trends in the last ten years but this growth was relatively modest compared to the early 1970s. This deceleration in yield growth in these countries has raised concerns about the prospects for meeting the rising demand for food. However, the deceleration may have simply been a reflection of the producers' response to the market (e.g., lower prices and a shift in consumers demand), rather than of physical and biological limitations.

[4] FAO, World Agriculture Towards 2015/30; 2002, pp. 34.

Table 3. Cereal Yield per hectare (milled rice equivalent, 3 year average)

	Yield per ha (ton)		Annual Growth rate (%)			
	1965	2008	1965–75	1975–85	1985–95	1995–2005
Bangladesh	1.1	2.7	0.8	2.2	1.9	3.4
Cambodia	0.8	2.0	0.4	1.0	2.6	3.6
India	0.7	2.1	2.9	3.0	3.0	1.2
Indonesia	1.1	3.4	4.0	3.9	1.3	1.2
IR Iran	0.8	2.1	2.0	1.8	3.9	2.9
Japan	3.1	4.2	1.9	0.7	0.4	–0.2
ROK	2.5	4.6	2.9	2.0	0.3	0.4
Lao PDR	0.6	2.8	4.8	4.8	2.0	3.5
Malaysia	1.4	2.4	2.7	–0.5	1.9	0.8
Pakistan	0.8	2.5	4.7	1.9	1.8	2.5
Philippines	0.8	2.5	2.3	3.6	2.2	2.9
ROC	2.8	4.1	0.5	1.9	1.8	–0.2
Sri Lanka	1.2	2.5	0.3	4.5	0.4	1.7
Thailand	1.3	2.1	0.8	1.2	1.5	1.6
Vietnam	1.3	3.5	1.3	2.4	3.0	3.1
(ref.) PR China	1.4	4.7	3.6	4.8	2.1	1.2

Source: FAOSTAT accessed Oct. 2010.

In Bangladesh, Cambodia, Lao PDR, and Vietnam, however, cereal yield rose in the latest ten year period of 1995–2005 at an annual rate of 3.0% or more, although their absolute yield levels are still lower than many other countries. Japan and the ROC saw a small decline in cereal yields in 1995–2005, as their policy efforts shifted from production increase to quality enhancement.

OVERVIEW OF THE SELECTED COUNTRIES

Economy and Agriculture

The six countries covered by the country study (India, Indonesia, Malaysia, Pakistan, the ROC, and Thailand) are diverse in many respects. The population of India is 50 times larger than that of the ROC and Malaysia. Their GDP per capita ranges from USD670 to USD17,000 in 2008. India's agricultural GDP is 100 times higher than that of Malaysia. Agricultural GDP has increased by 68% and 92% since 1990 in India and Pakistan but has declined by one third for the same period in the ROC. The share of agriculture in total GDP remains at around 20% in India and Pakistan but below 2% in the ROC in 2008.

Agricultural production patterns also vary. Cereals account for nearly 30% of the total agricultural outputs in India, Indonesia, and Thailand, while animal husbandry is a leading sector in Pakistan (specifically cow milk) and the ROC (specifically pig and poultry). Palm oil alone makes up more than 50% of the total agricultural outputs of Malaysia. Rubber is substituting traditional products in Thailand, with its share approaching 20% of the total value of the nation's agricultural output.

In the arena of international trade, Thailand has been a leading rice exporter in the world, whereas India has emerged as an equally important rice exporter since the first half of the 2000s. Pakistan's exports center on Basmati rice (aromatic rice) and cotton. Malaysia and the ROC are net food importers but Malaysia is one of the biggest exporters of palm oils. Indonesia is also a net importer of rice.

Table 4. Population and GDP per capita: selected countries

	Population (million)				GDP per capita (const 2000 USD)			
	1980	1990	2000	2008	1980	1990	2000	2008
India	687	850	1,016	1,140	229	318	453	724
Indonesia	148	178	206	228	397	612	800	1,083
Malaysia	14	18	23	27	1,919	2,608	4,030	5,155
Pakistan	83	108	138	166	330	465	536	678
ROC	18	20	22	23	n.a.	8,112	14,482	17,060
Thailand	47	57	62	67	789	1,400	1,968	2,645

Source: World Bank, World development Indicator 2009 and ROC statistical yearbook 2009

Table 5. Agriculture Value added (constant 2000 USD): selected countries

	Agriculture, value added (USD billion)				% of GDP			
	1980	1990	2000	2008	1980	1990	2000	2008
India	53.8	75.1	98.4	123.7	36	29	23	17
Indonesia	14.8	21.2	25.7	33.8	24	19	16	15
Malaysia	5.4	7.4	8.1	10.5	23	15	9	10
Pakistan	7.8	11.6	17.9	22.2	30	26	26	20
ROC	6.1	8.1	6.2	5.0	8	4	2	2
Thailand	6.5	9.4	11.1	13.7	23	12	9	12

Source: WB, World development indicators and ROC statistical yearbook, accessed January 2011.

Note: Agriculture includes forestry and fisheries.

However, we can also see some common features among these countries. First is a general trend of macro economy. Their economies and income per capita are growing relatively fast despite repeated hardships caused by the financial crisis in 1997, natural calamities such as the tsunami disaster in 2004, and frequent political instabilities. The GDP per capita has risen since 1990 by 4.7% per year in India, 4.2% in the ROC, 3.9% in Malaysia, 3.6% in Thailand, 3.2% in Indonesia, and 2.1% in Pakistan. These rates may not look very impressive but they nevertheless qualify as an average annual growth rate for a relatively long period of time. As a consequence, the share of agriculture in the national GDP went down by nearly 10 percentage points from 23–36% in 1980 to 10–20% in 2008, for all countries except for the ROC.

Second, labor productivity in agriculture measured as the GVAW also increased in India, Indonesia, Pakistan, and Thailand during the last 18 years (Figure 2). This was achieved under the growing number of agricultural workers. The GVAW in Malaysia and the ROC peaked in 1995 and declined until the early 2000s. Afterwards, this figure has been making a swift recovery, but the level still remains below its peak. The decline in Malaysia and the ROC is considered to be the composite effects of currency devaluation, an outbreak of animal diseases, and a slump in the key plantation sector.

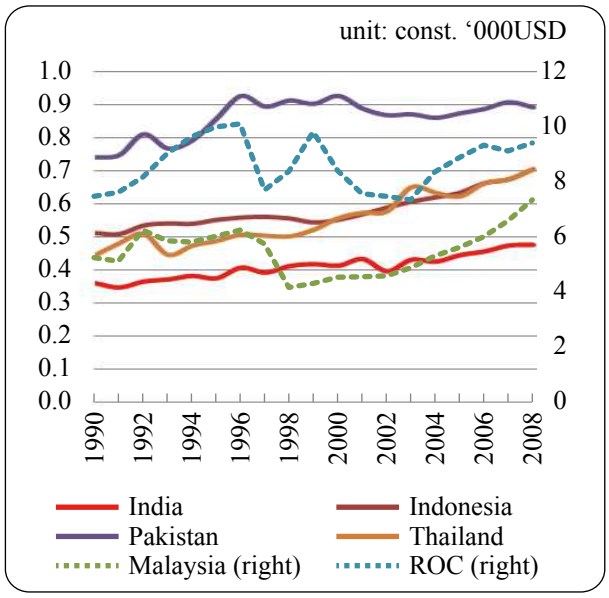

Figure 2. Agricultural value added per worker: Selected countries
Source: same as Figure 1.

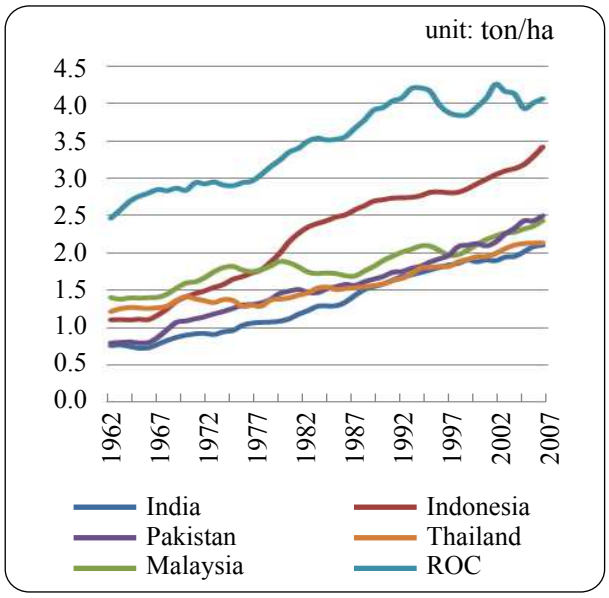

Figure 3. Cereal yields: Selected countries
Source: same as Table 3.

Third, the food supply pattern has been changing. Specifically, we can see a general shift in production from cereals to non-cereal crops and animal products. The reasons behind this shift are the rising incomes of consumers and shifts in dietary pattern from starchy food to fruits, vegetables, animal products and, more recently, to processed products. FAO food consumption statistics indicate that the share of cereals in the total dietary energy supply fell by 4% in India and Indonesia and by almost 10% in Pakistan and Thailand between 1990 and 2007. The annual per capita consumption of fruits has jumped from 28kg to 45kg in India and 30kg to 66kg in Indonesia. Whereas, milk consumption rose from 108kg to 159kg in Pakistan, 15kg to 22kg in Thailand, and 4kg to 11kg in Indonesia.

Figure 3 shows the trends of cereal yields (milled rice equivalent) in the selected countries. Though the absolute levels range between 2.0ton/ha to 4.3ton/ha in later years, they have been on a clear upward trend over the last four decades. There is no doubt that continual technological progress, supply of adequate inputs, and improved irrigation systems have been working within the six countries as well.

Basic Agricultural Policies

Population pressures have been a basic rationale for many governments in Asia to put food security as the most important policy objective. In most Asian countries, an increase in food production and the stability of food prices had been a prime policy target until recent years. The manners and degrees to which food security policies have been implemented differ by country reflecting the specific conditions faced by each country. One can observe that in India, Pakistan, and Indonesia, where population growth has been high, governments have had to continually emphasize food security. Food security in terms of access to food might not be a serious problem for food exporters or richer countries such as Thailand and the ROC, but they retained some kinds of food security policies as sovereign nations. However, in recent years many governments have felt the necessity for, and implemented, various policies that are not necessarily linked to food security. These include the policies for trade liberalization, market development, food safety, environmental protection, etc. These policies are receiving more impetus in middle income countries.

The governments of the selected countries apply various measures to promote food production. Among these are the provision of public services, direct investments, or subsidies for irrigation and fertilizer, as well as concessional loans. Most of these measures still play key roles in national agricultural policies.

All major irrigation investments have been carried out by governments. A water fee has often been kept low, if not free of charges. India and Pakistan provide subsidies for both investment and electricity power for well irrigation. Irrigation water is free of charge in Thailand and only a limited subsidy was given to electricity power for pumping irrigation. It should be noted that during the last decade, there was a lack of large scale investments for surface water irrigation in almost all of the participating countries.

Fertilizer subsidy has been a predominant agricultural input policy. Subsidies have taken either the form of discounted prices (as in India, Indonesia, Malaysia, Pakistan, and the ROC) or in the form of assistance to traders (as in Thailand). The subsidizing policies seem to have had a positive impact on food production and productivity, though some negative side effects exist such as overuse by farmers or higher margins. At present, fertilizer subsidies are still used in many countries.

Credit support is also an important means to promote agricultural production. All countries provide short term production credit with special low interest rates for farmers. However, longer-term farm credit for agricultural diversification has only recently been implemented and available in countries such as the ROC, Malaysia, Thailand, and Indonesia. Such longer-term farm credit supports are still limited in India and Pakistan.

Agricultural Research and Development (R&D), agricultural extension, and training are other areas that governments have provided assistance to in order to raise agricultural production and productivity. National/regional agriculture research centers and agricultural universities were established in all six countries as early as the 1950s–70s. They have been active in developing new crop varieties and technologies and involved in training and extension programs.

Most countries apply some sort of price stabilization measures for staple foods and key agricultural commodities to make sure that producers receive reasonable incomes, while consumers enjoy stable and affordable prices. As governments often have to intervene in local markets and external trade in a delicate manner, price support often requires a combination of various policy tools and complicated operations through statutory bodies. Although at the end of the day, the consumer and the tax payer eventually has to shoulder the costs, or the producer is sometimes penalized, market price support is a popular measure in most Asian countries.

Price stabilization measures vary among the selected countries. They usually link to trade regulating measures. Domestic market intervention is made through the direct procurement, sales of public stocks, and/or marketing price control. Often, government or parastatal agencies act as regulating/implementing agencies, such as the Food Corporation of India, PASSCO (Pakistan Agricultural Storage and Supplies Corporation), BULOG (Badan Urusan Logistik Nasional) in Indonesia, and BERNA (Padiberal Nasional Berhad, now privatized) in Malaysia. Their duties include: 1) maintenance of the nation's rice and other stockpiles; 2) acting as the buyer of last resort for paddy farmers; 3) regulating the distribution of rice; and 4) in some cases, handling subsidies to farmers on behalf of the government.

As for trade policies, APO member countries have been actively involved in the WTO agreement on agriculture, both before and after the establishment of the WTO in 1995. During the early period of the WTO (1994–98), the selected countries seemed to have over-reacted to the commitments. Many state

enterprises launched massive restructurings, as in the case of BERNA and BULOG. The institutional restructurings accelerated because of the Asian Financial Crisis in 1997, especially under the IMF programs in Indonesia and Thailand. The ROC joined the WTO in 2001 with substantial concessions for entry including tariffication of quantitative controls and a reduction in tariffs on many farm products.

Chronological Change of Overall Agricultural Policies

An attempt has been made to identify the major changes in agricultural policies and to classify the degree of policy orientation or intensity in each country. The results are summarized in Table 6. Food security, domestic price stabilization, and production oriented policies had a comparatively high degree of orientation in all six countries during the period before 1970 until 1990 and, in some part, carried over until now especially for food security and domestic price stabilization policies. Within this first period, trade protection policies and export promotion of basic agricultural commodities were also actively pursued to keep the domestic food prices stable and promote export earnings. Some crops were integral components to foreign exchange earnings, specifically, rice and cassava for Thailand, palm oil for Malaysia, cotton for Pakistan, and basmati rice for India and Pakistan. In this period, agricultural contribution to the national economy in the ROC was declining, which resulted in a lesser degree of orientation of both import substitution and export promotion of basic agricultural commodities.

Table 6. Chronological change of overall basic agricultural policy (selected countries)

Policy goals	Period	Degree of orientation by country
1. Food security	Before 1970 until now	All 6 (H)
2. Domestic price stabilization (staples, key products)	Before 1970 until now	All 6 (H)
3. Production oriented	Before 1970–1990s	All 6 (H)
4. Export control	1970s–1980s	All 6 (H)
5. Import substitution	1970s–1980s	All 5 (H), ROC (M)
6. Export promotion of basic agricultural commodities	1970s–1985	All 5 (H), ROC (M)
7. Export promotion of high value fruit & vegetable	1986–2008	ROC (H)
	1990s–2008	IND, PAK, THA (H)
	1996–2008	IDN (H)
	1999–2008	MYS (H)
8. Export promotion of processing and value-added agro-industrial products	1986–2008	ROC (H)
	1990(6)–2008	IND, IDN, MYS, PAK, THA (H)
9. Quality and hygiene standard policy control	1980s–2008	ROC (H)
	1995–2008	IND, IDN, MYS, PAK, THA (M~H)
10. Trade liberalization	1990s–2008	All 6 (H)
11. WTO commitment	1995–2008	All 5 (H)
	2002–2008	ROC (H)
12. FTA/EPA movement	2000–2008	IND, IDN, MYS, PAK, THA (H), ROC (L)
13. Market price support	1980s–2008	ROC (H)
	1990s–2008	IND, PAK (H), IDN (M), MYS, THA (L)

Source: Derived from country reports of APO project on " Regional Survey to Assess the Basic Policies Affecting Agriculture and the Rural Sector in Selected Member Countries 2003–2004) and Project on "Agricultural Policies in Selected APO Member 2008–2010."
Note: (a) Countries: IND=India; IDN=Indonesia; MYS=Malaysia; PAK=Pakistan; ROC=Republic of China; and THA=Thailand, (b) Degree of orientation: (H)=High; (M)=Medium; (L)=Low

Beginning in the 1980s up until 2008, the ROC shifted to a policy direction of promoting the export of high value fruits and vegetables. It did not take long for such policy direction to be adopted by India, Pakistan, and Thailand, while Indonesia and Malaysia followed closely. Simultaneously, in the early 1980s, the ROC initiated export promotion of processing value-added agro-industrial products in the form of both food and non-food products. This was partly due to the technology transfers from both Japan and USA through joint venture arrangements. Foreign investment promotion policy also helped to launch joint ventures in Indonesia, Malaysia, and Thailand and induced agro-industry development in these countries especially for marine products, poultry, and canned fruits and vegetables. In more recent years, policies on hygiene and food standards have been more and more intensified in these countries to cope with the changing world demand and international standard requirements.

During the 1990s, a trend of trade liberalization and globalization accelerated in Asia and forced all countries to prepare themselves for WTO commitments. By the mid-1990s, the overheated economies in Southeast Asian countries destabilized financial sectors and created negative impacts on agriculture. This eventually resulted in the Asian Financial Crisis in 1997. All these phenomena drove Asian countries into economic recession until the end of 1999.

The beginning of the Millennium brought the new policy direction of promoting bilateral and multi-lateral FTA (Free Trade Agreements) or EPA (Economic Partnership Agreements). For instance, trade liberalization was further accelerated among ASEAN countries for a regional economic community, while new bilateral FTAs were agreed between India and Thailand in 2003, between Japan and Thailand in 2007, and between the ASEAN and China in 2005 and ASEAN and India in 2009. This period signified a closer trade relationship among countries in the region and with other strategic partners in the Pacific rim. Although some key commodities such as staple food were often exempt or given special treatment, many agricultural commodities were included in the free trade commitments.[5]

Despite these general trends towards a more open market, price intervention policies became increasingly important and intensified through different forms of supports that were not violating the WTO commitments. The main reason for this was the volatility of international agricultural markets. Export prices of cereals, for instance, plummeted to a historic low in the early 2000s and shot up to a historic high in early 2008. India disposed of surplus grain stocks in the international market while maintaining low minimum prices for the first few years, and then they had to resort to an export ban in 2007. Thailand raised the price of their paddy rice pledging program every year after 2001 and it almost became a minimum support price for paddy rice.

The Driving Forces of the Policy Changes

There is no doubt that external forces have continuously pressured the selected countries to make their agricultural policies more open and fit the age of globalization. Most notable is the Uruguay round of General Agreement on Tariffs and Trade (GATT) and the establishment of WTO. The Agreement on Agriculture (AoA) asked all contracting parties to eliminate quantitative trade restrictions and to reduce tariffs, domestic support, and export subsidies. The immediate impact of their commitments may have been relatively small due to the favorable treatments for developing countries and/or domestic products

[5] Among 50 FTAs in Asia, 25 FTAs are said to be classified as "comprehensive" in terms of agricultural coverage, which means that more than 85% of the tariff lines of agricultural products are included trade liberalization commitments. See Kawai and Wignaraja, Asian FTAs: Trends and Challenges, ADB working paper, pp 15-16, 2009.

being competitive without protection. However, the WTO regime has become a hidden pressure for policy makers because all trade related policies are now subject to not only the AoA commitments but also to the Trade Policy Review and Dispute Settlement mechanisms. In the wake of the Asian Financial Crisis of 1997–98, international funding institutions advised Indonesia, Pakistan, and Thailand to initiate various policy reforms including privatization and reduction in subsides.

At least four other major driving forces on policy changes may be identified, i.e., 1) the expansion and development of the overall economy, 2) increased awareness about the high agricultural support of developed countries, 3) changes in political campaigns for more popular policies, and 4) external market shocks. Figure 4 illustrates the key factors behind the changes and the events that induced the transformation of agricultural policies, as depicted in a timeline.

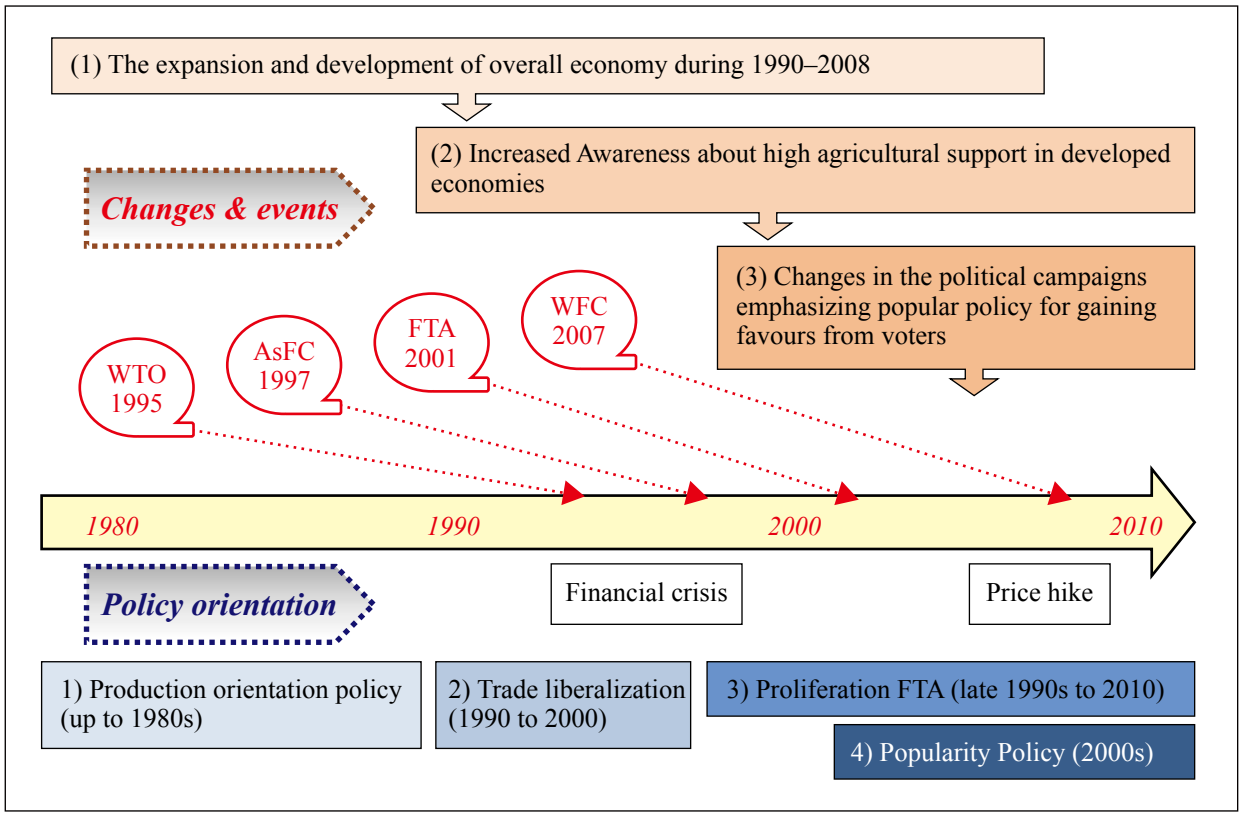

Figure 4. Key factors that have induced the transformation of basic agricultural policies in the selected countries

The expansion and development of overall economy

Despite the Asian Financial Crisis (AsFC), almost all countries in Asia have been experiencing favorable economic growth as a whole in the examined period. The share of agriculture in the GDP decreased as economies grew, which is the case in many other developing countries. This is due to the slower productivity growth in agriculture than in other sectors and the lower demand elasticity for food (or the so-called Engel's law). However, the decreased agricultural GDP, in most of the cases, did not lead to a decrease in population and labor force in rural areas. As a result, the income gap between the agricultural sector and other sectors has widened. All governments in the selected countries have faced rising pressures demanding greater support to the agricultural sector to ensure food security and social equity objectives.

Increased awareness about the international market and high agricultural support policies

Development in information and communication technology has enabled people in Asian developing countries to know more about generous producer support policies or consumer protection policies applied in the developed coutries. This has evoked the demand for higher support to agriculture, narrower income gaps, increasingly stabilized food prices, and more consideration on food security and safety. These voices became louder and louder, and were not able to be left unattended. In the last decade, social rallies by farmers, or consumers often erupted in Indonesia, Malaysia, and Thailand.

Changes in the political campaigns

As democracy becomes consolidated in the society of many Asian countries, political parties have begun advocating for popular policies to gain votes, especially in election campaigns. Food price issues were at the center of political campaigns, as exhibited in India and Thailand in the early 2000s and in most countries in 2007–08. India's government had to promise food subsidies to consumers on one hand, and had to commit to procurement at guaranteed prices to producers on the other. The result was the increased subsidy cost from USD2.99 billion in 2001–02 to USD8.58 billion in 2007–08 (an increase of 3 times). Thailand's government was forced to raise the pledging price of paddy rice during 2001–06, which ended up in 7.5 million tons of paddy rice (or 5 million tons of milled rice) of government stock in the crop year of 2005–06.

External shocks

Another common factor is that these countries have been badly affected by two external shocks. First was the financial crisis that suddenly devastated many Asian economies in 1997. The massive and fast withdrawal of external capital resulted in a sharp devaluation of local currencies in many East and Southeast Asian countries. The value of Indonesia's rupiah plummeted by nearly 80% between 1996–98, followed by 40% drop in Thailand's baht and Malaysia's ringhitt for the same period. Though relatively small, the value of local currencies in India, Pakistan, and the ROC also fell by about 20%. The sharp drop in exchange rates embarrassed the governments and forced them to tighten price control measures in order to prevent domestic inflation resulting from excessive food exports and higher import prices of food and fertilizers. The second shock was the sudden spike of international commodity markets (World Food Crisis), which begun in the latter half of 2007, and peaked in mid-2008. Having witnessed thinner stock levels and a policy-led strong and firm demand for bio fuels, prices of international cereal and oilseed soared to a historic high (e.g., to USD1,000 per ton for rice in May 2008). Many governments, including those of India and Pakistan, resorted to export restricting measures like export bans or raising export duties for rice and other key items through 2007–08 to secure the stability of the domestic food market.

ESTIMATED PSE INDICATORS AND IMPLICATIONS

The above observations seem to suggest that the agricultural policies in the six countries over the last 18 years should be moving, in general, towards being more open and less protective but some price stabilization measures had to be retained. It is likely that the absolute magnitude of support to producers and consumers would become smaller regardless of their signs of being either positive or negative. The importance of price support policies in the international agricultural policy may be declining and

replaced by the measures that are exempt from the WTO commitments. Market interventions may be less frequent but powerful countercyclical measures may have been at work to mitigate external shocks. Policy targets should be shifting from the production promotion of cereals to the market promotion of diversified farm products, or to more environmentally friendly farming. Can the PSE study results confirm these trends?

National Average PSE and CSE

Figure 5 and Figure 6 show the estimated national average %PSEs and %CSEs for the selected six countries. Comparison of these two graphs reveals several interesting points. First, the two graphs look like an upside-down mirror image each other. This implies that in most countries price support measures are still predominant in generating policy transfers between producers and consumers. If the primary source of policy transfers was government subsidies and taxes, the symmetrical structure of the graph could be impaired, as in the case of Malaysia. The pattern of symmetry appears less evident for India as well, but for different reasons. The absolute figures of India's average %CSE are much larger than that of their %PSEs because the government often sets delivery prices of major grains for poor households much lower than their 'cost prices' that are computed from procurement prices and operation costs.

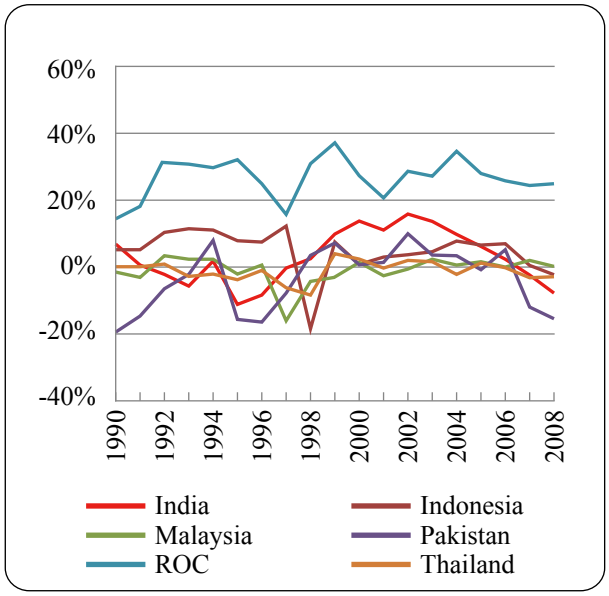

Figure 5. Average %PSE Selected countries

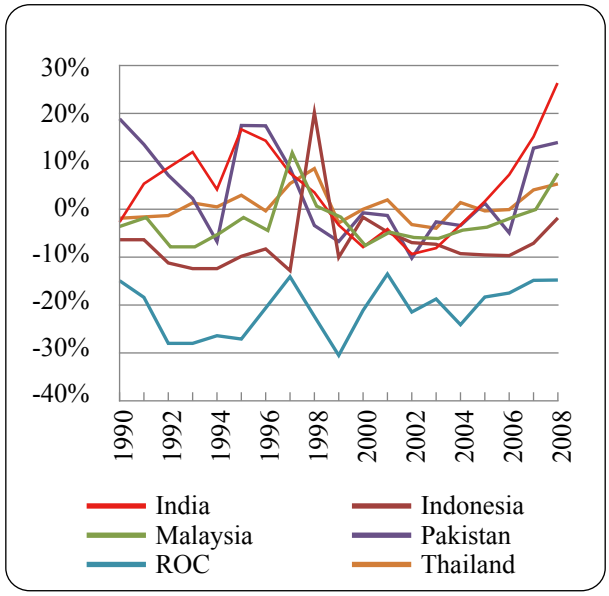

Figure 6. Average %CSE Selected countries

Second, %PSEs and %CSEs fluctuate considerably by year. The annual fluctuation was most apparent in 1997–98 for Indonesia, 1996–97 for Malaysia, and 1994–96 for Pakistan. Indonesia's %PSE tumbled down to negative 19% in 1998 from the previous year's positive 12%. It quickly returned to positive again in 1999. Malaysia and Pakistan also showed a similar move a year or two year earlier. The cases of Indonesia and Malaysia are explained by the impact of sudden dramatic falls in the value of local currency at the time of Asian Financial Crisis. Pakistan's %PSE was also affected by currency devaluation, as well as by the upsurge of cotton prices in the international market in the mid-1990s.

Third, the levels of transfer to producers measured by %PSE, regardless of whether they are positive or negative, are generally low with a range of minus 19% to plus 35%. If the ROC is excluded, the average %PSEs remain within a plus and minus 15% range in most years. This is a clear contrast to the %PSEs in OECD countries which hover around plus 30–50% and have never fallen below zero. All countries,

except for the ROC, have recorded negative PSEs for at least one time in the past 18 years, which means producers were sometimes taxed rather than supported by government policies.

Forth, as against prior expectations, we find no clear signs that national average %PSEs are converging to zero during the observed period. If policy reforms had been implemented in a manner that price differentials were reduced through trade liberalization or reduced market intervention, %PSEs should have decreased in countries where producers were protected, and should have risen where producers were penalized by policies. There are many possibilities for this: an increase in non-price support in return for price policy reform, a generous treatment of developing countries in the trade negotiations, or no specific commitment required for reducing negative support. However, it may be too early to draw any policy implications from this result because not only the levels of support but also the type of support or other factors, are equally important.

Fifth, both total PSE values and %PSEs saw a notable fall between 2007 and 2008 in all six countries. However, this does not mean that these countries had simultaneously implemented the quick policy reforms. It is due to a sudden upsurge in international commodity prices in this period. Having been concerned about the negative impact on poor households, many Asian governments rushed to inflation mitigating measures. Export restrictions, tightened food price control, and releases of government stocks helped domestic food prices remain relatively low and stable against skyrocketed international prices. The consequence was the reversal or widening negative price differentials between local and international markets. The total PSE value fell by a large margin, while the CSE value went up. Producers seem to have lost possible benefits at the expense of stable consumer prices.

PSE by Commodity

Rice

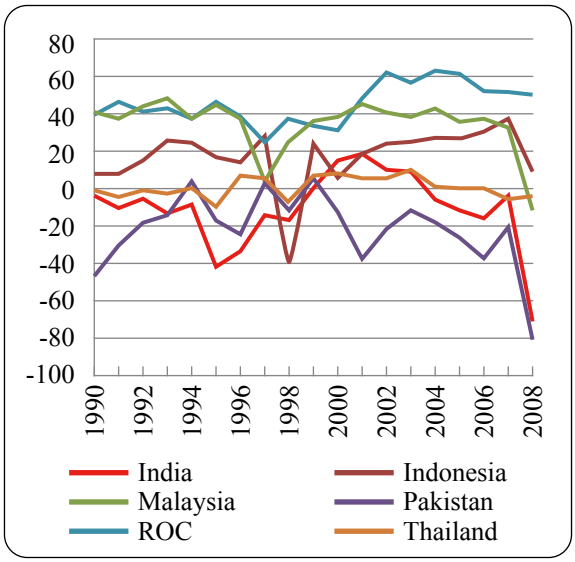

Figure 7. Rice %PSE

Rice is the single most important crop in monsoon Asia. As a staple food, it has been subject to various policy support including price control, stock holding, state trading, etc. Figure 7 highlights the trend of estimated %PSE for rice in the selected countries. It is no coincidence that the rice PSE is relatively high in the ROC and Malaysia at around 30–60%, except in 1997 and 2008. Although their consumption per capita has been declining, the rice sector still has a special importance for society in terms of food security, rural viability, and income sources for small farmers. The overall level of the ROC's %PSE for rice remained unchanged or even higher after the WTO entry, in spite of reduced rice outputs through a set aside program and increased rice imports under the minimum access commitment. This is partly because %PSE, a ratio of value of policy transfer to value of production, has nothing to do with the volume of total production or imports by nature. If the total production declined in proportion to the change in policy transfer, the %PSE would remain unchanged.

It is also no coincidence that %PSEs of rice for Thailand stay around zero because Thailand is a leading rice exporter in the international market and thus, no high assistance is required. However, India's %PSEs have fluctuated year by year even though India has often been a large exporter of rice. India's %PSEs dropped to minus 30–40% in the mid-1990s, moved up to plus 10–20% in the first half of the 2000s, and plummeted again as low as minus 70% in 2008. In contrast, Thailand's %PSE for rice remained fairly stable at low levels, except for a few years in the early 2000s. This clear contrast is the reflection of the different policy measures taken by the two countries. India has a solid domestic price stabilization system for major food products including rice, wheat, and sugar. Its system is a combination of procurement at minimum support prices, sales of public stocks at discounted prices, and trade controls. When international prices soared in the mid-1990s and again in 2008, India tightened export controls to keep domestic prices stable, which penalized producers and resulted in largely negative PSEs.

The early 2000s saw the opposite. India had to dispose of surplus public stocks of cereals in the international market at low prices, while maintaining domestic support prices unchanged. PSEs became positive during this period. Thailand, on the other hand, has mobilized no particular border measures to stabilize the domestic market even if international markets were volatile. Instead, the government stimulated rural development programs to relieve small rice producers who suffered from low prices. As we see later, rice %PSEs in Thailand in the early 2000s were positive at about 10% because input subsidies and other producer support increased.

Indonesia's rice %PSEs also show considerable ups and downs with a notable 'V' shape between 1996 and 1999, which bottomed out at minus 50% in 1998. The main factor for this was the exceptional turbulence of currency exchange rates during the Asian Financial Crisis. Its %PSE fell again in 2008 but not so drastically this time because appreciation of rupiah offset the rise in international rice prices and left the %PSE still positive. Pakistan's PSEs for rice are negative in many years and often the lowest among the six countries in percentage terms. It indicates that Pakistan rice farmers, especially basmati rice producers, are substantially 'penalized' (WTO 2008) by national policies including licensing.[6] Because of its specific aromatic flavor and limited production areas, basmati rice is traded at prices 3–4 times higher than ordinary rice in the international market.

Livestock products

The selected countries apply various border measures for livestock products. Specific duties, licensing, and import controls for religious reasons are the major reasons. Compared with cereals such as rice, it is far more difficult to measure and interpret the estimated PSEs for the livestock sector. Types of animals and products, trade forms, and related policies greatly differ from country to country. Unlike cereals, livestock products are traded mostly as processed products whose unit prices vary by types of products, degree of processing, and quality. They naturally deviate from those at farm gate. The estimated PSEs should be considered tentative and need further improvement because the estimation had to rely on many working assumptions and the use of adjustment coefficients in order to tackle practical problems such as quality difference[7] and physical conversion factors between carcass and block meats/cut meats.

[6] Our estimates indicate that export prices of basmati rice have been 56% higher than locally traded basmati rice in the years 2000–07 even if quality differences and transportation costs have been adjusted by 20%. The same calculation suggested only 12% price differentials for non-basmati rice.

[7] In some countries, we have found that 'haral' goods were traded at higher prices than non-haral ones. However, this study did not take this fact into account because no reliable data exists to show the likely difference in %.

The estimated %PSE of poultry meats shows no convergence among the six countries (Figure 8). India's %PSEs were as high as 40–60% in the mid-1990s and have reached these levels once again in recent years, whereas Pakistan and Indonesia have recorded very low % PSEs for the entire period. The rates fluctuated between plus 30% and minus 60% for Malaysia. The ROC's %PSEs were all positive with some variations. This diversity in poultry meat %PSEs should be attributed to the specific situations that individual countries faced: volatile exchange rates, outbreak of diseases, or trade liberalizations.

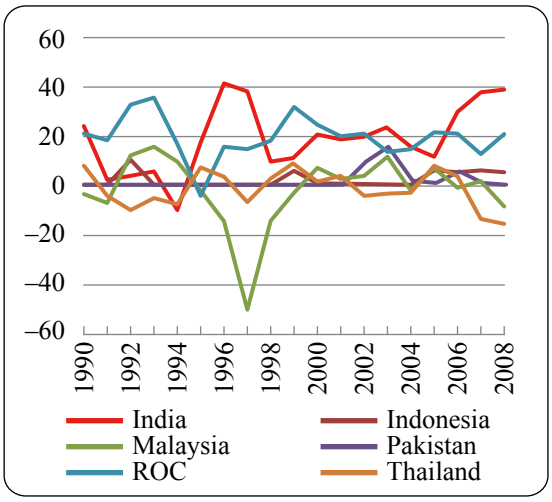

Figure 8. Poultry meat %PSE

A considerable variation of %PSEs by country was found for pig meat as well but with different patterns (Figure 9). The ROC's %PSE repeated cyclical ups and downs, in part owing to a 'pig cycle' but it was also aggravated by the outbreak of foot-and-mouth disease in 1997, which badly affected exports and turned the ROC from an exporter to a net importer. Setting up tariff quota after the WTO entry pushed up the %PSE of pigmeat but the conversion to an ad-valorem tariff in 2005 stabilized it at the 15% mark. Sharp drops in Malaysia's %PSE in 1999 and 2003 were also due to the outbreak of the Nipah virus and the indirect impact of SARS (severe acute respiratory syndrome).

The estimated %PSEs for milk presents two unique features. First, although the levels of support differ by country, the patterns of yearly fluctuation resemble each other as if all six countries had taken concerted actions (Figure 10). This resemblance derives from the method that the study has used for estimating price differentials. As all six countries apply some market support measures for milk, the PSEs were estimated by comparing local milk prices and the hypothetical import prices of milk reconstituted from imported skim milk powder and butter. If local milk prices are stable in these countries (as was the case) and international prices of the two milk products fluctuate as it did in the past, then the computed price differentials should follow a similar zigzag pattern among all countries. The second notable point is the low levels of milk %PSEs (except for in the ROC) even though various border measures such as tariff quotas, licensing, or export restrictions apply in one form or another. Milk %PSEs started to decline in 2002 and fell below zero in 2007–08 in most countries because international prices of milk products shot up to a historic high.

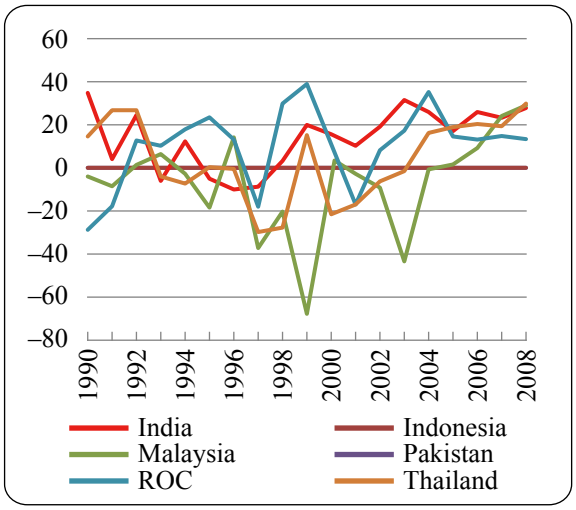

Figure 9. Pigmeat %PSE

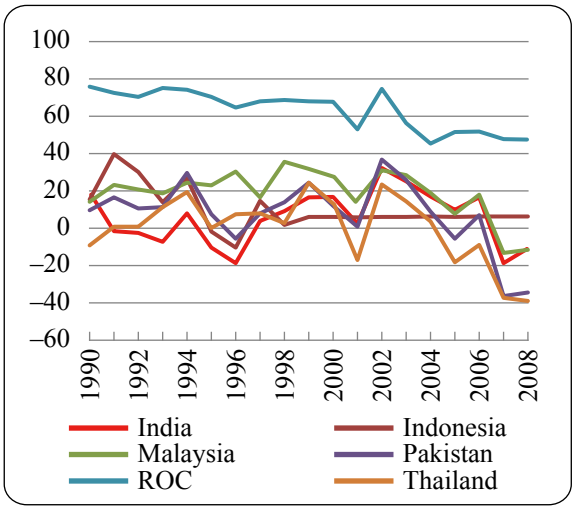

Figure 10. Milk %PSE

PSE Composition by Policy Type

In addition to overall policy directions, the compositional analysis of the estimated PSEs adds to the other useful information on the nature of policies, shift in payment types, priority commodities, etc. If the magnitude and the share of price support in the total PSE declines, we can conclude that agricultural policy reform in this country is advancing towards the right direction and becoming more market-oriented. If the share of rice in the national PSE falls, it may suggest that policy priority is shifting to other products.

In analyzing PSE composition, however, we have encountered a specific aggregation problem arising from negative PSE components. If national PSEs are composed of both positive and negative items, the total PSE can be smaller than some individual components, pushing up the percentages of components to a few hundred, plus or minus. It does not make much sense and becomes confusing to argue the compositional status by quoting some figures that are more than 200% while others are at minus 150%. One solution is to use a composite bar graph.

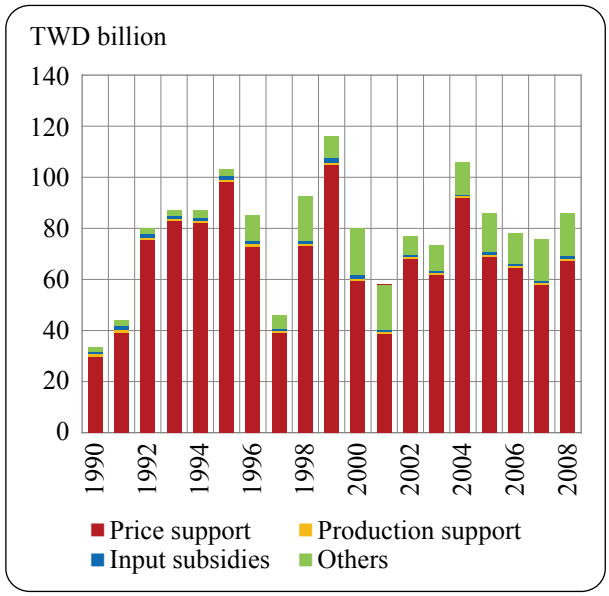

Figure 11. ROC: PSE by policy type

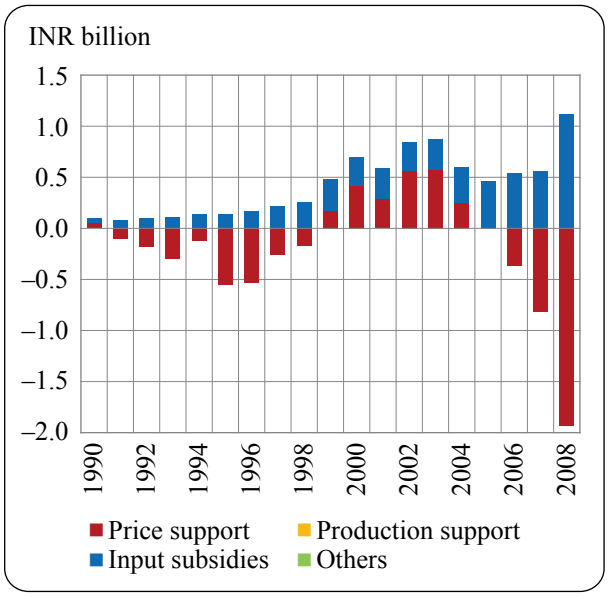

Figure 12. India: PSE by policy type

Figure 11 and Figure 12 illustrate the case of policy composition in the ROC and India. From these graphs we can see what types of policies have been generating transfers to producers and to what extent. It also tells us how policy priority has shifted. Figure 11 for the ROC indicates that the net annual PSE has been positive for the entire period with price support still remaining at 80% in total. But the shares of other types of assistance, including payments on input constraint (i.e., set-aside programs and others) have been steadily rising after the late 1990s because the ROC had to comply with the conditions set for the WTO entry while trying to minimize its impact on producers. Figure 12 reveals that virtually only two types of policies are causing policy transfers in India: market price support and input subsidies. Input subsidy (mostly subsidies for fertilizer and power) plays a critical role in India to support producers, particularly when transfers through market price support declined or became negative due to export control, as is the case in the latest few years. In other words, the Indian government has been managing agricultural policies in such a manner that the benefits of producers and consumers are counterbalanced. Input subsidies have been used as a 'balancer.'

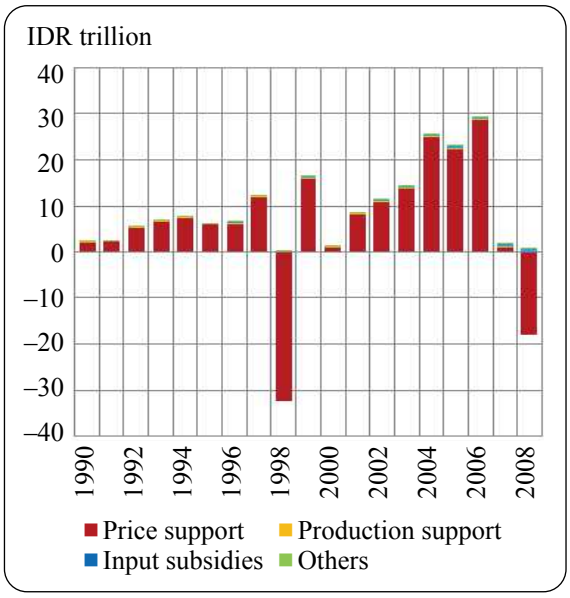

Figure 13. Indonesia: PSE by policy type

By looking at the PSE compositions of all six countries, we can conclude that the most notable common feature is the high share of market price support in the national PSE. Price support accounts for more than 90% of the total PSE in Indonesia and Pakistan for the entire period. It is also high in the ROC at 70–90%. However, this does not necessarily mean that producers have been 'supported' by policies because total PSEs often became negative with high volatility, as seen in Figure 13 for Indonesia.

It is likely that with an exception of the ROC, price support policies in these countries have functioned rather 'neutral,' or sometimes even 'against' producers. In years where international prices were low, price policies worked as a safety net for producers but when international prices soared, they benefitted consumers at the expense (i.e., foregone benefits) of producers. Price support policies seem to have been serving to their original purpose, i.e. price stability rather than income support. Here it may be of little relevance to discuss 'de-coupling', a popular notion of policy reform in the OECD countries.

PSE Composition by Commodity

As PSEs are measured for major commodities,[8] we have made a bar graph showing national PSE sorted by commodities. Once again bar graphs help visualize which commodities receive higher or lower support for specific periods in the selected countries. Although commodity specific PSEs have been measured only for the selected commodities, bar graphs should still represent the key characteristics of national policies because policy efforts center on these commodities, which account for 60–80% of the national GAO.[9]

The graphs drawn for the selected countries again reveal an enormous diversity in the commodity composition of PSEs and their size, swings, and trends, by country. The total PSEs seem to show a similar trend in India and Pakistan but their commodity compositions differ substantially. Leading commodities are rice, wheat, and milk in India, but are milk, cotton, and sugar cane in Pakistan. Rice is the central commodity in the national PSEs of Malaysia, Indonesia, and the ROC, but the PSEs of Malaysia and the ROC are affected by meats as well. Smaller shares of livestock products in PSEs had been expected in light of a food crop-dominant consumption pattern in Asia, but relatively high transfers have been observed in some countries such as milk in Pakistan and poultry meat in Indonesia and the ROC. The ROC is the only country for which the PSE shares of other commodities are significant. In the ROC transfer to producers is dispersed to a wide range of farm products, partly due to the set aside program for rice.

[8] In this study the PSE for each commodity is measured by allocating non-commodity specific transfers to producers (e.g., fertilizer subsidies) to each commodity in proportion to the GAO share. This method is not used any more in the OECD to highlight the policy changes to non-commodity specific support.

[9] The current OECD method assumes that %PSE for non-PSE commodities is the same as the average of PSE commodities and thus, national PSEs are estimated by extrapolating aggregate PSEs for selected commodities in proportion to the share of the GAO. But in reality, non-selected commodities are largely minor crops/animal products (fruits, vegetables, eggs and small animals, etc.), which are not covered by policy support in most cases.

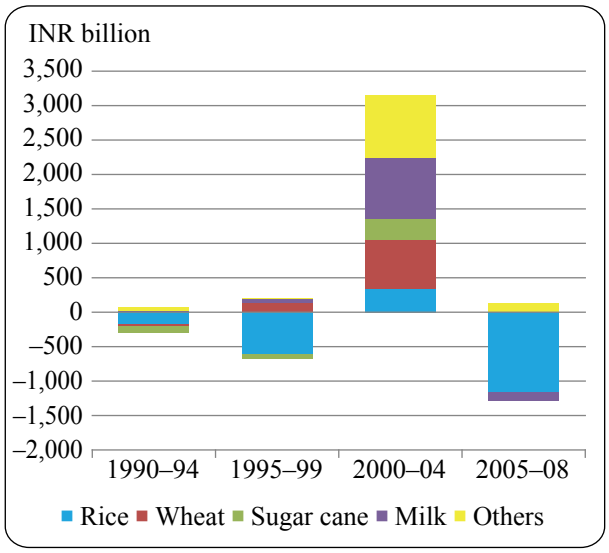

Figure 14. PSE composition by commodity: India

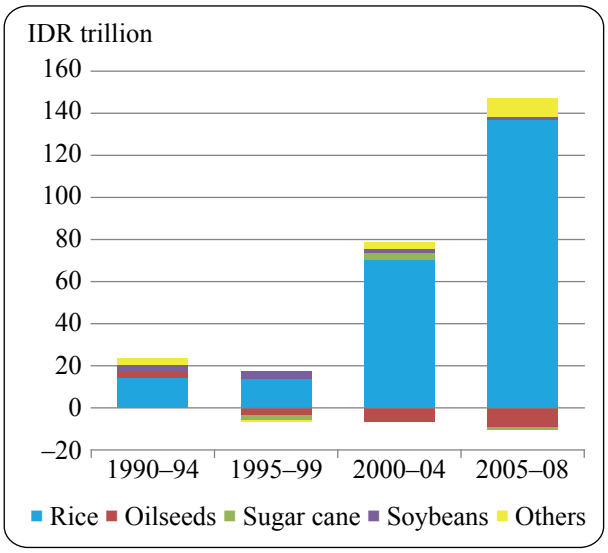

Figure 15. PSE composition by commodity: Indonesia

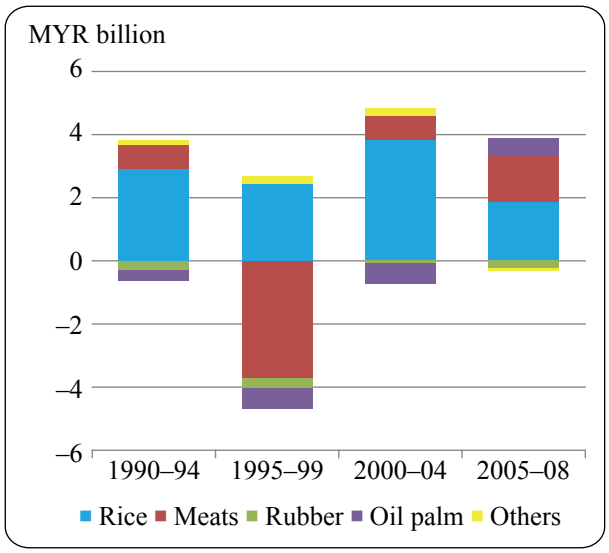

Figure 16. PSE composition by commodity: Malaysia

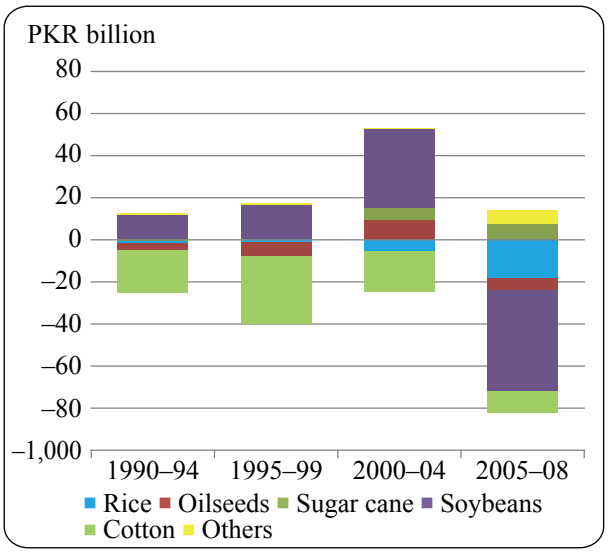

Figure 17. PSE composition by commodity: Pakistam

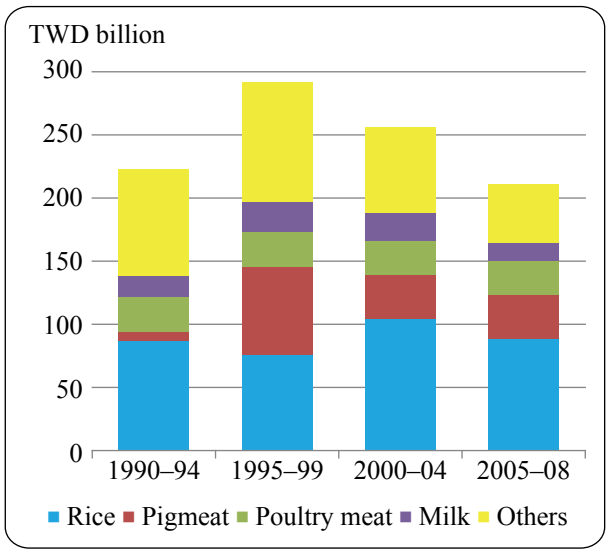

Figure 18. PSE composition by commodity: ROC

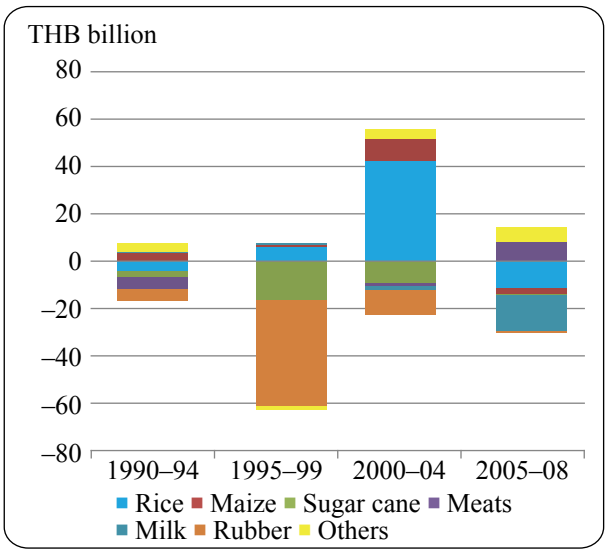

Figure 19. PSE composition by commodity: Thailand

Nevertheless, we may draw some general observations from these graphs. First is a high share of rice in total transfers to producers, irrespective of whether the PSE is positive or negative and whether the country is an importer or exporter. This is unique to monsoon Asia. As rice is the staple food in this region, policy efforts including market price stabilization or input subsidies naturally center on rice. Transfers to producers are positive in general but sometimes fall negative if international prices soar to a point that consumers' interests are to be secured.

Second, there is no clear general pattern in the commodity composition of PSEs among the selected countries. The assisted commodities and their shares in the total PSEs varied by period and by country. Major causes were the erratic moves of international commodity prices and exchange rates. Over the past 30 years, world commodity prices have had several unpredictable spikes, which occurred either independently or jointly among commodities, as shown in Figure 20. Peak prices often reached 3 times as high as trough prices. The exchange rates of Indonesia, Malaysia, and Thailand also saw a drastic shift in 1997–98. The erratic moves of international prices and exchange rates have widened the amplitude of price differentials between the local and international market for the key commodities. The impact should differ by commodities depending on whether or not they were guarded by domestic price support measures and on whether or not they were exportable. Price differentials, and thus PSEs, fluctuated more in protected and less exportable commodities than others.

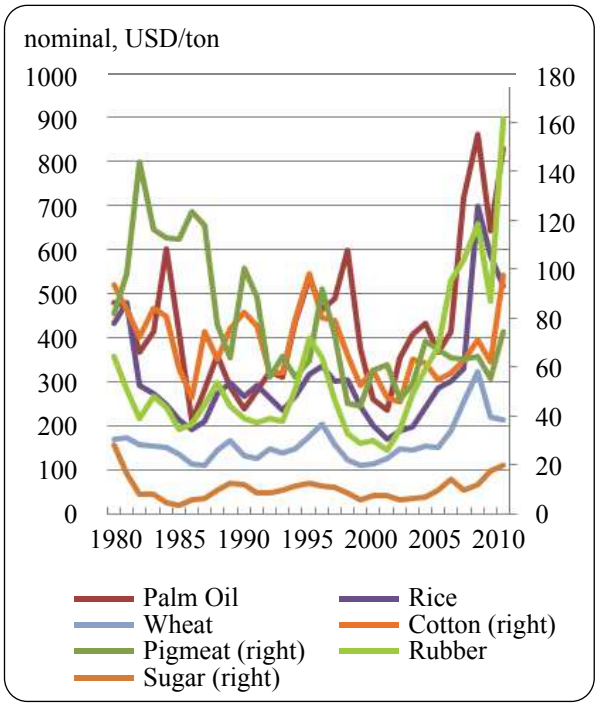

Figure 20. World commodity prices

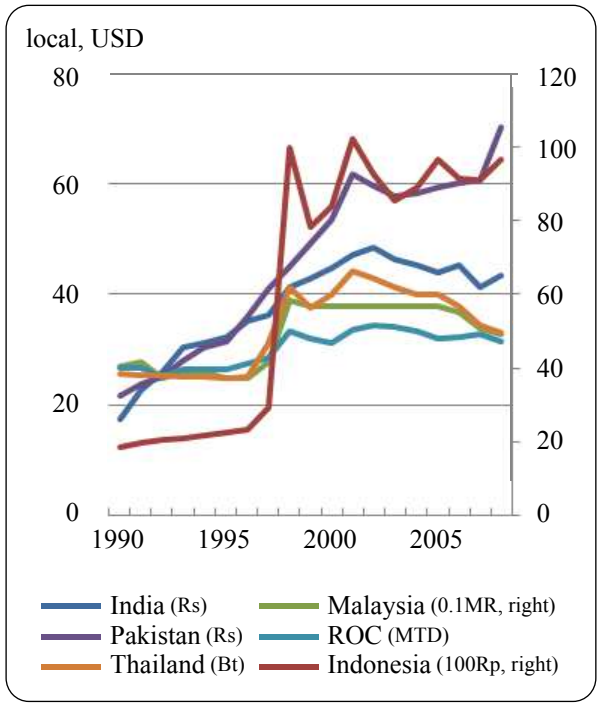

Figure 21. Exchange rate: Selected countries

Third, is the tendency for export commodities to often result in negative PSEs. Typical examples are cotton in Pakistan, palm oil in Malaysia, and rubber in Thailand. PSEs of these commodities have been largely negative, implying that some kind of export taxes such as export duties or higher margins of export agencies have been applied to them.

TSEs by Country

All of the policy transfers measured for individual commodities and budgetary transfers for general services in a country are integrated into the TSE table to show an overall picture of agricultural support at the national level (see the methodological part of the Chapter II and Annex tables for more detail). The TSE can be expressed as a percentage to the GDP or to the Gross Value Added for agriculture (GVA). We may call the former simply the percentage TSE, which illustrates a relative magnitude of support that the agricultural sector receives from consumers and taxpayers in a given country.

Figure 22 shows the estimated %TSE for the selected countries. It should be noted that negative TSEs, i.e., net taxes on the agricultural sector, have been recorded in some cases. As we have already seen, this is attributable to the negative PSEs registered as a combined effect of price support policies and specific external factors, i.e., the impact of volatile exchange rates and sharp rises in international commodity prices.

The estimated %TSEs fluctuate year by year in many countries but they are generally small and remained mostly less than 2% of GDP. The only exceptions were the 1998–2004 period for India and several occasions for Pakistan. The %TSE sometimes turned negative in India, Indonesia, Malaysia, and Pakistan, while it was always positive for Thailand and the ROC. Pakistan's violent swings in the mid-1990s mostly reflect the volatility of international cotton market.

From these limited TSE estimates, we may not able to endorse the view that support to agriculture would shift from negative to positive as the economy develops. If we exclude 2007–08 as exceptional years, a weak upward trend may be detected for Pakistan and India, however 16 years would be too short to consider in the evaluation. For other countries, we cannot find clear upward moves.

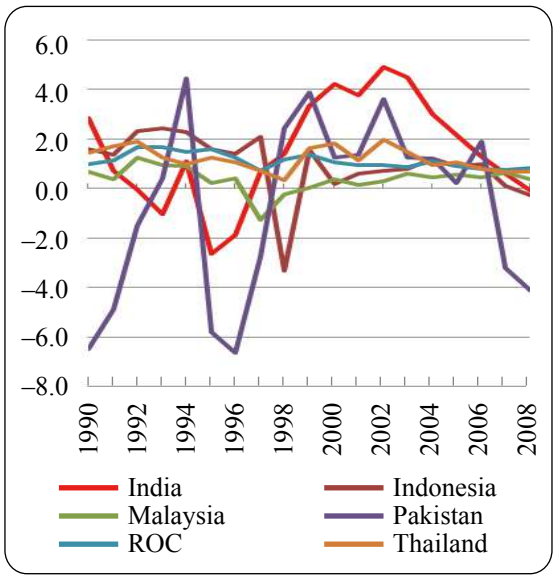

Figure 22. %TSE in selected countries

The TSE can be broken down into three major components: PSE, GSSE, and transfers to consumers from taxpayers (TCT).[10] Their compositions expressed as % of TSE normally give us clearer ideas on the nature and trend of basic agricultural support in individual countries. However, if the total PSE or TCT is negative in a country, it cancels out the GSSE, which is always positive (as it is budgetary-financed) and makes the TSE look much smaller, concealing the complex impact of policy. One solution to this problem is again, the use of a composite bar graph, by which, three major components are explicitly shown. It can tell how the TSE is derived from the three components, i.e., transfers to producers, to public sectors, and to a part of consumers,[11] irrespective of their signs. Figures 23 through 28 show the estimated TSE compositions in the six countries. To be more informative, the graph splits PSEs into two parts: transfers from market price support (PSE: MPS) and others (PSE: other).

[10] TCT is the sum of government payments to consumers and a portion of CSE that cannot be captured by the normal transfers arising from MPS between producers and consumers. It includes import duties (negative) and food subsidies (positive).

[11] The transfer from producers to consumers (or vice versa) arising from price support measures is submerged as a marker price support (MPS) component in the PSE and thus does not appear in the TSE.

These graphs present no common trends among the six countries, although some similarities exist between India and Pakistan and between Malaysia and Indonesia. They revealed that:

- The main factor that makes net TSEs negative is the PSE, which often fell below zero when international prices spiked;
- The shares of the MPS based PSE in the TSE are high in India, Indonesia, Pakistan, and the ROC but the GSSE plays the central role in agricultural support in Thailand and Malaysia;
- In India, Malaysia, and Thailand, the transfers from non-market measures including input subsidies and the GSSE, tend to counterbalance the negative transfers generated by market support measures; and
- TCT is negligible except in India.[12]

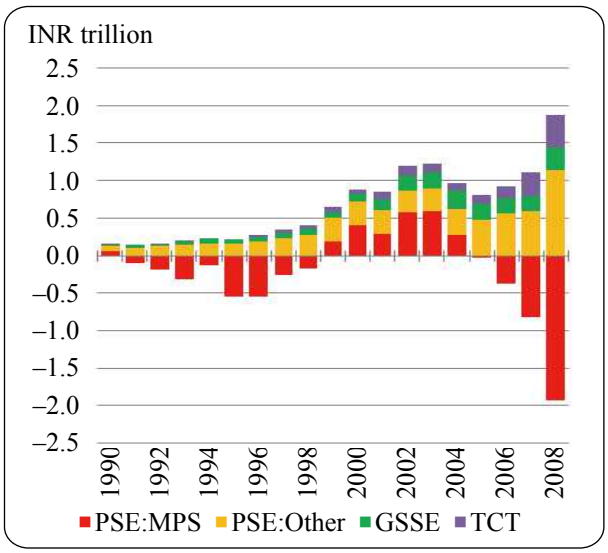

Figure 23. TSE composition: India

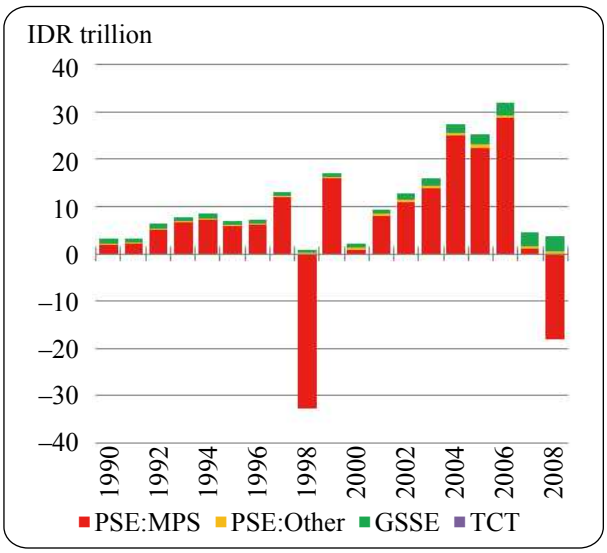

Figure 24. TSE composition: Indonesia

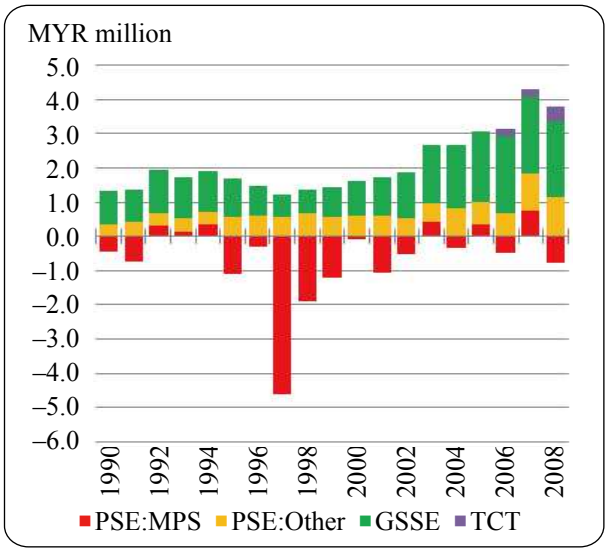

Figure 25. TSE composition: Malaysia

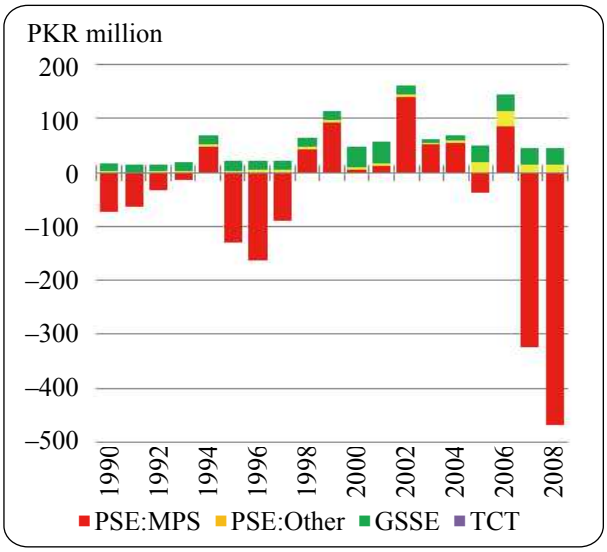

Figure 26. TSE composition: Pakistan

[12] This is due mainly to the Public Distribution System, which offers discounted sales of rice and wheat to 60–70 million low-income households throughout India.

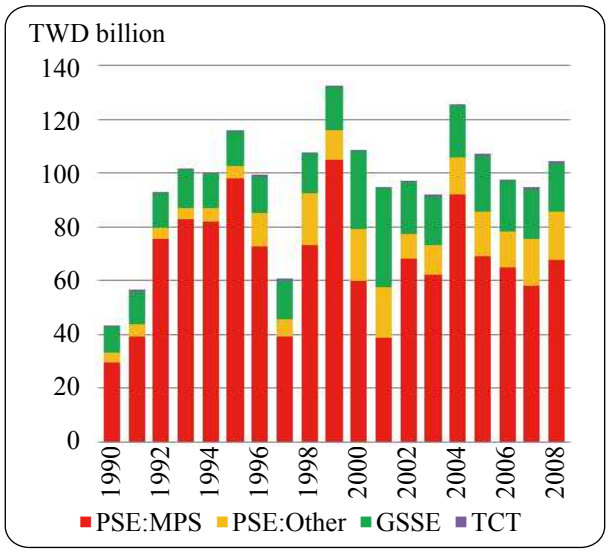

Figure 27. TSE composition: ROC

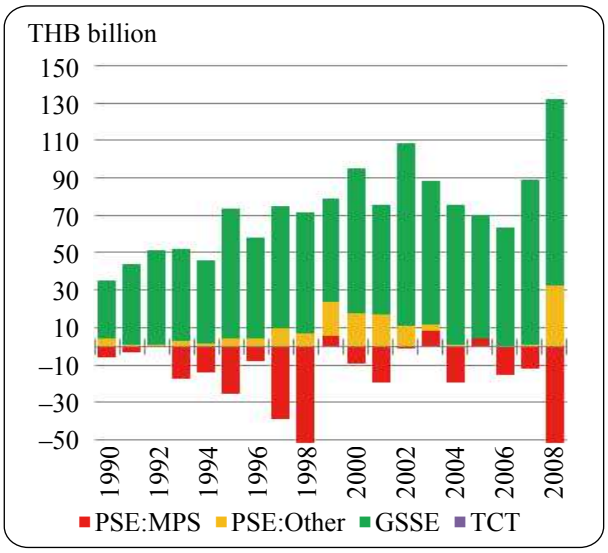

Figure 28. TSE composition: Thailand

As for the impact on productivity, we have to consider how and to what extent these TSE components would affect production in the long-run. The effect of observed high shares and volatility in MPS-based PSEs is unclear. It suggests that domestic prices have been kept stable as against turbulent international market prices. Stability in domestic prices may encourage farmers to produce and invest more for higher productivities because it reduces risks and transaction costs. On the other hand, if support levels are maintained below international prices or at levels that promise only thin margins, perhaps few farmers with entrepreneurial minds would invest in agriculture. Frequently observed turnovers of negative and positive PSEs may suggest that price support policies in these countries did not have had any significant impact on productivity.

Another uncertainty lies in the non-MPS PSEs, i.e., "PSEs others." In some countries, subsidies for fertilizer and power (e.g., electricity for water pump) make up the largest share in this category. Theoretically, input subsidies may be less market-distortive than price support because the consumption side is not directly affected and farmers are given more freedom in the choice of producing commodities. Increased use of irrigation facilities or fertilizers may encourage investment in irrigation systems or fertilizer factories and thus, would help a nation's productivity growth in the long-run. Even though the linkage between input subsidies and long-run productivity growth will have to be tested, it may be time that non-MPS PSEs were given a more positive role in productivity growth and poverty reduction in developing countries.

GSSE

The least controvertial TSE element, with respect to the linkage to productivity growth, is GSSE. Apart from the often heard problem of inefficiency in government agencies, there is a broad agreement among economists that R&D, extension services, vocational training, agricultural schools, sanitary and phytosanitary measures, inspections and standards, and better infrastructure have a positive impact on agricultural productivity. An immediate policy implication would be that "the more GSSE per agricultural worker, the higher the productivity (e.g., GVAA per agricultural worker)." This notion should be tested by a careful regression analysis that pays due attention to the time lag between the two factors. However, we can see some evidence by comparing both indicators across the countries.

Is the GSSE easy to capture?

Though it may be conceptually simple, in reality, the GSSE is the most difficult area to measure in the actual measurement of PSE indicators. The reason does not lie in theory, but in practice. It is extremely difficult to collect consistent and complete budgetary data for "agriculture." The titles of budgetary codes frequently change because new governments or leaders prefer different names, even though target or contents are similar. Budgetary size announced by politicians is often a few times larger than actually allocated. Classifying budget data into an appropriate policy group is even more difficult. Many budget items use the term 'rural' 'promotion' or 'development' but there is no concrete way to know what the money is actually spent on or in which year. Normally, budgetary tables do not tell whether the money goes to farmers as subsidies, or to government workers as salaries. Sometimes collected data are a mix of actual expenditures and loan amounts. In the end, we always need to use some descretionary judgement and re-classsification by ourselves in order to measure the GSSE.

Other problems arise from the diffrence in governement systems. This study has decided to deal with the expenditures of central government only and exclude subnational public expenditures. But in some countries such as India and Indonesia, state or provincial governments also provide extensive agricultural services and investment funds for irrigation or rural roads. The financial statistics of India suggest that the size of state expenditures for agriculture and irrigation is as large as that of the central government. In addition, the compostion substantially differs between the two. The central government focuses more on food and input subsideis, while the states spend more for irrigation and services.

In some countries, agricultural funds are channeled though several different ministries or agencies rather than the ministry of agriculture alone. For instance, the budget size of "rural development" in Thailand in the fiscal year 2001, was six times higher than that of the Ministry of Agricultre and Cooperatives. There are many cases in which the budget for rural infrastrucures are allocated through other agencies, such as the Ministry of Public Works, Plantation Agencies, etc. For these reasons, we have to be very careful when we make cross-country comparison of GSSEs and thus PSEs.

Table 7a shows the GSSE per agricultural worker (economically active population in agriculture) expressed in USD. This ratio varies greatly by country but fairly stable over years for a given country except for 2000–04 period in the ROC. It seems to be roughly proportional to the labor productivity measured by the GVAA per agricultural worker as suggested by Table 7b. But we cannot conclude with this data alone that a higher GSSE would promise higher agricultural productivity. Perhaps this would be partly derived from the fact that richer countries spend more for public services per person.

Table 7a. GSSE per agricultural worker (annual average, USD)

	1990–94	1995–99	2000–04	2005–08	1990–2008
India	8	8	16	9	8
Indonesia	12	5	3	10	11
Malaysia	226	155	207	228	222
Pakistan	35	25	19	33	34
ROC	445	558	1,044	518	468
Thailand	83	99	93	106	94
(India+)	32	35	42	33	32

Note: India+ is the case that the expenditures of state governments are included

Table 7b. GVAApw and GSSEpw (annual average 2005–2008, USD)

	GV Apw	GSSEpw
India	388	9
Indonesia	759	10
Malaysia	5,716	228
Pakistan	746	33
ROC	9,019	518
Thailand	708	106
(India+)	388	33

We may find several interesting points on a table showing GVAA per GSSE as well (Table 8). First, is the similarity among the six countries despite enormous differences in agricultre and policies. The largest ratio of GVAA per GSSE is in Indonesia but if sub-national expenditures were taken into account, the ratio would be one third or smaller.[13] The ratio for India would fall if state expenditures were included. Second, is the stability of the ratios over time. Except for one or two periods in Indonesia and Pakistan, the ratios remain constant by and large. Third, is that there must be good reasons for ups and downs. A sudden jump of the ratios in Indonesia and Malaysia in the 1995–99 period can be explained by the financial difficulies of their governments, which led to reduced spending on infrastructure. The fall in the ROC's ratio in 2000–04 comes from the government effort aimed at entry into the WTO. Public expenditures on schooling, infrastructure, and others, expanded quickly in 2000 and 2001, pushing up the total GSSE to TWD36 billion, nearly four times more than that of 1990. These expenditures were less market distortive and mostly exempt from the reduction commitments in the AoA.

Table 8. GVAA/GSSE (average for each period)

	1990–94	1995–99	2000–04	2005–08	1990–2008
India	51.8	53.2	29.4	44.0	42.4
Indonesia	53.6	186.5	215.7	79.8	160.5
Malaysia	19.5	39.6	25.6	25.6	28.0
Pakistan	18.5	34.2	78.9	22.7	45.9
ROC	16.6	16.3	8.4	17.4	13.0
Thailand	7.3	7.3	7.2	6.8	8.1
(India+)	11.9	12.4	10.5	11.8	11.0

Note: India+ is the case that expenditures by the states are included

[13] World Bank indicates that size of sub-national public expenditure in Indonesia was 1.5 times more than that of central government.

In analyzing government policies for productivity, GSSE composition should provide important clues because the GSSE contains some important components of investments for future productivity growth. Figure 29 and Figure 30 reveal a clear contrast in the GSSE composition in India and the ROC. Costs for stockholdings out-numbered other costs in India's GSSE, while infrastructure is the single largest item in the ROC's GSSE. This difference, however, almost disappears if state expenditures are counted as shown by Figure 31. Now, India's GSSE composition looks more normal: it has the highest share of infrastructure, followed by other investments. This means that there is a financial 'division of labor' between the central government and the state governments in India.

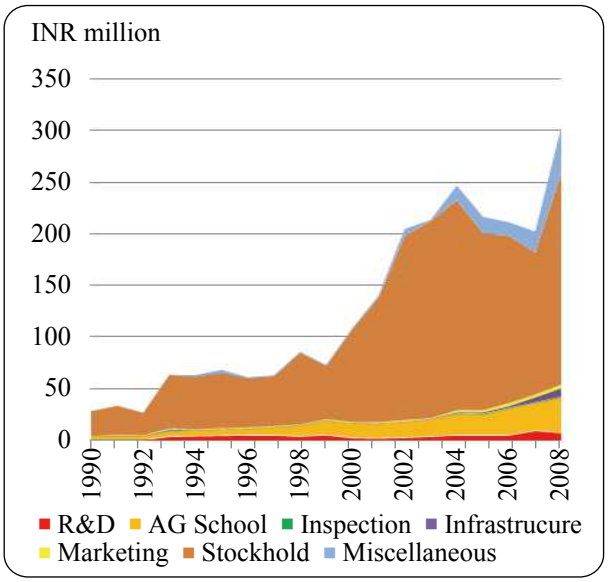

Figure 29. GSSE: India

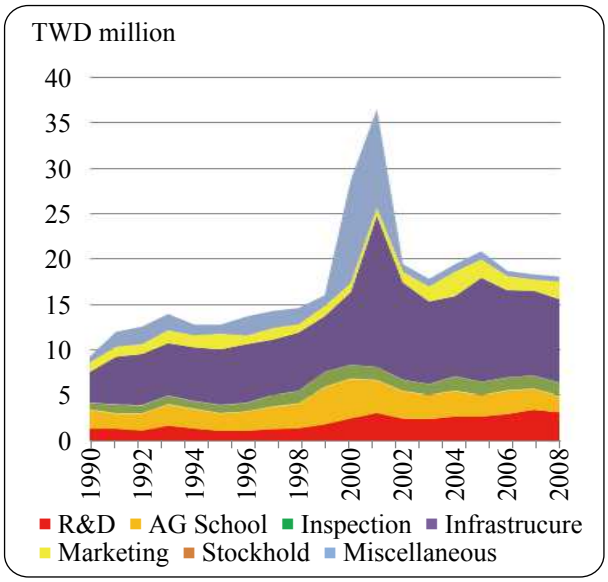

Figure 30. GSSC: ROC

The former focuses their spending on stockholdings, whereas the states take care of irrigation and R&D costs. Thus, the overall structure as a nation eventually becomes more balanced. The only area that both countries substantially differ is in the spending of public stockholdings. The ROC spent very little on public stockholdings because of their set aside program, while India had to mobilize considerable funds to keep 20–40 million tons of cereal stocks under its Public Distribution System.

If we have more detailed data on GSSE compositions in these countries, we would be able to study whether policies are moving for technology-oriented, business oriented, or greener directions. So far our PSE estimates have shown no clear trend in this regard.

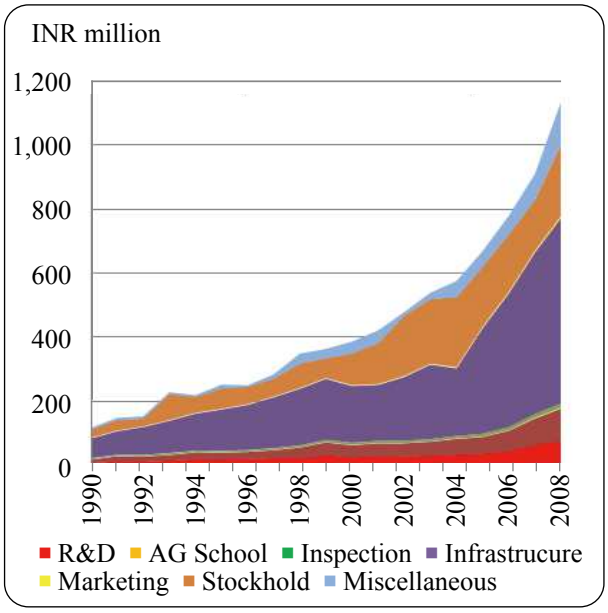

Figure 31. GSSE: India (including states)

ADDITIONAL ANALYSIS AND POLICY IMPLICATION

Nominal Assistance Coefficients

Based on the estimated PSE indicators, we can continue further analysis with respect to policies and productivities. Some PSE indicators such as producer NPC (p-NPC) and producer NAC (p-NAC), may provide rudimentary information on the competitiveness of commodities or of the agricultural sector in a country, as a whole. The p-NPC is the ratio between the average price received by farmers and the border price (both measured at farm gate), and the p-NAC is the ratio between the value of gross farm receipts (GFR) including support and the GFR valued at border prices (measured at farm gate). Conceptually, p-NPC is similar[14] to the nominal rate of protection (NRP), which compares the domestic price and the border price for the same commodity. If a country's p-NPC of a commodity is less than one point, it means that the country is internationally competitive for this commodity, and likely to be more productive than others under certain conditions.[15] As the p-NAC can be computed from the %PSE,[16] it shows to what extent policies are compensating for (or exploiting if it is below one) the insufficient competitiveness of the commodity or the agriculture sector in question. The next four figures illustrate the estimated p-NPCs on rice, poultry meat, and milk for the selected countries.

The rice p-NPCs for Thailand are constant and equal to one in all periods while those for India and Pakistan fluctuate and stay below one (Figure 32) in most periods. This implies that Thailand does not require much policy intervention to be competitive as the world's largest rice exporter, whereas India and Pakistan were often more competitive at least at farm gate levels and kept domestic prices relatively low. Figure 32 also tells that rice in the ROC and Malaysia is not competitive unless considerable support (25–75%) is given.

Poultry meat and milk sectors present different pictures. From Figure 33, we can see that the p-NPC for poultry meat was close to one for all periods in Thailand, Pakistan, Indonesia, and Malaysia, while they were 20–40% higher in the ROC for all periods and in India for recent years.

India, Thailand, and Pakistan seem to be competitive in milk at the farm gate level, particularly in recent years (figure 34). If the computation is not overly biased, this contrasts with developed countries where high rate of protection is required for milk, except for New Zealand. The ROC's p-NPC for milk is still high but on a declining trend in recent years.

Although all selected countries are located in tropical or sub-tropical zones, not all of the countries are competitive in the international sugar market. Thailand is the only country whose p-NPC for sugar was constantly below one (figure 35). India and Indonesia may have had some competitive edges when international sugar prices were high. The sugar production of the ROC and Malaysia would not be sustainable without government support.

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[14] The differences are: 1) the price received by farmers includes payment on output in p-NPC, 2) the numerator is the incremental price in NRP and 3) p-NPC is measured at the farm gate, while NRP is normally compared at the border.

[15] Higher volumes of labor input due to low wages can be the main reason for the observed competitiveness and in this case we cannot claim that low p-NPC means higher productivity.

[16] Mathematically p-NAC can be denoted as

$$pNAC = 1 + \frac{\%PSE}{(100 - \%PSE)}$$

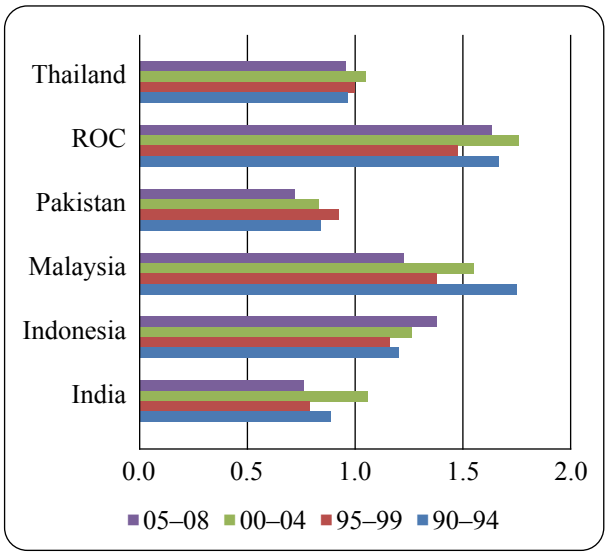

Figure 32. Average p-NPC: Rice

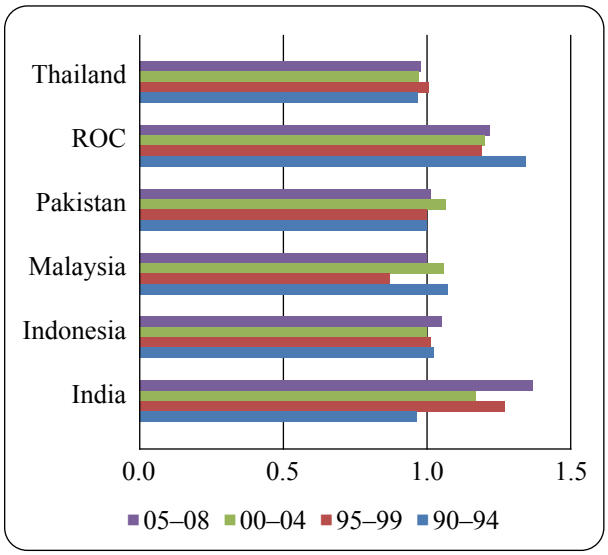

Figure 33. Average p-NPC: Poultry meat

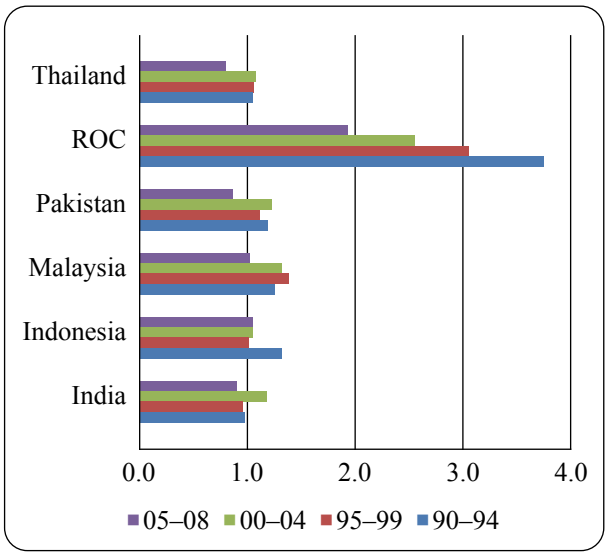

Figure 34. Average p-NPC: Milk

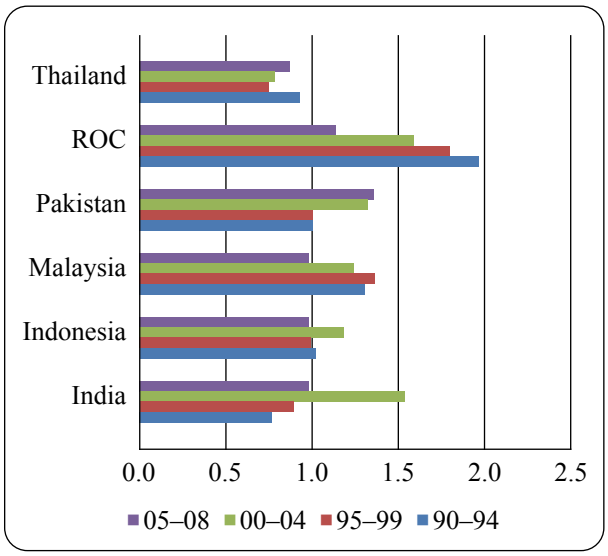

Figure 35. Average p-NPC: Sugar cane

Transfer Per Beneficiary

New dimensions of support policies are disclosed when we compute "derived" indicators by reorganizing the PSE components or combining it with other indicators. The first derived indicator is a transfer per beneficiary expressed at current USD. Table 9, Table 10, and Table 11 summarize the estimated average annual TSE per agricultural worker (TSEpw), PSE per agricultural worker (PSEpw), and CSE per consumer (CSEpc) for a given period in each country. These indicators may stand for a certain degree of influence or effectiveness of policies as a whole if the prime target is to give economic incentives to a particular group of people. Major findings were:

- The level of TSEpw is relatively small, or sometimes negative in the selected countries excluding the ROC. It seldom exceeds USD100 in India, Indonesia, Pakistan, and Thailand, ranging between plus USD102 and minus USD177.

- The difference between TSEpw and PSEpw is small in India, Indonesia, and Pakistan, but relatively large in Malaysia and Thailand, where GSSEs are the largest component of TSE.
- CSEpc always falls far below PSEpw in all countries, mostly staying between minus USD18 and plus USD28, except in the ROC. This derives from the fact that the number of agricultural workers is much smaller than that of consumers (i.e., total population).
- Even in the ROC, CSEpc is relatively small at USD75–114, only one fiftieth of the PSEpw (USD4,370) in 2005–07.
- A weak upward trend may be detected for the PSEpw before 2007 but no clear trends are found for the CSEpc

Table 9. TSE per worker in agriculture (current USD)

	1990–92	1995–97	2000–02	2005–07
India	18	-21	87	49
Indonesia	54	81	18	47
Malaysia	217	–117	152	529
Pakistan	–112	–177	76	–26
ROC	2,312	3,657	4,227	5,465
Thailand	81	83	102	87

Table 10. PSE per worker in agriculture (current USD)

	1990–92	1995–97	2000–02	2005–07
India	11	–32	65	12
Indonesia	42	74	16	41
Malaysia	4	–302	–15	149
Pakistan	–151	–213	44	–63
ROC	1,892	3,094	3,010	4,370
Thailand	3	–31	10	–12

Table 11. CSE per population (current USD)

	1990–92	1995–97	2000–02	2005–07
India	3	14	–9	8
Indonesia	–10	–18	–6	–16
Malaysia	–5	19	–2	–4
Pakistan	20	28	–7	8
ROC	–97	–114	–75	–87
Thailand	–2	6	0	4

These observations suggest that there have been good reasons for governments to support producers through price support measures, because:

- Where and when PSEs are positive, i) costs for transfers are largely born by consumers not by governments, ii) consumers' burden per person is relatively light compared with the benefit per producer, iii) governments can get revenues from import duties, and iv) the capacity of consumers and governments to swallow the costs may rise as economy grows.

- Where and when PSEs are negative, i) majority of costs are born by producers, not by the government, ii) the producers' burden per person is relatively small and mostly takes the form of forgone benefits and thus, goes unnoticed, and iii) government can collect export tax.

Many economists argue that price policies distort markets and resource allocations more than other type of policies and may have a negative impact on productivity growth in the long-run. A shift from price support to direct income support, i.e., 'decoupling,' would be more desirable in respect to better targeting, efficiency, and transparency. Market interventions by the government are often accompanied by inefficiency and generate economic rent if not corruption. However, our estimates for the selected countries indicate that the absolute magnitudes of transfer per beneficiary arising from market support policies are generally small. Transfers accrue mainly for basic food products and specific export products as the result of government efforts to protect domestic producers and consumers from external shocks. It would be socially sensible for the government of developing countries to resort to price policies.

Transfer Matrix

One of the most useful aspects of the PSE methodology is that they allow us to analyze the flow of possible transfers caused by policies among three key players: producers, consumers, and taxpayers (the government). In other words, it can tell how much economic transfers may occur from whom to whom as the result of agricultural policies, or who pays the costs to whom. It does not directly address the issues of agricultural productivity increase per se, but it can offer policy makers many powerful messages on the 'productivity of policies,' including cost effectiveness and targeting efficiency.

From the estimated PSE indicators, we can make a simplified matrix that shows the flow of possible transfers among the three players. Table 12 illustrates the structure of this matrix.

Table 12. Structure of the Transfer Matrix

	Producers	Consumers	Taxpayers	Total (pay)
Producers	0	– TPC	– PYP + XTX	– PSE
Consumers	TPC	0	– PYC + MTX	CSE
Taxpayers	PYP – XTX	PYC – MTX	***GSSE***	Net cost for taxpayers
Total (receipt)	PSE	– CSE		(TSE)

Note: TPC=net transfer to producers from consumers; PYP=payment to producers from taxpayers; PYC=payment to consumers from taxpayers; XTX=net export tax; MTX=net import tax

Theoretically, the cells in the left to right diagonal line should be zero and all the cells must be symmetric against the diagonal line if each element is expressed in net transfers. One exception comes from the insertion of the GSSE in the diagonal cell for taxpayers so that we can see the total net transfer from taxpayers in the cell of total payment at the very right. For reference, the TSE value is listed in the diagonal cell for the total. The TSE value equals to the sum of the PSE, GSSE, and PYC and corresponds to neither total (payment) nor total (receipt).[17]

Table 13 has been compiled from our national average PSE estimates (the 2000 price deflated by GDP deflators) for 1990–2008. It tells us, for example, that agricultural policies in India generated on average INR172 billion worth of transfers per year from the producers to the consumers, whereas taxpayers (Indian Government) pay INR367 billion to producers, INR93 billion to consumers, and INR144 billion to the sector (general services), totaling INR538 billion.

Although these numbers change according to the period we choose, we may pick up several stylized characteristics of agricultural policies in these countries. First, in India, both the producers and the consumers were the net recipients, leaving the taxpayers as the only net payers. The producers were taxed by market support policies but received more subsidies (input subsidies) from the taxpayers than they pay to consumers. The consumers' net gains were also positive, reflecting the positive transfers from producers in the form of lower prices and food subsidies from the government.

Second, the net receipt of producers is positive in the ROC but that of consumers is negative. The pattern remains the same for all years. This indicates that producer prices have been kept above international prices through boarder measures or market controls and as such, penalize consumers. Similar patterns appear in the OECD food importing countries. Third, the transfer matrix of Pakistan, and to a lesser extent Thailand, exhibits exactly the opposite: producers are taxed, while consumers on average benefit. The main reason for this would be that the two countries are leading exporters of rice and some commercial crops (e.g., cotton for Pakistan and rubber for Thailand) for which price support functioned as de fact export taxes when international prices soared. Fourth, the last column (total payment) indicates that in India, Pakistan, and Thailand, the payments of taxpayers, including the GSSE, outnumbered the payments from the producers and consumers. It means that government expenditures, rather than transfers from consumers or producers, are critical in these countries.

Another notable point is that TSEs often mask the real size of transfers among the three players. For instance, the matrix of Pakistan suggests that the magnitude of TSE (PKR22.1 billion) is much smaller than either the PSE (–PKR48 billion), CSE (PKR47.7 billion), or even the total budgetary expenditures (PKR25.6 billion). The main reason for this is the negative PSE arising from negative price differentials. Wherever PSEs become negative, TSEs can conceal the actual size of transfers among the three players. This is another reason why we need the matrix analysis.

[17] TSE disregards the value of import tax because it is not considered as support to the agricultural sector. However, the transfers to producers arising from the import tax are counted in the TPC (and thus, the TSE) through the increased price.

Table 13. Transfer Matrix: Selected countries (1990–2008 average, 2000 price)

		Producers	Consumers	Tax payers	Total (payment)
India (INR billion)	Producers	0	172	–367	–195
	Consumers	–172	0	–93	–266
	Tax payers	367	93	144	605
	Total (receipt)	195	266	–	(430)
		Producers	Consumers	Tax payers	Total (payment)
Indonesia (IDR trillion)	Producers	0	–11.7	1.0	–10.8
	Consumers	11.7	0	1.8	13.6
	Tax payers	–1.0	–1.8	2.0	–0.8
	Total (receipt)	10.8	–13.6	–	(12.7)
		Producers	Consumers	Tax payers	Total (payment)
Malaysia (MYR billion)	Producers	0	0.13	0.05	0.18
	Consumers	–0.13	0	0.55	0.41
	Tax payers	–0.05	–0.55	1.40	0.80
	Total (receipt)	–0.18	–0.41	–	(1.25)
		Producers	Consumers	Tax payers	Total (payment)
Pakistan (PKR billion)	Producers	0	47.2	0.8	48.0
	Consumers	–47.2	0	–0.5	–47.7
	Tax payers	–0.8	0.5	25.9	25.6
	Total (receipt)	–48.0	47.7	–	(–22.1)
		Producers	Consumers	Tax payers	Total (payment)
ROC (TWD billion)	Producers	0	–67.8	–11.7	–79.6
	Consumers	67.8	0	11.1	78.9
	Tax payers	11.7	–11.1	17.5	18.1
	Total (receipt)	79.6	–78.9	–	(98)
		Producers	Consumers	Tax payers	Total (payment)
Thailand (THB billion)	Producers	0	2.6	1.5	4.1
	Consumers	–2.6	0	–0.4	–3.0
	Tax payers	–1.5	0.4	40.1	39.0
	Total (receipt)	–4.1	3.0	–	(36)

Note：Figures in brackets are TSE

The transfer matrix can also illustrate how transfer patterns have changed over time. Let us look at India once more. Table 14 shows the transfer matrix for four periods, 1990–94, 1995–99, 2000–04, and 2005–08. There are some different pictures from what we have seen in Table 14 for the average in 1990–2008. During the first two periods, net transfers to producers were very small or negative but turned huge positive in 2000–04. Net transfers to consumers moved in another direction, from positive to negative between the second and third periods. We know that these were attributable to the changes in market conditions and the responses of the government in each period. Total transfers from the taxpayers steadily rose over time from INR366 billion in 1990–94 to INR994 billion in 2005–08. It should be noted that the magnitude of tax payers' support to producers in the first period was large enough to replenish most of the foregone benefits that the producers lost as a result of negative market price support. The situation is similar in the second period, although the net receipt by producers is negative. The pattern of latest period (2005–08) resembles the second period (1995–99) because the government had to protect consumers against possible food price hikes by tightening export control.

Table 14. Transfer Matrix for India (INR billion, annual average, 2000 price)

	1990–94				1995–99			
	PRD	CSM	TXP	Total	PRD	CSM	TXP	Total
PRD	0	252	–268	–15	0	388	–318	70
CSM	–252	0	–10	–263	–388	0	-52	–440
TXP	268	10	87	366	318	52	98	468
Total	15	263		(111)	–70	440		(78)
	2000–04				2005–08			
	PRD	CSM	TXP	Total	PRD	CSM	TXP	Total
PRD	0	–480	–354	–834	0	618	–568	50
CSM	480	0	–114	366	–618	0	–222	–840
TXP	354	114	201	669	568	222	204	994
Total	834	–366		(1,150)	–50	840		(371)

Note: PRD=producers; CSM=consumers; TXP=taxpayers

Figures in brackets are TSE

The GSSE figures (the intersection between TXP raw and the column) in this matrix will be more than doubled if state expenditures are counted, which endorses the view that India's public sector has been exerting powerful influence on the agriculture sector. This may be beneficial and sustainable as long as the government revenues keep rising.

In the same vein, we can continue similar analysis for other countries by using the transfer matrix (see Annex table D-1). Major findings are:

- Net positive transfers from consumers to producers have been recorded for Indonesia and Malaysia in all four periods (except in 1995–99 for Malaysia) largely owing to rice price support.
- Pakistan's TSEs were negative in three periods. Price support for cotton and cereals under soaring international prices worked as de-fact export taxes in 1990–96 and 2006–08. Relatively small government subsidies could not offset them.
- Net payments by the central government have turned negative in Indonesia since 2000–04 because the value of estimated import taxes exceeded government expenditures. This may change if we take into account provincial expenditures.
- Transfers from producers to consumers were negative in three of four periods in Thailand but their size was very small compared to the GSSE.

SUMMARY AND CHALLENGES

Over the past two decades, many APO member countries have experienced high growth, turbulences, and a transformation of the economy in the course of globalization. The agricultural sector has contributed to or has been affected by these changes. Governments have tried to make their agricultural policies fit this new international environment, while protecting domestic producers and consumers. The six country studies and the synthesis have provided a rich pool of analytical evidence of the agricultural

policies and transfers generated thereof among key players. Below are the tentative summaries and considerations that may have some policy implications for the APO and member countries.

Validity of PSE Measurement and Policy Analysis

The study has reviewed agricultural policies of APO member countries with particular attention paid to the six selected countries. It examined the possible use of PSE methodologies for assisting member countries to improve policy performance and agricultural productivities. Although more efforts are required for collecting appropriate data and close collaboration with member governments, the PSE methodology has proved to be a powerful tool by which policy makers can draw many lessons. It can offer a bird's-eye view of what they are doing altogether with the complicated agricultural policies they implement. If prudently estimated, PSE indicators can show not only the rough magnitude and direction of policy assistance but also changes in policy types. They may also tell from whom to whom and how much transfers have been generated by a specific policy or policies as a whole, or whether the producer has been a net receiver of policy transfers or not. This is exactly the kind of information that the policy makers in APO member countries may need for improving policy effectiveness.

The availability of consistent and reliable data and policy information remains a basic problem but the situation is quickly improving through the increased transparency of government policies, better coverage of statistics, and the increased use of ICT technologies. The PSE template developed by the APO helped reduce the burden of national experts. The PSE methodology provides many policy-related indicators that may be utilized as initial inputs to analyze the policy-productivity linkage. Some PSE indicators such as the GSSE per worker, CSE per consumer, or %TSE may show some aspect of the productivity of policies or budgetary expenditures.

Policy Changes and Estimated PSE Indicators

Globalization and recent changes in trade regimes have pressed most governments to reduce market interventions and agricultural support. Although having taken a number of positive steps to reduce agricultural support, they have not drastically changed the basic structure of price support systems for staple food and strategic commodities. The estimated PSEs and TSEs did not show discernible downward trends. The majority of transfers have accrued to a limited number of key commodities such as rice, wheat, milk, meats, and some export crops. In most countries, price support has been the single largest source of policy transfers.

Despite this extensive use of price support measures, national average %PSEs (transfers to producers divided by the gross value of producer receipts) have seldom exceeded 15% except for in the ROC. They have fluctuated by a large margin by year and by period mostly due to the abrupt changes in external factors. Unlike in developed countries, %PSEs of these countries often turned negative when international prices soared or the value of national currencies plummeted, as in the mid-1990s and 2007–08. In India, the input subsidies seem to have partly offset the adverse effects of negative PSEs derived from export control.

These low or negative %PSEs and their counter-cyclical moves indicate that the price policies in these countries have served their original purpose i.e., protection of people from excessive price fluctuation and external shocks rather than income support. With this low %PSEs, it is unlikely that price support policies have had a significant impact on productivities.

Many official documents and the country reports often suggest that the selected countries have made considerable efforts to reform agricultural policies in recent years. However, estimated TSEs have shown no specific reduction trends among the selected countries. One possible reason is that such reform effects have been masked by the erratic moves of PSEs. The other is that many governments have turned their efforts to less market distortive measures while maintaining the overall size of support by increasing budgetary assistance to agriculture.

PSE by Commodity and Compositions

The %PSE for each commodity has shown its own distinct feature. Three groups are identified in rice %PSE: importers (high %PSE in the ROC and Malaysia), exporters (low or negative %PSE for India, Pakistan, and Thailand), and Indonesia (high fluctuation in %PSE). The meat %PSE has depicted few common trends among selected countries. Being affected by religion, outbreak of animal diseases, and specific consumption patterns, they have followed no similar patterns. Milk %PSE has been unique – figures of all six countries move in tandem although the absolute levels differ. They have also shown a downward trend over the examined period.

For many countries, price support was the main source of both average and commodity-specific %PSEs. In India and Thailand, government subsidies play an equally important role for agricultural support. The share of non-price support PSEs has increased after the WTO entry in the ROC.

Commodity compositions of average national PSEs have varied by country and period. Rice has been the largest item in many cases but other commodities have often taken the top position: milk for Pakistan and India, cotton for Pakistan, meats for the ROC, and rubber for Thailand. Positions of these commodities have remained the same even if signs of PSEs reversed.

TSE and Its Composition

The estimated %TSEs (% proportion to GDP) are generally low. Except in India and Pakistan, %TSE remained at 2% or less. %TSEs sometimes fell below zero in countries such as India, Pakistan, and Indonesia. TSE composition has shown no common trend among the six countries, although some similarities exist between India and Pakistan, and between Malaysia and Indonesia. They have revealed that the main factor making the net TSEs negative is the PSEs, which often fell below zero when international prices soared. The shares of PSE in the TSE are high in India, Indonesia, Pakistan, and the ROC but the GSSEs play the central role in agricultural support in Thailand and Malaysia. In India, Malaysia, and Thailand, the transfers from non-market measures including input subsidies and GSSE, tend to counterbalance the negative transfers generated by market support measures. GSSE compositions sometimes differ by country. In India, the cost of public stock holding is relatively high, while infrastructure comes first in the ROC and Indonesia.

Competitiveness and Productivity

Some derived PSE indicators such as producer NPC or GSSE per beneficiary may provide rudimentary information on the competitiveness of commodities or efficiency/productivity of policies. The estimated producer NPCs for rice indicates that Thailand does not require a lot of policy intervention to be competitive, as it is the world's largest rice exporter, although India and Pakistan were occasionally more competitive than Thailand. Rice in the ROC and Malaysia is not competitive unless considerable support is given.

India, Thailand, and Pakistan seem to be competitive in milk in recent years, which contrasts with developed countries where a high rate of protection is required for milk. Not all the selected countries are competitive in the international sugar market. Thailand is the only country whose p-NPC for sugar was constantly below one. India and Indonesia may have had some competitive edges when international sugar prices were high. The sugar production of the ROC and Malaysia would not be sustainable without government support.

GSSE should be the most important TSE element to enhance productivity growth in the long run because it includes expenditures for various agricultural services and rural infrastructures. The study has found that the GSSE per agricultural worker tends to increase in proportion to agricultural labor productivity, but this needs further scrutiny to be deemed complete. The effectiveness measured by the GVAA (gross value added of agriculture) per GSSE, has been similar among counties and rather stable over the examined period.

Transfers per beneficiary may also show some aspects of the efficiency of policies, i.e., the degree of influence or effectiveness of policies as a whole, if the prime target is to give economic incentives to a particular group of people. The estimated TSE per agricultural worker (TSEpw), PSE per agricultural worker (PSEpw), and CSE per consumer (CSEpc) illustrates that the TSEpw is relatively small or sometimes negative except in the ROC, ranging between plus USD102 and minus USD177; and the CSEpc always falls far below PSEpw in all countries, staying between minus USD18 and plus USD28, except in the ROC.

Considering that transfers per beneficiary are generally small and accrued mainly for the basic food products as the result of government efforts to protect domestic producers and consumers from external shocks, agricultural policies in the selected countries may have had little impact on their productivities.

Transfer Matrix

One prominent advantage of the PSE methodology is that it can tell how much and from whom to whom transfers have been generated by policies. The transfer matrix analysis has revealed that in India, both the producers and the consumers were the net recipients leaving the taxpayers as the only net payers. The producers were taxed by market support policies but received more subsidies (input subsidies) from the taxpayers than they paid to consumers. The net receipt of producers is positive in the ROC but that of consumers is negative. The transfer matrix of Pakistan and to a lesser extent, Thailand, exhibits exactly the opposite: producers are taxed while consumers are on average benefitted. The main reason for this would be that the two countries are leading exporters of rice and some commercial crops. In India, Pakistan, and Thailand, the payments of taxpayers, including the GSSE, outnumbered the payments from the producers and consumers. This means that government expenditures rather than transfers from consumers or producers are critical in these countries.

Limitations and Future Challenges

This study has attempted to analyze agricultural policies as quantitative as possible through the measurement of PSE indicators. As in other quantitative tools, the PSE methodology relies on many assumptions, availability and quality of data, and specific parameters used. It is assumed that price support policies generate price differentials but other factors including perishability and religious taboos may cause price gaps without price policies. Input subsidies are counted as government expenditures,

while tax concessions are seldom captured in the PSE. A 10% change in the quality or weight adjustment coefficient may mean a 10–20% change in %PSE.[18] The omission of sub-national government expenditures may underestimate the real public support for agriculture. Therefore, the estimated individual figures must be blunt and thus, need careful treatment in their interpretation and cross-country comparison.

Another limitation is because price differentials are measured at farm gate levels by adjusting the costs of transportation, processing, and marketing. This is not a serious problem if the domestic market is competitive enough. However, if the market is imperfect or regulated, then there is a risk that we count the inefficiency of regulated processing/marketing sectors or benefits of monopoly/oligopoly as the transfers to producers. We have to pay due attention to this issue when domestic market and processing/marketing sectors are regulated or protected in one form or another, such as in India and Pakistan.

In addition to these technical limitations, we have to keep in mind that PSEs "reflect the provision of support or the level of effort made by governments and are not intended to, and do not measure policy impact."[19] Specifically, they are 'ex-ante' rather than ex-post measurements on the support to agriculture. If the ultimate goal of this study is to analyze the 'impact of policies on productivity,' we have to admit that we are only standing at the starting point. There are many factors working between policy transfers and resulted productivity gains. There is no guarantee that one dollar spent for price support and one dollar spent for extension services have an equal impact on productivity. Assistance in research or infrastructure may need a long time until it starts generating returns.

Challenges and Recommendations

The validity of PSE policy analysis is clear from the above observations, although it requires considerable resources, skills, and time. However, the task is not over yet. The most important question remains unanswered: how can we use these observations for productivity growth? Estimated PSE indicators are still stunted. They alone would not be able to say much about the issues of policy choice for better agricultural productivity. Linkage between policies and productivities will have to be further tested by the use of complementary modeling tools, such as the policy evaluation matrix. PSE indicators should provide useful inputs to the modeling works.

With the huge potential for contributing to policy considerations and agricultural development in member countries, it may be worthwhile for the APO to make efforts to continue, improve, and elaborate this study. Close cooperation with member governments and international organizations, such as the OECD, should help reduce burdens. Major challenges are summarized as follows.

1) Improvement in the quality and coverage of data and information: In this study we have had to compromise the quality and coverage because of limited data availability. There may be many omissions, double counting, or misclassification in the current PSE budgetary tables. Price data quoted and adjustment coefficients may not necessarily represent the actual commodity market. Data on production and processing costs are mostly rough percentages of producer or market prices. Their accuracy, appropriateness and classification should be re-examined again and further improved through the close cooperation with the governments.

[18] For example, a 10% change in weight adjustment coefficient leads to 8–18% point change in sugar %PSE in India and 10% change in quality adjustment results in 7–18% point change in tobacco %PSE in Pakistan.

[19] OECD PSE manual 2.2, page 16.

2) Country coverage and commodity coverage: This study has examined only six countries for various reasons. Participation of many other countries would not only help them learn new methodologies of policy analysis but also enable all member countries to share the knowledge on effective agricultural policies. In doing so, commodity coverage may be expanded so that the selected commodities for PSE measurement including 'other commodities' accounts for 70–80% of the national GAO.

3) PSE Template tables: The PSE Template has been proven as useful to reduce workload, minimize copy errors, keep consistencies, and make secondary transfer analysis. However, there are several areas to be improved further, e.g., a) refinement and streamlining of policy checklists, GAO tables, and MPS tables, b) adding columns showing data sources and remarks, such as MPS policy type or tariffs, and c) adding tables for transfer analysis.

4) Evaluating impact on productivity: To bridge the gap between PSE indicators and productivities, new studies may be launched focusing on the impact of agricultural policies on agricultural performance and productivity. One possibility is regarding the PSE indicators as policy variables and examining their impact through modeling works such as the OECD's policy evaluation model (PEM). However, this approach has many limitations[20] in the assessment of policy impact on productivities in developing countries.[21] Other types of quantitative models may have to be examined to address the issue of productivity and agricultural policies in developing countries.

5) Continuation of study: Longer-term growth and competitiveness of the agricultural sector depends largely on the growth of its productivity and agricultural policies, which play a decisive role in developing countries. It is crucial for the APO member countries to make their best effort to evaluate their agricultural policies and improve their performances. The PSE analysis offers a set of useful indicators by which policy makers can capture the overall picture of agricultural support and perceive possible policy reforms. However, it has also revealed that there are many areas to be further improved including data collections, methodologies, and policy-productivity linkage analysis.

6) Recommendations: If the APO has enough resources, the following actions may be recommended.

   a) Improvement in measurement tools as pointed above.

   b) Refinement of current PSE tables and their subsequent updating every two years.

   c) Creating an agricultural productivity database including PSE indicators for member countries.

   d) Updating these database periodically and making them available to member countries and upon request.

   e) Organizing training courses targeting policy makers.

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[20] See Brooks, J., G. Dyer and E. Taylor (2008), "Modelling Agricultural Trade and Policy". "Impacts in Less Developed Countries", OECD Food, Agriculture and Fisheries Working Papers, No. 11, OECD publishing.

[21] Most of modeling works examine the impact of policies on economic welfare or farm incomes of developed countries but not on productivities for developing countries. They assume a perfect market, perfect information, rational responses, full substitution among inputs, etc., which are far from the reality of developing countries. Impact on productivity may be of longer-term nature rather than adjusted by price changes in the short-run.

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PART FOUR: COUNTRY PAPERS
INDIA

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MAJOR CHALLENGES FOR THE AGRICULTURAL SECTOR

An Overview of the National Agriculture and Its Performance

Background

Agriculture is the main economic activity in India with strong linkages to rural livelihood and food security. About 70% of the population and 75% of the poor, live in rural areas that are predominantly dependent on agriculture. Agriculture provides employment to about 60% of the rural workforce.[1] The National Sample Survey Organization estimates show that the direct income from farming accounted for more than 50% of farm household income. This share is even higher if the income from agricultural wages is included. Therefore, improving agricultural production and income conditions in this sector is critical for reducing rural poverty.

In addition to these important social dimensions, agriculture has significant economic linkages as well. Besides being a consumer of a variety of industrial products (e.g., fertilizers and pesticides), agriculture is also a source of raw material for a number of industries. The economic importance of agriculture for different industries is evident from the estimates of the market potential for processed foods, which is estimated at INR4,600 billion in 2003–04 and is projected to increase to INR13,500 billion by 2014–15 (MFPI, 2005). Thus, the well being of this sector has widespread economic and social ramifications.

The trends in the overall performance of the agricultural sector in India are summarized in Table 1. During the 1980s, with concentrated policy efforts on technology dissemination, there was significant growth in agriculture. Similarly, in the 1990s, when the New Economic Policy was initiated with a focus on macroeconomic stability, rationalization of the exchange rate regime, and policy bias for agriculture, growth in agriculture continued to rise. However, in the last decade, agriculture growth has decelerated to 2.5%, primarily due to the apparent policy vacuum in the areas of institutional and marketing infrastructure. With a rise in agricultural production, inadequate marketing and institutional support facilities have resulted in high market inefficiencies.[2] Recent studies have shown that there is a high

[1] About 228 million people live in rural India, and 56% of the labor force are farmers and agricultural laborers (Census, 2001).

[2] Following the balance of payments crisis in 1991, India embarked on an economic reform program, which covered exchange rate, trade liberalization, and FDI regimes. While these measures encouraged agricultural production, restrictions on marketing and distribution continued. The Essential Commodities Act (1955), the Agricultural Produce and Marketing Act (1972), and the Prevention of Black Marketing (1980), have prevented the free mobility of agricultural produce and segmented the domestic market. There were also restrictions on domestic and foreign investment, which prevented the private sector from undertaking large scale investments in agricultural storage marketing and processing activities. Subsequently, reforms in these areas have been initiated, but continue to be slow.

logistical tax on India's agricultural exports. This is due to poor transport and storage infrastructure, high marketing costs on account of a fragmented supply chain, and inadequate policy support for the creation of new infrastructure. As a result, India's international transportation costs are 15–30% higher than those in other countries (World Bank, 2008). Furthermore, the continuation of regulations on domestic agricultural trade and markets has increased the incidence of transaction costs. These disadvantages faced by the agriculture sector are apparent in the differences in the growth rate between agriculture and non-agriculture sectors.

Table 1. Average GDP Growth Rates of Agriculture and Other Sectors at 1999–2000 Prices (%)

Period		Total economy	Agriculture & allied	Non-agriculture
Pre-green revolution	1951–52 to 1967–68	3.7	2.5	4.9
Green revolution period	1968–69 to 1980–81	3.5	2.4	4.4
Wider technology dissemination period	1981–82 to 1990–91	5.4	3.5	6.4
Early reforms period	1991–92 to 1996–97	5.7	3.7	6.6
Ninth and tenth plan	1997–98 to 2006–07	6.6	2.5	7.9

Source: Chand Ramesh, (2008).

Given these inadequacies of infrastructural and institutional support facilities, putting India's agriculture on a higher sustainable growth trajectory requires a framework of policy that focuses not only on production factors (as in the past) but also on issues relating to marketing, distribution storage, and processing. In this regard, the National Agricultural Policy of 2000 was the first attempt to view agricultural growth in its totality by integrating production growth with post-harvest and marketing infrastructure. A related policy initiative, which aimed at improving the net income of farmers, is the National Policy for Farmers, announced in 2007.

Characteristics of Indian Agriculture

In the Indian federal system, agriculture is a state (federal) subject where all major policy initiatives for the sector are taken by the state governments.[3] Due to differences in the levels of economic development, topographical variations, and the diversity in crop production systems, the policy approach to agriculture varies significantly by state. The interstate divergence in agricultural productivity and agricultural income is substantial and has further increased over the last two decades.[4] This growing gap between underdeveloped and developed states has underlined the need for special efforts on technological, institutional, and infrastructural fronts to raise productivity in the underdeveloped states.

Low productivity is a result of structural, institutional, and policy constraints. Among the structural issues, fragmented and small scale operational holdings are a major constraint. The average operating holding size in India is 1.55 hectares. More than two-thirds of the agricultural households operate on less than 1 hectare, while about 1% of the land holders operate from holdings that are in excess of 10 hectares. Thus, most of the agricultural production is carried out under small scale conditions, which is overall, economically unviable.

[3] There are 20 major states, 10 small states, and 5 union territories.

[4] The interstate disparities were measured using the coefficient of variation (CV). During the 1980s, the regional disparities in agricultural productivity were 36%, which increased to 40% by the 1990s (Ramesh Chand, 2004).

Another important constraint is the high production susceptibility to monsoon conditions. In India, only about 40% of the gross cropped area is irrigated and the rest is dependent on rainfall. This over-dependence on rainfall has two important fall outs: sharp year-to-year production fluctuations and low productivity in unirrigated areas. Thus, most of the agricultural production increases in India has been through area expansion rather than productivity improvement.

Limited production diversity has also constrained agricultural growth in India. Most of the production is concentrated in food crops[5] with limited commercial orientation. Even the exportables are largely in their primary form. As a result, farming has not been very remunerative. In recent years, the production shares of horticulture and livestock have been rising but their commercial development has been limited.

Performance

During the last three decades, the overall growth of the agricultural sector ranged between 2.5% to 3.5%, which is far lower than that of non-agricultural sectors. However, there has been a significant production diversification and an increased emphasis on commercial production. This is reflected by higher production growth in the sub-sectors of agriculture, particularly that of livestock and horticulture. During 1996–97 and 2001–02, the growth of livestock and horticulture was 3.5% and 4.6% respectively, compared to 2.7% of the crop sector (Table 2).

Table 2. Annual Average Growth Rates in Agriculture and Its Sub-sectors at 1993–94 Prices (%)

	Value of Output			
Period	Crop sector	Livestock	Fruit & Vegetable	Non horti. crops
Decade-wise Growth Rates				
1950–51 to 1959–60	3.06	1.42	0.56	3.44
1960–61 to 1969–70	1.70	0.41	5.82	1.09
1970–71 to 1979–80	1.79	3.92	2.88	1.55
1980–81 to 1989–90	2.47	4.99	2.36	2.48
1990–91 to 1999–2000	2.99	3.82	5.97	2.26
Historic Growth Rate				
1950–51 to 2001–02	2.65	3.12	4.00	2.39
Reforms: Growth Rate				
1990–91 to 1995–96	2.65	4.25	4.93	2.13
1996–97 to 2001–02	1.28	3.47	4.55	0.34

Source: Chand Ramesh, (2008).

At the same time, the trade orientation of Indian agriculture continued to remain low despite a three-fold increase in the value of agricultural production. India's share in world agricultural exports was only 1.5% in 2006–07. Even though at the aggregate level, India is a small player in global exports, India maintained a high market share in selected export products such as cashew kernels, tea, spices, and groundnuts. However, over the years, the market share of these products has decreased significantly.[6] With a declining

[5] The crop sector accounts for 60% of the value of agricultural output. Amongst crops, cereals account for about 35% of the output of which, rice and wheat are most important. These two crops account for 50% of cropped area in India and account for 85% of cereal production.

[6] In 1990, India's exports of cashew kernels accounted for 60% of world exports, while that of tea & spices was 28% and 11% respectively. By 2005, the share of cashew kernels, tea & spices declined to 28%, 9.6%, and 9.7% respectively.

share in traditional exports, India has not been able to develop new exportables, particularly processed agricultural products. To a large extent, India's agricultural exports have been dominated by primary products with an insignificant share in high value agricultural exports, like fruits, vegetables, meat, and milk.

India's agricultural imports have continued to be minimal and accounted for about 5% of the total merchandise imports in 2005–06. Of these, edible vegetable oil is the major importable for India. Imports of other agricultural commodities also occur, primarily for value addition and re-exports. These imports are cashew nuts, tea, and pepper.

Major Challenges for the Agricultural Sector

The deceleration in agricultural growth during the last decade, which was highlighted in the earlier section, raised serious concerns about maintaining food security and has underlined the structural deficiencies that have constrained the overall growth of this sector. In this regard, the major challenges for India's agricultural sector are: production stagnation, water management/irrigation, investment, credit support, agricultural marketing, and food management.

Production Stagnation

Sluggish agricultural output growth has been evident from the mid-1990s. The production of food grains and oilseeds has been below the production targets by almost 10%, while non-food crops, particularly sugar cane, cotton, and jute production has exceeded the targets (Planning Commission, 2007–08). One of the reasons for the stagnation in food grain production has been the falling productivity levels. Studies have shown a declining share of Total Factor Productivity in output and even a negative output for some crops like pulses, fibre, sugar cane, and vegetables (Kumar & Mittal, 2006). These trends imply that India's agriculture is experiencing diminishing returns to input use. This is because the growth in output is primarily due to increased use of inputs, rather than technology or efficiency.

Related to the issue of low productivity, increasing yield gaps has also emerged as a major policy concern. Table 3 shows the average yields in India compared to those in other countries. India's yield of rice and wheat is less than one-third of its potential.

Table 3. Average Yield and Yield Potential at TE 2003–04 (ton per hectare)

Food Items	Yield (India)	Potential Yield (Highest in the World)
Rice	3.03	9.71 (Egypt)
Wheat	2.69	8.89 (Namibia)
Total Cereals	2.39	10.41 (Ireland)
Pulses	0.60	5.14 (Barbados)
Edible Oilseed	0.25	4.29 (Peru)
Sugar cane	60.70	122.70 (Malaysia)

Source: Mittal, (2006a).

Note: Countries in parenthesis are the ones that have the highest yield for the specified food item.

TE = Triennium Ending

Irrigation

Irrigation is very important for raising agricultural production and productivity in India. Management of the irrigation facilities, especially under increasing pressure from population growth and urbanization, is emerging as a major challenge for India. Studies have shown that irrigation should emerge as a critical bottleneck for self-sufficiency in food grain as the demand for irrigation would exceed its availability by 30% by the year 2020. This gap in the demand and supply of irrigation is primarily due to the sharp decline in the creation of additional irrigation potential and the decline in utilization rate.[7]

Managing the irrigation potential has been a difficult task due to problems on both policy and operational fronts. On the policy front, there has been a tendency to spread the available resources over many projects due to inadequate funds. Furthermore, the high cost of new projects and the backlog of incomplete projects are compounding the problems of irrigation.

On the operational front, the large scale canal irrigation systems have not been maintained well. Poor maintenance of irrigation projects and the absence of suitable drainage systems have lead to problems like water logging and soil salinity. Moreover, with the absence of overall water management systems (like rain water harvesting and water shed programs), the ground water table has been rapidly depleting in most states.

Investment in Agriculture

Investment in agriculture is critical for optimizing the supply side gains. However, in India, both public and private investment has remained stagnant since the mid-1990s. Between 1999 and 2006, the share of agriculture in gross capital formation declined from 8.6% to 5.8%.

The Eleventh Five Year Plan strategy paper suggests that the overall agricultural investment should be around 16% of the agricultural GDP, with public investment contributing about 4–5%. However, in 2005–06, investment was only 11.6% of the agricultural GDP, with public investment contributing only about 2.6%.

Recent studies have highlighted that public investment in R&D, rural roads, new technologies, and institutional infrastructure can lead to high rates of return in agriculture. Estimates show that the rate of return on investments in research is over 60% and for extension, it is over 50% (IFPRI, 2005). Currently however, India invests about 0.5% of agricultural GDP on R&D, suggesting a systematic under-investment in this area. Thus, there is a strong need for more investment in agriculture and fostering public-private partnership for initiating new projects.

Credit Support

With costs of agricultural production rising due to higher input costs, credit has become critical, especially for small farmers. Credit is also critical for mitigating the risks of uncertain climatic conditions, which are a result of the high dependence on rain-fed agriculture.

[7] The creation of the additional irrigation potential came down sharply from about 3% (per annum) during 1950–51 and 1980–81 to 1.2% during 2002–07. Similarly, the rate of utilization, which was at 90% in 1991–92 declined to 85% during 2002–07 (Planning Commission, 2007–08).

The non-availability of the institutional credit for farmers has led to an increasing dependence on non-institutional agencies, mostly at exorbitant interest rates. The share of rural credit from non-institutional sources is over 40%, which in a way reflects the inefficiencies in the current credit system. This excessive dependence on non-institutional agencies has resulted in a widespread indebtedness of farmers. This indebtedness is the main cause for poverty and distress.

Agricultural Marketing

With an increasing commercialization of Indian agriculture, marketing has emerged as a critical link for raising the competitiveness of agricultural products. The marketing chain for most agricultural products is highly fragmented and dominated by a number of private market agents, resulting in a high price spread. For example, in the case of horticulture, it was found that the average price at the farm gate was only 12–15% of the retail price (World Bank, 2008).

Farmers' lower share in the value chain is also a result of an underdeveloped marketing infrastructure, which results in high marketing inefficiencies. In this regard, there is a need for a comprehensive approach for developing primary and wholesale markets, scientific storage capacity, warehousing facilities, telecommunications, etc.

A related issue is the high costs of transportation, both international and domestic. India's international transportation costs are 20–30% higher than those faced by other countries, thereby nullifying the inherent production cost advantages. Studies have shown that a 20% improvement in transport efficiency can result in a 12% fall in final price (World Bank, 2008).

Another important area relating to marketing is the issue of wastage in transit. Due to poor transport conditions of tracks, losses in transit are as high as 35% in the peak of summer. This is further exacerbated by poor packaging and quality certification systems.

Food Security/Food Management

Food and nutritional security continues to remain central to India's agricultural policy due to the predominance of the poor in this sector. Food security issues are addressed through a mix of policy instruments that aim at ensuring remunerative prices to farmers, distributing food grains to the poor at affordable prices, and maintaining food buffers.[8] In recent years, support prices have risen continuously, thereby leading to an increase in food procurement and buffer stocks. This rise in food stocks has increased the cost of food management and lead to unsustainable food subsidies. Between 1990–91 and 2005–06, food subsidies increased from INR24.5 billion to INR230.71 billion i.e., a tenfold increase. But, not all of this cost can be considered subsidies. About 20–30% of this cost is on account of distribution and storage costs, which to a large extent is due to inherent inefficiencies in the procurement, storage, and distribution systems.

Shifts in food habits, particularly during the 1990s, added new dimensions to food management issues. Rice and wheat were no longer the only sources of calorie and protein intake; a demand for milk, poultry meat, eggs, fruits & vegetables, and fats & oils increased with rising incomes. This diversification of demand has necessitated a new policy approach for supplying these products at reasonable prices.

[8] Most of the small farmers do not have the capacity to hold on to their produce and, therefore, sell at low prices soon after harvest and buy food at higher prices in the off-season.

Increasing the supply of these products requires increasing investment and necessitates developing infrastructure to support downstream activities, such as food processing and marketing activities. There are many challenges for this shift to high value agriculture. First, to encourage farmers to shift to high value agricultural products the following actions are necessary: adding public investments in rural infrastructure; improving marketing and distribution systems; strengthening the support facilities like quality certification; and packaging. Secondly, considering the high initial investment required, the major beneficiaries would be large and commercially oriented farmers. The challenge is to include the small farmers into the diversification process, which would require planned government support and appropriate incentives.

Agricultural Trade

To support the overall goals of food self-sufficiency and price stability, a variety of trade policy instruments have been used to regulate agricultural exports and imports. Besides tariffs, quantitative restrictions such as quotas, licenses, and canalization through state parastatals were used to monitor agricultural trade with the objective of maintaining adequate domestic supplies. Under the Economic Reform package of 1991, partial liberalization of agricultural trade took place. Import licensing on sugar and cotton were relaxed and controls on rice exports were withdrawn. These initial steps were inadequate as most agricultural commodities were subjected to import control (Tables 4 & 5). India's import policy reform gained momentum only after the abolition of Quantitative Restrictions (QRs) in 2001, as required under the WTO framework.[9]

The broad guidelines for policy changes in trade (including agricultural trade) are provided by the Export-Import policy, which will be implemented for a five-year period. However, changes in tariff rates are announced annually and sometimes changes are made within a year.

Important features of India's agricultural trade are as follows:

- Even though the QRs were progressively withdrawn, restrictions on imports and exports continued on some critical commodities (i.e., wheat, pulses, edible oil, onions, and potatoes).
- In the modified tariff structure, there is a wide gap between bound and applied rates. This gap has been maintained to provide flexibility for tariff adjustments within the WTO frame-work of bound rates.
- Agriculture Export Zones (AEZs) were established to promote value-added agricultural exports. The Central Government, as well as the State Governments, has supported the establishment of the AEZs.
- In the early 2000s, the policy of subsidizing the export of cereals (wheat & rice) was initiated. Although these subsidies were small compared to domestic production but this export pricing support has resulted in the growth of India's exports of food grains.

[9] With considerable improvement in the balance of the payment situation in 1997, there was international pressure on India to accelerate the phasing out of QRs by 2001. Anticipating a surge in imports, India renegotiated bound tariff rates for some critical commodities. They include meat products (35%), dairy products (40–60%), cereals (60–80%), rapeseed oil (75%), soybean oil (45%), prepared meat & vegetables products (55%), fruit juices (85%), etc.

Thus, the broad approach of India's agricultural trade policies in recent times has been to integrate domestic markets with world markets, which necessitated a policy thrust for enhancing trade competitiveness.

Table 4. Changes in Import Policy for Major Agricultural Commodities

Commodity	1988–91	1992–97	1997–2002
Wheat, barley, sorghum, rice	Canalized	Canalized	Canalized till 1999. Now free
Maize for feed	Free	Free	Free
Chickpea and other pulses	Free	Free	Free
Rapeseed-mustard seed, soybean seed, groundnut seed	Canalized	Canalized	Canalized till 1999. Now free
Rapeseed-mustard oil	Canalized	Canalized	Free
Soybean oil	Canalized	Canalized	Free
Groundnut oil	Canalized	Canalized	Free
Edible vegetable oils	Restricted Canalized	Restricted Canalized	Coconut and RBD Palm oils canalized till 1999. Now Free
Onion	Restricted	Restricted	Restricted
Potato	Restricted	Restricted	Restricted
Cotton	Canalized	Restricted	Free
Jute	Canalized	Restricted	Free
Sugar	Free	Free	Free

Source: Ramesh Chand (2004).

Note: "Canalized" means that the imports of these commodities is subject to channeling through the statutory body or government agency.

Table 5. Changes in Export Policy for Major Agricultural Commodities

Policy	Commodities covered in different periods		
	1988–91	1992–97	1997–2002
Wheat	Restricted	Free s.t. QRs and MEP	Free s.t. QRs
Rice	Restricted	Free s.t. QRs and MEP	Free
Maize for feed	Free	Free	Free
Maize	Restricted	Free s.t. QRs and MEP	Free s.t. QRs
Sorghum	Restricted	Free s.t. QRs and MEP	Free s.t. QRs
Barley	Restricted	Free s.t. QRs and MEP	Free s.t. QRs
Pulses	Prohibited	Restricted	Restricted
Rapeseed/Mustard	Prohibited	Restricted	Free
Soybean	Prohibited	Restricted	Free
Groundnut	Free	Restricted, except H.P.S. which is free	Free
Soybean oil	Prohibited	Restricted for more than 5 kg. pack	Restricted for more than 5 kg. pack
Rapeseed/Mustard oil	Prohibited	Restricted for more than 5 kg. pack	Restricted for more than 5 kg. pack
Groundnut oil	Prohibited	Restricted	Restricted
Onion	Canalized	Canalized	Canalized
Cotton	Free	Regulated	Free
Sugar	Canalized	Free s.t. QRs	Free

Source: Ramesh Chand (2004).

Note: QR (Quantative Restriction), MEP (Minimum Export Price).

BASIC POLICY FRAMEWORK AFFECTING AGRICULTURE

Macroeconomic/General Policies

In 1990–91, India embarked on economic liberalization and structural reform programs, following the severe balance of payments crisis. These widespread reforms were undertaken in phases and covered most sectors of the economy. The overall reform program focused on exchange rate correction, foreign trade and payment policies, external borrowing, and investment policies. At the sectoral level, widespread reforms were initiated for industry and manufacturing, as well as the services sector, particularly the financial sector. The agricultural sector was initially completely bypassed, though a gradual liberalization in the sector started in 1994. This sector, however, gained indirectly from reforms in exchange rate policy and fiscal and monetary policies, which together improved the terms of trade for agriculture.

Fiscal Policy

The thrust of the fiscal policy reform has been to address the rising fiscal deficit (of the central and state governments) and to contain the slowdown in industrial production. The government revenue came through different types of taxes, where the tax rates were high and regressive. The expenditure, however, was more for current consumption, which completely neglected the investment needs of the economy, particularly that of physical infrastructure, education, health, and social programs. Furthermore, government borrowings (both from domestic and external markets) dampened the domestic private investment because of high real interest rates and resulted in unsustainable government debt.

Following the development of the above macro issues, the fiscal reforms aimed at: (a) finding innovative ways to finance government investment, particularly in the development sector; (b) providing appropriate incentives for encouraging private investment; and (c) rationalizing various taxes for promoting production.

As such, a wide range of tax reforms (both direct and indirect) and measures for controlling government expenditure were initiated. Spending by Central and State Governments was restricted by legislation requiring them to cut their fiscal deficit. The Fiscal Responsibility and Budget Management Act of 2003, called for the reduction in the fiscal deficit and the elimination of the revenue deficit by March 2009. To increase the government's revenue, efforts were made to widen the tax base and for better tax compliance. Thus, there was an overall improvement in fiscal transparency of public finances, greater value for money in public expenditure programs, and noticeable progress in major tax reforms.

Monetary Policy

Monetary policy is the responsibility of the Reserve Bank of India (RBI). The objectives of the monetary policy have been growth, accompanied by stability. Between these two goals, the emphasis has been to maintain price stability (within reasonable bounds) and to ensure an adequate flow of credit to the productive sectors of the economy. The RBI also ensures a favorable monetary and interest rate environment for supporting exports and investment demands.

The RBI manages the monetary policy by targeting broad money supply. Various instruments like cash reserve ratio and open market operations were used to manage the money supply growth. To enable

short-term liquidity, repo and reverse repo auctions were carried out periodically. Thus, the focus of the monetary policy has shifted from liquidity related issues to improving system efficiency.

With the recent rise in international commodity prices, the inflationary pressure in the domestic market has increased significantly. As a result, the RBI in 2007 raised the interest rates by increasing reserve requirements and the reverse repo rate. This resulted in the rise in call money rate (to a nine-year high) and translated into a high real interest rate (of 6–7%) (WTO, 2007).

Trade Policy Reform

India's trade policy, in the past, had focused on a system of controls and licenses that supported an approach to development that looked inward. In the mid-1980s, experimentation with partial liberalization was initiated. However, major shifts in the approach of India's trade policy took place in 1991 in order to make the trade policy consistent with the new economic reform program.

The exchange rate reforms, particularly those of devaluation and partial convertibility, addressed the anti-export bias that underlined the previous policy approach. The other reforms have aimed at simplification and a quest for transparency in procedures and incentivizing exports. Some of the major policy initiatives that reformed trade were:

- the elimination of licensing and expansion of Open General Licenses products;
- the lifting of quantitative restrictions on imports of goods;
- the reduction in peak tariff from 300% to 25%; and,
- the simplification and rationalization of Export Oriented Units and Export Processing Zones.

The first three measures aimed at improving efficiency through the reduced cost of imported raw material and the last one provides fiscal incentives to encourage exports (Roy, 2005).

Efforts were also made to liberalize capital flows. The major reforms that were initiated in the areas of Foreign Direct Investment (FDI) and Foreign Portfolio Investment. In key sectors like power, roads & highways, ports, drugs & pharmaceuticals, hotels & tourism, advertising, and mining, 100% foreign ownership was allowed under an automatic route. In some sectors like telecommunications and airports, below 100% FDI was permitted. The financial sector gradually became opened to FDI. In a few industries, FDI was permitted on a case-by-case approval. The negative list of FDI includes industries like agriculture & plantation, retail trading, atomic energy, gambling, etc.

The exchange rate policy, since 1993, has been guided by the broad principles of the managed float regime. The objective has been to contain exchange rate volatility through a pre-announced target or 'band' for appropriate intervention. Since 1993–94, the Indian rupee has been made fully convertible on current account. Policy options are also being explored for capital account convertibility. As the growth in inflation is higher in India compared to its major trading partners, there is a wide gap between nominal and real effective exchange rates.

One of the outcomes of the managed float system has been the massive build up of foreign exchange reserves. In recent years, the net inflows (capital plus current account) have been rising, thereby putting severe pressure on money supply and inflation.

Agricultural Policies

The agricultural policy framework in India is guided by three goals; food self-sufficiency, remunerative prices to farmers, and stable prices for consumers. Even though these goals have underlined developments in the agricultural policy framework, the instruments used for attaining these objectives has differed over the years. Broadly, four phases of agricultural policy developments have been categorized to understand the evolution of agricultural policy instruments.

The first phase, which covered the 1950s to the mid-1960s (i.e., the pre-green revolution period), focused on widespread agrarian reforms, institutional changes, and major irrigation projects. The objectives were to increase agricultural production through area expansion, minimize the exploitation of the cultivators, and to provide support facilities.

The second phase, which covered the mid-1960s to the mid-1970s, aimed at food self-sufficiency through improved agricultural technology, specifically, High Yielding Varieties (HYV) of wheat and rice. The approach was to strengthen input supply systems, research, extension, credit, marketing, and price support. This strategy helped India attain food self-sufficiency, thereby reducing import dependency for food.

During the third phase, which covered the 1980s, the approach was to develop a production pattern that was consistent with the changing demand pattern. The emphasis was on diversification that was largely driven by the output growth of non-food grains like milk, meat-products, fruits, vegetables, etc. Support to the agriculture sector was largely in the form of input subsidies and price support schemes. Accordingly, the market orientation of the agricultural sector increased significantly during this phase.

During the fourth phase, which covered the 1990s and the 2000s, the approach was to integrate domestic markets with that of the world markets. Partly, this was on account of domestic compulsions and in response to the developments in the multilateral trade negotiations. Reforms such as the abolition of minimum export prices on basmati rice, the removal of import controls on sugar, cotton, and common rice, and the reduction in tariffs in the edible oil sector, were initiated. The underlying emphasis was to enhance India's agricultural competitiveness and integrate it with the world economy.

Under this changing agricultural policy environment, a number of problems have surfaced. The thrust on input subsidies and price measures for increasing crop production/productivity resulted in the complete neglect of developing efficient marketing infrastructure. With the persistence of imbalances in commodity price incentives and the ineffectiveness of input subsidies, it has become evident, especially in the years after mid-1990s, that to push the agricultural sector into a higher growth trajectory, these issues required immediate attention. The domestic compulsions of meeting the growing food requirements, raising incomes, and reducing poverty in rural areas, alongside with external compulsions of staying competitive in the world market has necessitated a review of the existing policy instruments. For this reason, a detailed review of existing policy instruments has been carried out, primarily to define their objectives and subsequent effect.

Price Support

The price support policy aims to safeguard the interests of the farmers against a sharp price fall and ensure reasonable farm income. Currently, the government sets Minimum Support Prices (MSP) for 24

major crops[10] based on recommendations made by the Commission on Agricultural Costs and Prices. The MSP is announced before the commencement of sowing operations each year and thus, it becomes the floor price that the farmers are assured. Depending on the market price, the farmers have the option of selling the produce in the open market or to the designated government agency at the MSP. The MSP operations are significant only for rice, wheat, and sugar cane. For other commodities, the actual government procurement is negligible as the market prices have been generally higher than the MSP.

For horticultural and other agricultural commodities not covered by MSP, there is the Market Intervention Scheme (MIS). Under the MIS, if a price of a commodity falls below a specific level, the government can intervene and purchase the product at the intervention prices. The MIS has been used to support a number of horticultural crops like oranges, coriander, apples, oil palm, potatoes, red chilies, ginger, and onions.

The MSP has been maintained at higher than the cost of production, particularly for rice and wheat. High MSP has encouraged production, thereby necessitating greater government procurement, and resulting in a huge accumulation of buffer stocks. These burgeoning buffer stocks exerted downward pressure on open market prices, thus necessitating even greater government procurement.

The steady increase in MSP has also had adverse trade implications. In the late 1990s, the rising MSP coincided with a steep downturn in international prices. Domestic prices rose, while international prices fell, thus making Indian exports uncompetitive. Following this, the government raised the import duty of wheat from 0% to 50%. With increasing buffer stocks and high associated costs, the government had to subsidize the marketing costs and internal freight costs in order to offload some of the stocks as exports.

Another dimension of the MSP policy has been its impact on food management and food subsidies. Food subsidy to consumers is operated through the Targeted Public Distribution System (TPDS), which is the only safety net program that subsidizes the prices of essential food commodities. TPDS has a two tiered pricing structure for those Below the Poverty Line and those Above the Poverty Line.The government has also introduced another sub-scheme in 2000 called the Antyodaya Anna Yojana. This was aimed to benefit the poorest of the poor. The Antyodaya Anna Yojana provides a larger price subsidy and quantity of rice and wheat than that of Below the Poverty Line households.

Under the existing TPDS, the issue prices remained unchanged, while the procurement cost increased with the rising MSP. As a result, the growth in food subsidy has been very significant. Studies have shown that the benefits of high MSP have been cornered by the large scale farmers, particularly in agriculturally developed states. Even with the implementation of the TPDS, a large number of the poor still remain out of this scheme due to implementation issues (World Bank, 2004).

Agricultural Inputs

In the post-Green Revolution period, subsidizing agricultural inputs has been central to the agricultural policy of India. As the availability of inputs was critical for increasing agricultural production, the main objective of subsidizing these inputs has been to improve access for farmers' and to ensure their availability and affordability.

[10] These are: paddy, maize, coarse cereals, pulses, cotton, groundnut, sesamum, niger seed, wheat, barley, rapeseed, mustard, safflower, sunflower seed, soybeans, toria, copra, jute, sugar cane, and tobacco.

Agricultural input subsidies have registered a fourfold growth, i.e., from INR140 to INR488 billion, during this period. Of these figures, fertilizers, electricity, and irrigation account for a share of about 91% (Government of India, 2002).

It needs to be emphasized that only a part of these input subsidies actually accrue to the farmers. In the case of fertilizers, a significant part of the subsidies is shared with the fertilizer industry as per the existing pricing policy.[11] On the basis of import parity price formula, studies have shown that the farmers' share varies between 45–80% depending on the price of the imported fertilizers (IFPRI, 2005).

Irrigation and electricity subsidies are charged to the budgets of the states. Because of issues with measuring, only a part of these subsidies actually accrue to the farmers. Agricultural power consumption is not metered and is determined on a residual basis. As such, there is wide scope of including power consumption for other uses than that of the agricultural sector. It has been estimated that agricultural power consumption is overstated by 40% (Gulati & Narayanan 2003). Furthermore, a part of the subsidy also supports the inefficient supplier, i.e., the State Electricity Board .

In the case of irrigation subsidies, the main beneficiaries have been farmers, as the pricing of canal water does not cover more than 20% of the operation and maintenance costs (O&M). Various pricing methodologies have been suggested by different committees constituted by the government. The suggestion made by the Vaidyanathan Committee, which recommended that the water pricing need to cover O&M plus one per cent of Cumulative Capital Expenditure, is more acceptable. On the basis of this formula, the government's estimate of irrigation subsidies understates the actual subsidy by 15–20% (IFPRI, 2005).

Farm Insurance

Erratic yields due to weather fluctuations, natural calamities, pests, and diseases have subjected farmers to high yield risks. To facilitate the farmers in managing these risks, the National Agricultural Insurance Scheme was introduced in 1999–2000. The scheme is available to all farmers (irrespective of their size holdings) and covers all food crops, oilseeds, and other commercial/horticultural crops. At present, a 10% subsidy on the premium to be paid is available to small and marginal farmers.

Despite a high claim ratio (1.3:3) and low premium rates, farmers (particularly non-loanee) have not come forward to capitalize on the benefits of the scheme. In making the scheme more farmer friendly, the Weather-Based Crop Insurance Scheme was implemented on a pilot basis in 2007–08. This scheme has the advantage of settling the claims in short time and the premium charged is subsidized. Under the scheme, for crops, the farmers pay only 20% of the premium and the remaining 80% is contributed equally by the Central and State Governments. For horticulture crops, the farmers are to pay 50% of the premium, while the remaining is contributed by the Central and State Governments.

[11] The Retention Price Scheme for fertilizers aims to insulate the farmers from rising prices and to ensure the availability of this input. On the basis of the normal cost of production (which includes a 12% post tax return), a retention price is fixed for the industry. The government also fixes the "sale price" of fertilizers. The difference between the retention price and sale price is paid as a subsidy to each manufacturing plant.

Credit Support

The credit support to agriculture, primarily in the form of concessional interest rates, has almost doubled over the last five years. The commercial banks have continued to be the major source of institutional credit followed by the co-operative banks.

To ensure a free flow, about 18% of the bank credit of all commercial banks is earmarked for agriculture. The Kisan Credit Card scheme was introduced in 1998–99 to facilitate access to short term credit for farmers. This has become a widely accepted mechanism of credit delivery to farmers. The co-operative banks have the highest share in disbursing these loans.

Price Stabilization Fund Scheme

This scheme was initiated in 2002 and covers plantation crops (e.g., tea, coffee, rubber) and tobacco. The objective is to facilitate farmers for managing price risks without resorting to the practice of procurement operations. Intervention through Price Stabilization Fund means that when price falls (below a threshold level), participating growers will be compensated through the fund. Consequently, when prices rise, the growers will have to contribute a fixed amount to the Price Stabilization Fund. The scheme has not been very effective as there has been a high incidence of default by growers in depositing their contributions.

RECENT POLICY DEVELOPMENTS

With rising incomes, urbanization, and shifts in consumption patterns, the approach to long term development of the agricultural sector has been reviewed. Until the 1990s, the agricultural policy framework was driven by the objectives of food self sufficiency, stable consumer prices, and remunerative prices to farmers. The new policy initiatives, besides underlining the importance of agriculture in the socio-economic fabric of India, also aim to address the income disparity between the farm and the non-farm sector. As such, the approach has been to evolve an appropriate policy framework that would ensure viable farming activity and improve the economic conditions of farmers on a sustainable basis. During the past decade, as discussed earlier, the agricultural growth rate has shown a declining trend; and production and productivity has remained stagnant. Therefore, to reverse this deceleration, focus has been laid on addressing imperfect market conditions and strengthening the backward and forward linkages.

National Agricultural Policy

The National Agricultural Policy announced in 2000, aimed at achieving an annual growth of 4% in the agricultural sector by improving the post-harvest and marketing infrastructure, so as to reduce production losses that result from poor storage and processing facilities. Further, the Bharat Nirman Programme identified seven areas of strengthening rural infrastructure that need to be addressed by 2009. Some of these areas are: additional irrigation capacity, road links, houses for rural poor, provision of potable water, and provision of electricity. The other initiatives taken to address the farmers' livelihood and income are: the National Rural Employment Guarantee Scheme; the National Horticulture Mission; the expansion of Institutional Credit to Farmers; the establishment of National Rainfed Area Authority; the reform in

agricultural marketing; the reform and support for agriculture extension services; the National Food Security Mission; the Warehousing Development and Regulation, etc.

Eleventh Plan Outlay

The approach paper to the Eleventh Five Year Plan also emphasizes the need to increase farm productivity through better resource use and the need to diversify to higher value-added outputs including horticulture and floriculture. A greater emphasis was also laid on fisheries and livestock sub-sectors. Efforts in this direction have been further initiated. In 2002, foreign direct investment was permitted in tea plantations and in 2006, it was permitted in horticulture, animal husbandry, food processing, and retailing. Nine items in agriculture and allied industries are currently reserved for production by the small scale sector. Further, linkages between farmers and processors have been strengthened through contract farming. In the 2004–05 budget, the government announced the National Horticulture Mission, which aims to increase the output to 300 million tons by 2011–12 and to enhance exports of these products. Support from the private sector is encouraged to set up agricultural markets, marketing infrastructure, grading certification, and quality inspection.

National Policy for Farmers

The National Policy for Farmers announced in 2007 is a holistic approach to improve the net income of farmers. The objective is to identify low income farmers and provide institutional support for increasing productivity and profitability, besides the provisions of appropriate price policy and risk mitigation measures. In this regard, special categories of farmers (such as tribal farmers, plantation farmers, and pastoralists) have been identified to extend requisite support facilities. Additionally, special categories of farming have also been identified. These are: Organic Farming, Green Agriculture, GM Crops, and Protected Agriculture. Thus, this policy aims to address the local needs in different states.

National Food Security Mission

The National Food Security Mission (NFSM) is a centrally sponsored scheme that aims to increase food production above the benchmark levels of the Eleventh Plan through area expansion and productivity enhancements. The NFSM also aims to create employment opportunities and enhance farm level economy.

The implementation of the NFSM at the district level and the identified districts are given flexibility to adopt any local area specific interventions. The NFSM is being implemented in 306 districts across 16 states. An amount of INR14.94 billion has been released to various states.

National Horticulture Mission

The National Horticulture Mission was launched in 2005–06 as a holistic development of the horticulture sector by ensuring horizontal and vertical linkages. The National Horticulture Mission's objectives are to: enhance horticulture production through area-based differentiated strategies; improve income support to farm households; and develop and disseminate technologies.

SUPPORT TO AGRICULTURE

Selection of Major Commodities

India has a diversified agricultural production base consisting of cereals (35%), pulses (5%), oilseeds (7%), fibres (3.5%), spices (4%), sugar cane (6.4%), beverages (2.8%), fruit and vegetables (23%), and others (6%).[12] Each of these product groups has its own significance in the overall framework of agricultural development of India. The development of cereal production has been underlined by the need to attain food self sufficiency. In the case of pulses and oilseeds, which carry a significant weight in the consumption basket, the domestic production is inadequate in meeting domestic consumption requirements. As such, the import dependence for these crops has continued to be high. For spices, beverages, sugar cane, and fruit & vegetables, the commercial orientation of these crops is very high and, therefore, the focus has been on export promotion. Given these differences, the market and trade issues differ significantly between crops and also the crop programs.

In addition, some of these crops are important for rural livelihood. As the production is concentrated in certain regions of the country, they have significant relevance for the local agriculture. For example, pepper, natural rubber, tea, and coffee account for over 70% of Kerala's agricultural economy. Similarly, the production of tea is concentrated in the states of Assam and West Bengal, and sugar cane in the states of Uttar Pradesh and Maharashtra. Thus, these various dimensions of India's agricultural production need to be duly represented while selecting the agricultural commodities for estimating the PSE and other policy indicators. In doing so, various criteria like the relative importance in agricultural production, export orientation, import substitution, and new consumer products have been used for the selection of agricultural products. A total of 15 commodities have been selected, whose details are given in Table 6. A summary of the production level, value of production, and trade status of each of the selected commodities is given in Table 7. Fruit and vegetables have not been selected as they are highly diversified and data is not easily available.

Table 6. Composition of TSE by Recipient of Transfer (INR billion)

	1990	1991	1995	2000	2005	2008
PSE	133.6	14.3	–382.1	725.8	465.9	–784.0
GSSE	28.0	33.3	68.4	108.7	216.4	303.0
Transfer to consumer	0.6	0	0	56.4	114.8	436.5
TSE	162.2	47.7	–313.7	891.0	797.1	–44.5

Source: PSE Template.

Table 7. Composition of TSE by Source of Transfer (INR billion)

	1990	1991	1995	2000	2005	2008
TSE	162.2	47.7	–313.7	891.0	797.1	–44.5
Transfer to Consumer	52.6	–102.2	–545.9	416.4	–4.8	–180.9
Tax payers	109.4	149.6	227.7	474.4	803.3	1,762.8
Budget	0.2	0.3	4.6	0.2	–1.3	1.8

Source: PSE Template.

[12] The figures in brackets are the share of the value of output in the total value of agricultural output as estimated by the Central Statistical Organization in 2000.

Data Sources and Key Assumptions in Measurement

Data Adjustments for Computation of Crop-wise PSE

The reference period for the calculation of the PSE, both at crop level and national aggregate level covers the years of 1990 to 2008. For computing the PSE, detailed data on crop-wise production, producer prices, and trade data (export & import) is required. The primary data source for all crops is the "National Accounts Statistics" put together by the Central Statistical Organization (CSO), which provides the data on the value of agricultural output. This data has been used for calculating the Gross value of Agricultural Output (GAO). The value of agricultural output data at the crop level has been used to estimate the producers' prices by dividing them with the production data. The production data has been taken from "Agricultural Statistics at a Glance," produced by the Department of Agriculture and Co-operation, Ministry of Agriculture. For milk and meat products, data on production and producer prices have been taken from the FAO.

For all crops, trade data has been sourced from the database "India Trades" of the Centre for Monitoring India's Economy (CMIE). The HS codes, corresponding to the primary form only, have been considered and the details are provided in Table 8. Trade data for milk and meat products have been taken from the FAO.

The adjustments made for computing producer prices, border prices, and reference prices are detailed in Table 8.

Table 8. Composition of GSSE (INR million)

	1990	1991	1995	2000	2005	2008
GSSE total	28,032	33,346	68,438	108,731	216,387	303,005
Research and development	148	262	4,548	2,375	4,941	7,238
Agricultural schools	3,218	3,545	5,777	13,724	19,734	33,715
Inspection services	316	736	478	354	809	1,336
Infrastructure	11	45	180	197	1,232	8,024
Marketing and promotion	20	19	370	728	2,079	3,367
Public stockholding	24,200	28,505	53,920	90,335	171,976	205,816
Miscellaneous	120	235	3,165	1,018	15,616	43,508

Source: Authors Calculation from Template.

Budget Data and Adjustments

- The data used for budgetary transfers for various policy schemes are the Revised Estimates from the budget documents. Also, both Plan and Non-Plan expenditures have been considered.

- Credit disbursements
    i) Total yearly disbursement = Short Term + Medium Term + Long Term Credit.
    ii) 2% interest concession for agricultural credit.
    iii) 2% of total yearly disbursement taken as credit subsidy.

- Policy schemes for Soybean & Groundnut
    i) Scheme wise, the expenditure for combined oilseeds is given. Apportioning of the expenditure for soybean and groundnut was on the basis of the share of each crop in the value of output of oilseeds: Groundnut: 26.6%, and Soybean: 21.1%.

- Policy Scheme for Pepper
    i) Scheme wise, the expenditure for pepper is combined with all spices implemented by the Spices Board. The share of pepper in the production, marketing, and export policy support has been apportioned on the basis of the share in area of all spices, which is 9%.

- Food subsidy: Allocation between GSSE and Consumer Transfer
    i) MSP of paddy adjusted by 0.7 for rice.
    ii) Issue price – MSP.
    iii) MSP x offtake = Consumer subsidy (calculated separately for Wheat and Rice)
    iv) From the government's annual food subsidy, consumer subsidy was subtracted to derive the expenditure on warehousing and distribution. This was put under GSSE.

Trends in Total Support to Agricultural

The total support to agriculture (TSE), by definition, is the monetary value of all gross transfers from taxpayers and consumers, which arise from policies that support agriculture. The trends in the composition of the TSE show the economic group that benefits from the transfers and the economic group that bears the cost of these transfers. Table 6 summarizes the trends in the TSE in terms of different recipients[13] and Table 7 summarizes the trends in terms of the sources of transfer.

The broad trend in the TSE indicates negative support to agriculture until 1996 followed by positive support until 2007. To a large extent, the trend in the TSE is determined by the PSE, implying that the agricultural policy developments in India have focused on individual producers (Table 6). At the same time, the support through general services has increased during the reference years. The share of the GSSE in the TSE increased from 12% in 1999 to 38% in 2006.[14] This reflects a slow shift in policy support from the PSE to general support measures for agriculture, particularly since early 2000.

A closer look at the composition of the GSSE shows that public stockholding is a major component of the GSSE, followed by agricultural schooling, and R&D (Table 8). The public stockholding mainly supports the PDS and furthermore, most of the expenditure is on account of operational inefficiencies. As such, this cost head provides very limited support to agriculture in general. However, from early 2000, there has been a perceptible shift in the structure of the GSSE support to agriculture. The relative importance of public stockholding has declined over the years from 86% in 1991, to 67% in 2008. Expenditure on R&D and agricultural schooling has increased significantly. From 2005 onwards, new expenditure heads like policy & planning and RKVY (employment generation) have gained significance.

[13] The transfers to agriculture as distinguished by recipients are: (a) transfers to producers (PSE); (b) transfer to general services; and (c) transfers to consumer, i.e., consumer subsidies.

[14] It needs to be mentioned that an assessment of the relative importance of GSSE in TSE is difficult to make, particularly when the PSE is negative or low due to a negative MPS. For instance in 2007 and 2008, TSEs were very small being offset by negative market support and this resulted in the share of GSSE at 67% in 2007 and minus 681% in 2008.

The cost of support to agriculture (=TSE), as Table 7 highlights, is largely borne by consumers, particularly during 1999 and 2004. This is because of higher domestic prices relative to world prices. Prior to 1999 and after 2005, the producers had negative market support.

Level of Producer Support

Between 1990 and 2008, there were wide variations in the PSE primarily due to counter-cyclical support measures. Two policy instruments have determined the trends in the PSE, namely, Market Price Support (MPS) and payments based on input use. In most years, the MPS was negative, except 1990 and from 1999 to 2004. The negative MPS implies that the agricultural producers were taxed as the domestic prices were lower than the world prices. During the years 1999 and 2004, the producers received positive support as the world prices fell steeply. Moreover, during these years, the rupee depreciated steeply.

The transfers to producers have been mainly in the form of input subsidies particularly, fertilizers, electricity, and water. In most years, the positive input subsidies have been counter-balanced by the negative market support. This would mean that when the absolute value of positive input subsidies is higher than that of a negative MPS, this results in a positive PSE. This is particularly evident in 1991, 1994, 1998, 2005, and 2006. The issue that arises from this is whether or not the government is compensating the negative price support with input subsidies.

During the years 1999 and 2004, the PSE is positive on account of a positive MPS and positive input subsidies. A closer look at the relative importance of input subsidies during these years shows that the share of subsidies in the PSE has declined from 61% in 1999 to 55% in 2004. This raises the issue of whether there have been shifts in the composition of the PSE (Table 9). In this regard, the important economic policy developments that took place during these years need to be underlined.

Table 9. Composition of Producer Support National Aggregate (INR million)

	1990	1991	1995	2000	2005	2008
PSE	133.6	14.3	–382.1	725.8	465.9	–784.0
MPS	58.5	–96.5	–541.5	416.5	–20.9	–1,928.0
Payment based on input used	75.0	110.9	159.0	309.3	478.8	1,135.9
PSE %	7.4%	0.7%	–11.4%	14.1%	6.6%	–7.7%

Source: Authors Calculation from Template.

Following the economic restructuring program of 1991, serious efforts were made to reduce the incidence of subsidies, particularly that of food, fertilizer, electricity, and water. At the same time, there have been shifts in India's tariff policy when canalizations of most agricultural imports were withdrawn in 1999. Also, India had to withdraw QRs in a phased manner by 2001, which included over 220 tariff lines falling under agricultural products. The threat perception following this has translated into higher border protection for some sensitive products, particularly those relating to food security (cereals) and import substitution (edible oils). During this period, India also undertook measures (both aggregate and commodity specific) to promote exports as reflected in the New Foreign Trade Policy (2004–2009). These policy changes, along with the continuous increase in the MSP for cereals, pulses, cotton, oilseeds, and sugar cane have led to higher domestic prices relative to international prices, thereby resulting in a positive market price support to producers.

In this context, the trend in %PSE highlights the significance of the above transfers in producers' gross farm receipts. Between 1998 and 2003, the %PSE increased from 2.5% to 13.8% and thereafter, declined to 2.5% by 2006. This reflects the rising significance of support measures to producers particularly under conditions of falling world prices. Additionally, it is also important to highlight the macro policy developments, particularly those relating to exchange rate changes that have also contributed to the observed market price differentials. The Rupee–US dollar exchange rate, which was INR41.26 in 1998, depreciated to INR48.59 in 2002, and thereafter stabilized at INR45.9. Thus, the changes in world prices, exchange rate, and agricultural policies have influenced these shifts in producer support.

Produce Support: Commodity Level

The PSE indicators by commodity highlight the wide differences in the level of support across crops. As the policy approach differs between food and non-food crops, the selected products have been categorized for analyzing the trends in producer support as: food crops, exportables, and milk and meat. Broadly, four indicators have been used to compare the level of support across crops and assess their contributing factors. These indicators are: Total PSE, Unit PSE, %PSE, and Producer NPC.

During the reference period, the PSE is negative (or producers have been taxed) for rice, natural rubber, tea, cashew, pigmeat, and beef & veal. For the other products, the PSE is positive. In terms of Unit PSE, there is a rising trend for wheat, soybean, poultry meat, milk, and groundnut, and a decreasing trend for sugar cane. A detailed examination of the PSE trends in each of the product groups is examined in the following sections.

Producer Support: Food Crops

a) Rice

As rice is a major food crop in India, there are widespread restrictions on the procurement, marketing, distribution, and exports on common rice. The primary objective of the pricing policy is to maintain low consumer prices while maintaining remunerative prices to the producers. As such, the government intervenes in the rice market through support prices and procurement prices/operations.[15] While the producers are supported by the Minimum Support Prices (MSP), low consumer prices are maintained by restricting exports. Exports of common rice were banned until 1994 but in recent years India has emerged as a major exporter of common rice with export subsidies. Currently, even though the rice exports have been made free, exports have been banned from time to time, whenever domestic prices have risen.

The PSE estimates for rice are negative in most years except for the years 1999 to 2003, when the world prices fell. The rice producers were taxed as the domestic prices were maintained lower relative to world prices. On average, the domestic prices received by producers were about 10%–30% lower than the world prices as reflected by the trend in Producer NPC.

[15] Under the Essential Commodities Act (1955) the Food Corporation of India (FCI) procures rice from the millers at the previously announced procurement prices as per the statutory levy system. Thus, rice procured is distributed to consumers under the Public Distribution System. With the continuous rise in support and procurement prices, the stocks accumulated with the FCI, thereby compelling the government to export the excess stocks by giving export subsidies.

The Market Price Differential (MPD) values indicate that rice producers have been taxed in all of the years except for the years 1999 to 2003. From 1990 to1999, the domestic prices were lower than the international prices because of the export ban in place until 1994 and because of the world price peak in 1995–97. The trend in Producer NPC indicates that the producers were being taxed to the extent of about 10%–30%. The disprotection continued again from 2004 onwards, when world prices began to rise, coming to a peak in 2008.

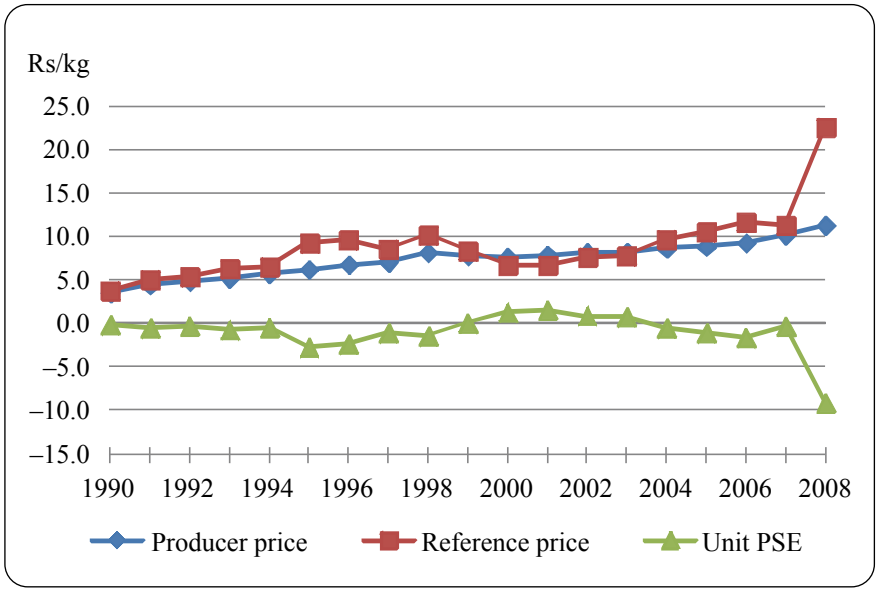

Figure 1. Rice Prices and Unit PSE

These trends in the MPD clearly explain the observed export trends. In 1996, following the withdrawal of the export ban, rice exports increased to 4.9 million tons, from about 0.9 million tons in the previous years. The same trend in exports is evident from 2003 onwards. This would imply that without policy restrictions, domestic producers would have realized better market opportunities from the international market.

As the world prices fell during 2000 and 2003, the PSE for rice became positive primarily because of the rise in MSP, which ensured stable producer prices. During these years, it is important to note that the government had given subsidies for exporting common rice to reduce the stocks with FCI.

As highlighted in Table 10, the PSE for rice is determined by the trend in MPS. Although the input subsidies (fertilizer, irrigation, and credit) have increased over the years, the tax due to lower domestic prices was more than the positive input subsidies.

Table 10. PSE Estimates for Food Products

Rice	1991	1995	2000	2005	2008
1. PSE	–33,050	–208,496	107,944	–86,794	–864,124
(a) Market price support	–51,454	–232,403	68,120	–149,060	–1018,858
2. %PSE	–9.5	–41.4	15.7	–9.9	–69.4
3. Producer NPC	0.9	0.7	1.1	0.8	0.5
Wheat					
1. PSE	8,873	–41,231	208,272	165,132	61,879
(a) Market price support	–1,408	–54,401	181,872	124,059	–40,673
2. %PSE	5.9	–16.5	46.1	33.6	7.3
3. Producer NPC	1.0	0.8	1.8	1.4	0.9
Maize					
1. PSE	8,650	–932	11,827	11,901	–9,824
(a) Market price support	7,157	–2,924	8,184	5,503	–12,028
2. %PSE	30.1	–2.2	18.8	13.2	–6.3
3. Producer NPC	1.4	0.9	1.2	1.1	0.9
Soybean					
1. PSE	4,416	4,750	7,187	16,982	27,758
(a) Market price support	3,345	2,440	3,911	8,976	421
2. %PSE	21.4	10.4	13.2	15.1	12.7
3. Producer NPC	1.6	1.1	1.1	1.2	1.0
Sugar cane					
1. PSE	–1,009	–60,892	21,976	78,440	–8,937
(a) Market price support	–7,766	–71,232	3,238	48,389	–57,206
2. %PSE	–1.4	–47.4	11.2	30.8	–2.8
3. Producer NPC	0.9	0.6	1.0	1.3	0.8
Groundnut					
1. PSE	–17,944	–136	2,249	6,612	41,461
(a) Market price support	–21,657	–4,623	–3,137	–3,494	9,045
2 %PSE	–25.1	–0.1	2.5	4.7	16.0
3. Producer NPC	0.7	0.9	1.0	1.0	1.0

Source: Authors Calculation from Template.

Note: PSE and MPS figures are in INR million. Producer NPC is ratio.

b) Wheat

Wheat is another important staple food crop that is subjected to a wide range of policy interventions. On the domestic front, support prices for producers are maintained even while there are restrictions on domestic movements between states and stocking limits for traders. On the trade front, exports were restricted until 1995 and imports were subjected to a tariff of 50% from 1999 onwards.

The domestic production of wheat has increased from 55 million tons in 1990 to 69 million tons in 2008, under a consistently rising producer price support regime. The MSP for wheat increased from INR2.25/kg in 1990 to INR10.80/kg in 2008. This rise in producer prices has influenced the wheat trade flows. Until 1998, the domestic prices were lower than world prices, which resulted in very low imports.[16] Exports also did not take place as there were export bans until 1995. However, after 1998, domestic prices were higher than the world prices and imports rose until 2000.Thereafter, greater efforts were made to export wheat by giving subsidies to farmers.

[16] In 1993 and 1994, wheat imports took place as production fell short of consumption.

The effects of these policy shifts on wheat producers are clearly evident in the subsequent graph. The unit PSE is positive and has been rising since 1995 onwards. From 1998 to 2005, the unit PSE ranged between INR1.02/kg to INR2.38/kg. This trend clearly shows that the level of protection has increased with a fall in border prices. Overall, the protection remained high from 1998 to2005. The trend in the % of PSE shows that price support has accounted for about 17% to 34% of the gross farm receipts received by the producers.

The composition of support for wheat is primarily through market price support and payments on input use. Between 1998 and 2005, the share of the MPS increased from 66% to 78%. However, during the years when world prices have peaked (i.e., between 2006 and 2008), a larger share of support was on account of input use payments.

Despite this high level of price support, wheat exports increased from 0.8 million tons in 2001 to 4.1 million tons in 2004 and 2.0 million tons in 2005. The producer NPC was greater than one, indicating that the domestic prices were higher than the world prices. Under these conditions, exports picked up only when subsidized. Thus, India emerged as a net exporter of wheat from the year 2000 onwards.

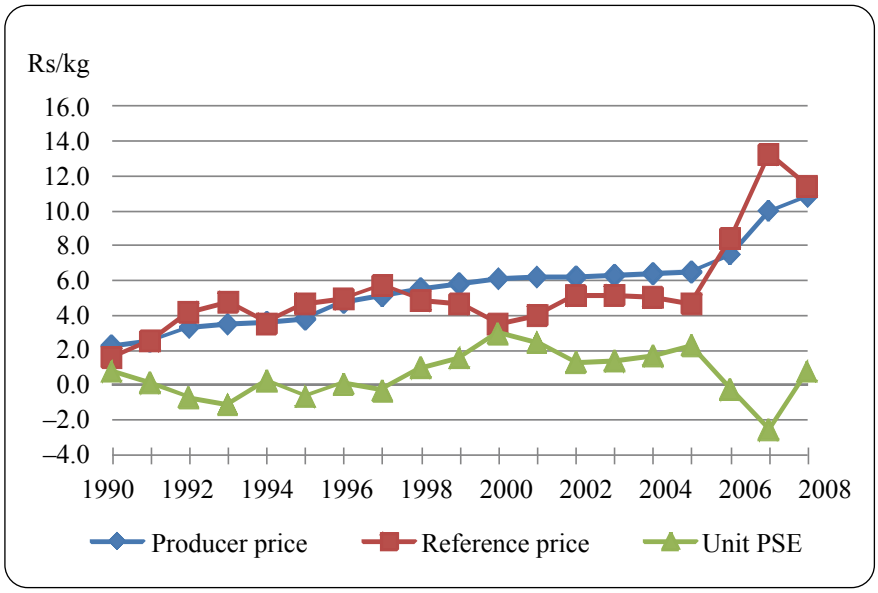

Figure 2. Wheat Prices and Unit PSE

c) Soybeans

Edible oils are India's main agricultural import, with palm oil and soybean oil being the main importables. With a significant production to consumption gap, India followed a conscious import substitution strategy wherein the import restrictions accorded a high level of protection to the edible oil sector. As a result, the domestic prices were about 60% higher than world prices in the 1990s (IFPRI, 2005). This policy approach has resulted in India achieving near self-sufficiency in edible oils.

However, beginning in 1994, import policy reforms were initiated. Besides freeing the imports, tariffs were also reduced in the successive years. Tariffs on soybeans, which were at 60% in 1990, were reduced to 30% in 2008. It needs to be underlined that although India does not engage in the trade of soybean, imports of soybean oil can emerge as a potential import threat and therefore, the tariffs on soybean oil imports become important for analyzing the policy approach for obtaining self sufficiency in edible oils.

The tariffs on soybean oil, which were 65% in 1993, fell to about 15% by 1999. However, when world prices fell in the late 1990s, there was a surge in imports because of which, India's self sufficiency fell from 97% in 1993 to 55% in 2001 (IFPRI, 2005). Following this, the import duties were raised to 35%.[17] Furthermore, there have been reports that in early 2000, oilseed imports were restricted through phytosanitary and import licensing procedures.

Thus, the support to soybean farmers in India is directly related to the import policy measures on soybean oil. Between 1990 and 2008, the support to soybeans varied significantly. The producer NPC estimates indicate that the domestic prices were maintained higher than the world prices by about 7% to 36% during 1999 and 2008. The unit PSE also increased from INR1.36/kg to INR5.28/kg reflecting a general trend of protection to this crop during these years. The %PSE shows that the producer support accounted for about 11% to 23% of the gross farm receipts of the farmers. To a certain extent, these trends are reflective of the import policy changes undertaken from 1994 onwards.

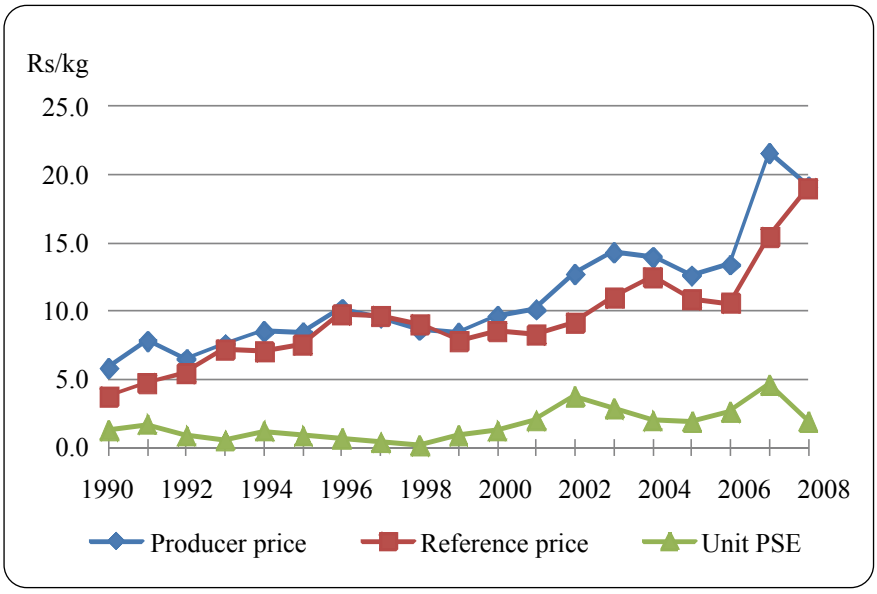

Figure 3. Soybeans Prices and Unit PSE

Soybean producers were primarily supported through the MPS, though its relative importance has reduced. The MPS accounted for about 80% of the PSE in 1990–91, which decreased to the 60% mark in the mid 2000s. In nominal terms, the MPS transfers increased continuously during the reference period irrespective of the changes in the world prices. Thus, it would seem that India has been successful in insulating the domestic producers from international competition through various types of border measures.

d) Groundnut

Groundnut is an important oilseed that is also subjected to import restrictions, as in the case of other oilseeds. There are, however, exports of peanuts ranging between 100,000 to 251,000 tons during 1996 and 2008. Prior to that, the exports were negligible.

[17] India was able to raise their duties as the WTO bound rates for crude and refined soybean oil was 45%.

The overall producer support to groundnuts was positive from 1996 onwards. To a large extent, the support was through input subsidies. The input subsidies accounted for 74% of the PSE in 1996 and 78% in 2007. In some years the negative MPS was counterbalanced by positive input subsidies, which resulted in a positive PSE. This is particularly evident for the years 1997 to 2008. As a result, the unit PSE increased from INR0.79/kg in 1996 to INR3.11/kg in 2008. These trends imply that the input subsidies have resulted in low domestic prices thereby making groundnuts export competitive.

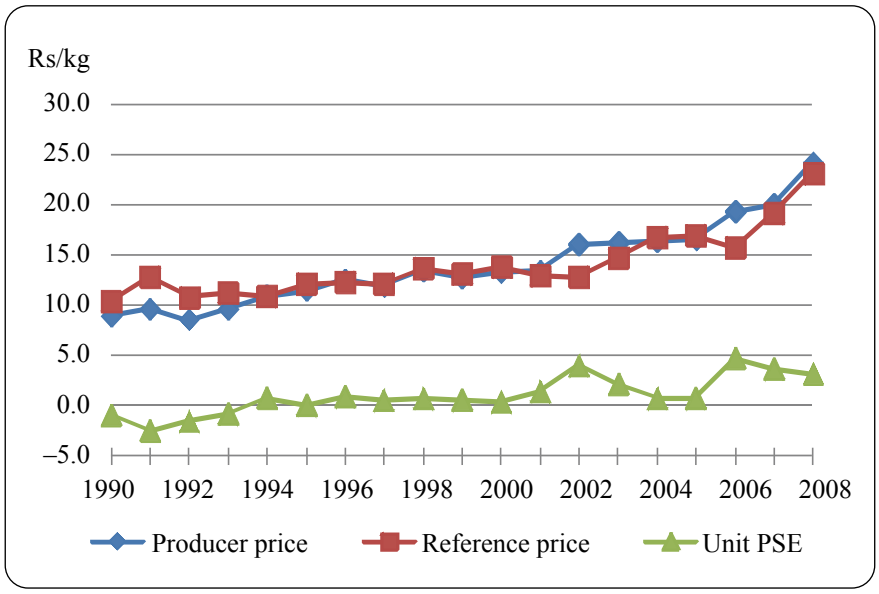

Figure 4. Groundnuts Prices and Unit PSE

However, it needs to be mentioned that this support to groundnut producers is guided by the overall oilseed policy (which also includes groundnuts) that focuses on the import regulations on edible oil. As such, the other beneficiaries of the policy support are groundnut processors. The groundnut processing in India is reserved for the small scale industry, which is unable to take advantage of scale economies and, therefore, needs protection from edible oil imports.

e) Sugar cane

India is a major producer and consumer of sugar. Over the years, India attained self-sufficiency, with exports taking place during production surplus years and imports during deficit years.

As sugar falls under the Essential Commodities Act, the policy interventions have been wide-spread and aim at regulating the prices received by producers and maintaining low controlled prices for consumers. Thus, the sugar policies encompass the pricing of cane and processed sugar, and marketing and distribution. The government fixes the Statutory Minimum Prices for each region, which the sugar mills are required to pay the producers. The millers are required to sell a part of the sugar at lower than market prices to the government (called the levy sugar), which is sold through the Public Distribution System (PDS). On average, the levy price is about 30% lower than the market price.

Furthermore, on the trade front, sugar imports are subjected to high tariffs. Imported sugar is also subjected to levy requirements and other domestic distribution stipulations. For exports, the government provides incentives like freight subsidy and marketing cost subsidy. Additionally, exports are exempted from levy requirements.

Clearly, the policies detailed above have had wide distortionary effects on the domestic sugar industry. Similarly, the world market for sugar is also highly distortionary due to the presence of subsidies and border measures. As such, the PSE estimates of sugar cane need to be interpreted with caution. Moreover, as sugar cane is a non-traded commodity, PSE estimates assume a certain efficiency level in sugar cane processing, which if not observed, can lead to biased estimates of the protection levels.

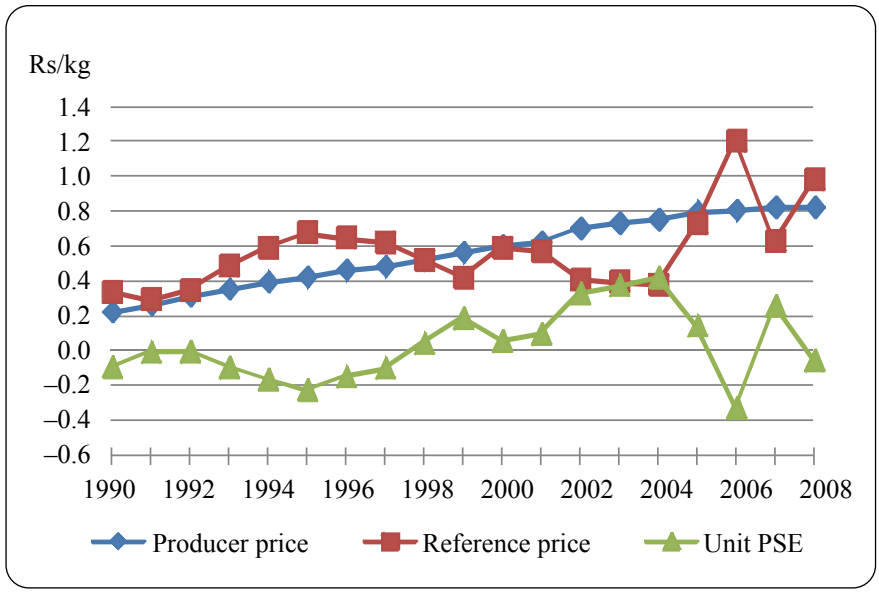

Figure 5. Sugar cane Prices and Unit PSE

The complex sugar pricing policies in India have been able to insulate the farmers, as well as the sugar industry, from the price variations in the world market. As shown in the graph, there has been a steady rise in the producer prices (i.e., statutory minimum prices) even when the world prices fell between 1999 and 2004. The trend in the MPD clearly shows that there was positive support to the sugar cane farmers from 1999 onwards. The magnitude of this support is clearly brought out by the producer NPC values, which have ranged from 1.09 to 1.99, even though they were subjected to wide year to year fluctuations. This implies that the domestic prices are 10% to 99% higher than the world prices. Interestingly, sugar exports during these years have also risen because of the various incentives and subsidies given by the government.[18] This is reflected in the sudden rise in unit PSE from 2002 onwards.

Producer support measures have contributed positively to the farmers' gross farm receipts, especially from 1998 onwards. The percentage of the PSE has ranged from 7% to 52% in these years. By correlating this data with export trends, it is evident that India has emerged as a net exporter of sugar on account of export subsidies that were necessary to make Indian sugar competitive in the world market.

In terms of the composition of the PSE, MPS and payments on input use are the most important. Subsidies on inputs are particularly relevant as over 80% of the area under sugar cane is irrigated, which also requires heavy fertilizer use.

[18] Some of these export incentives are specifically: a freight subsidy of up to INR1,000 per ton to cover the domestic transportation cost starting in July 2002; an ocean freight subsidy of INR350 per ton, and the reimbursement of marketing costs of INR500 per ton, starting in 2003. Also, sugar exports are exempted from local taxes, cess, and levy requirements. In addition, state governments also provide an export subsidy of INR2,500 per ton to the sugar mills (IFPRI, 2005).

f) Maize

India is not a major producer of maize and is also a small player in the world market. As corn accounts for about 40% of the coarse grain production, it falls under the ambit of the overall policy framework for developing coarse grains. Besides minimum price support, other border measures (like quantitative restrictions) have been used to regulate imports and promote domestic production. With the growth of the poultry industry in India, the domestic demand for maize increased mainly for feed use.

In the early 1990s, the imports of maize were liberalized only for the feed industry under licenses issued on the basis of actual usage. Imports of maize for other uses continued to be restricted. In 1999, the QRs were withdrawn and in their place Tariff Rate Quotas (TQRs) were established with an in-quota rate of 15% and an over-quota rate of 65%. Exports were subjected to a ceiling set by the government until 2002.

During the reference period, production increased from 9 to 19 million tons and trade was insignificant. In 2000, 0.2 million tons were imported and from 2002, India emerged as a net exporter.

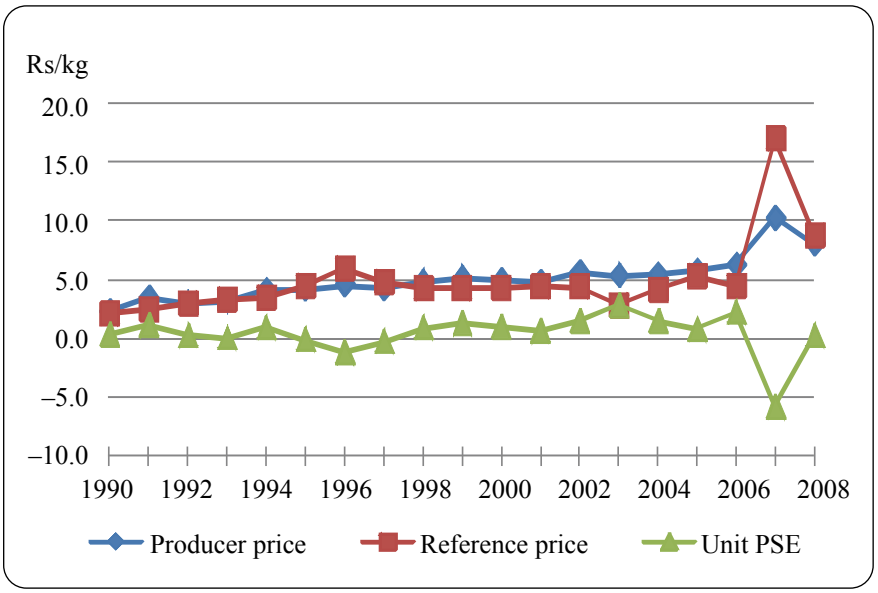

Figure 6. Maize Prices and Unit PSE

The trend in the MPD clearly shows that the price support measures ensured higher domestic prices as compared to international prices, particularly from 1998 to 2006. On average, the domestic prices were higher than the international prices by 10% to 30%, between 2001 and 2006. During these years, the unit PSE increased from INR0.9/kg to INR1.50/kg. The share of these support policies in the gross farm receipts of the farmers ranged from 17% to 46% during this period.

The budgetary payments for input use and production expansion programs are relatively small and, therefore, the support is mainly in the form of MPS, which in a way, captures the effect of TRQs and the subsidization of freight and taxes of exports.

Producer Support: Exportables

Table 11. PSE Estimates for Exportables

Cashew	1991	1995	2000	2005	2008
1. PSE	–1,589	–7,755	–361	2,311	4,732
(a) Market price support	–1,874	–8,083	–1,319	655	1,224
2. %PSE	–28.9	–110.6	–2.2	9.9	16.9
3. Producer NPC	0.7	0.5	0.9	1.0	1.1
Tea					
1. PSE	7,495	12,815	–25,653	–40,942	103,602
(a) Market price support	–59	4,681	–40,347	–59,803	48,358
2. %PSE	5.3	7.6	–10.4	–15.9	23.9
3. Producer NPC	1.0	1.0	0.8	0.8	1.2
Natural Rubber					
1. PSE	620	6,696	3,740	4,189	–21,025
(a) Market price support	10	4,970	2,080	200	–28,141
2. %PSE	10.1	25.5	20.1	9.3	–42.3
3. Producer NPC	1.0	1.3	1.1	1.0	0.6
Tobacco					
1. PSE	2,156	1,719	1,891	–2,263	4,053
(a) Market price support	1,486	879	827	–3,969	748
2. %PSE	17.2	9.6	10.3	-9.4	15.4
3. Producer NPC	1.2	1.1	1.1	0.8	1.0
Pepper					
1. PSE	28	595	–816	57	1,881
(a) Market price support	–60	371	–1,381	–495	690
2. %PSE	1.8	12.9	-8.6	0.8	20.5
3. Producer NPC	1.0	1.2	0.8	0.9	1.1

Source: Authors Calculation from Template.

Note: PSE and MPS figs are in INR million. Producer NPC is ratio.

a) Cashew Nuts

The cashew industry in India has evolved primarily as an export oriented industry. Raw cashew nuts are processed and exported as plain and value-added cashew kernels. Between 1990–91 and 2007–08, the volume of exports of shelled cashews increased from 55 to 126 thousand tons. In terms of value, the increase was from USD249 to USD555.5 million.

The export of shelled cashews is critically dependent on the availability of raw nuts for which, India has a high import dependency. Imports accounted for about 30% of the export earnings in 1990–91. This increased to 80% by 2005–06, highlighting the rising import costs of raw nuts. This rise in import costs should have resulted in the expansion of domestic production. However, the acreage under cashew nuts remained stagnant as the net-returns were lower compared to competing crops like jackfruit, coconut, and rubber. A closer look at the organization of the production of cashew nuts in India highlights the following:

- A significant share of the acreage under cashew cultivation is on marginal land primarily taken up as a measure for wasteland development and afforestation. As such, the productivity is low and lacks commercial orientation.

- Cashew cultivation also takes place on private land but the production practices vary between farmers. Intensive production practices are not widespread and the commercial orientation is limited due to the lack of an efficient marketing system and the non-availability of processing facilities.

As a result, the adoption of new production technologies has been limited. Government support has primarily been in the areas of developing new varieties and providing extension facilities. To a small extent, subsidies are provided for HYV seedlings (which are not widely adopted) and irrigation facilities. These region specific initiatives have had limited results due to weak and backward integration.

Given these limitations in expanding domestic production, imports supplemented the raw nut availability for the cashew processing industry, particularly during the off-season months.[19] Thus, there is no price competition between imported and domestically produced cashew nuts.

Developments in the shelled cashew industry exerted upward pressure in the prices of raw nuts. First, with the establishment of processing facilities in Tanzania and Mozambique, who are the main raw nut exporting countries to India, the prices of imported raw nuts increased, along with uncertainties in raw nut availability. Second, there has been an unprecedented growth in the domestic demand for cashew kernels. The share of domestic market, which was at 48% in 1990–91, increased to 60% in 2005–06. These consumption shifts put upward pressure on the domestic prices of shelled cashews and thereby on the prices of raw nuts altogether.

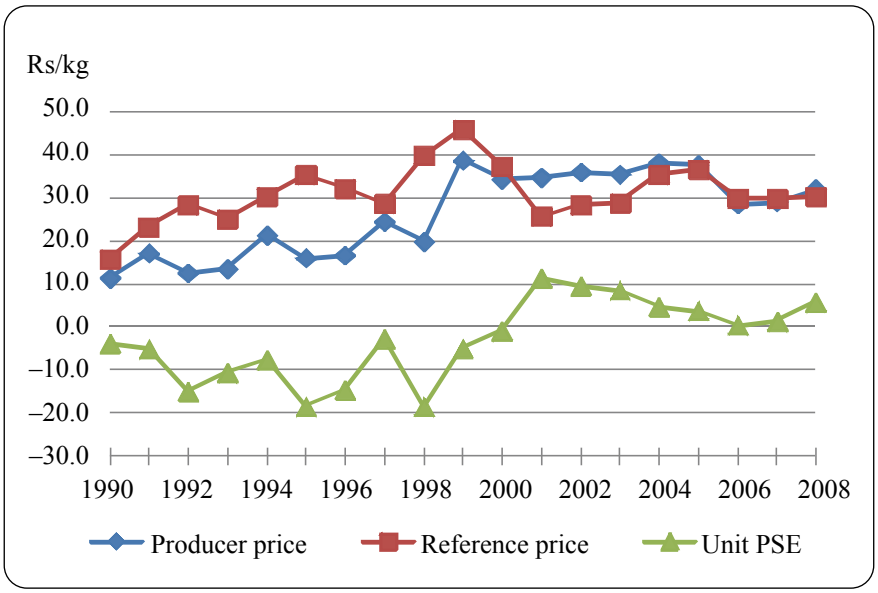

Figure 7. Cashew Prices and Unit PSE

[19] Cashews are a seasonal crop, which is harvested during the months of March and June. As the processing units operate all throughout the year, imported raw nuts are used for processing operations during the off season months.

In the background of these developments in the raw cashew nut sector in India, the MPD should be positive for all the years considered. However, MPD is positive only for the years 2001 to 2005. This is primarily due to the movements in the exchange rate. The rupee depreciated from INR43.05 in 1999 to INR48.59 in 2002 and INR45.32 in 2006. Also, it is important to underline that the imports of raw cashew nuts take place mainly in off-season months and they supplement the domestic raw nuts. In effect, the imported nuts do not compete with the domestically produced nuts and higher off-season prices would lead to higher import prices and negative MPD in the computation.

Considering these characteristics of the cashew industry and the absence of market price support measures, the PSE should be derived only from commodity specific transfers. To a certain extent, this may underestimate the PSE, as the transfers to the cashew processors have not been included. It needs to be emphasized that the prices for raw nuts are influenced by the efficiency of the processing units and the prices realized for processed cashew exports. Therefore the current PSE computation for cashews includes the estimated MPD.

The composition of the PSE clearly highlights that in recent years, the support is mainly in the form of budgetary payments for input use. The absence of production related support is also clearly evident. The trends in the PSE percentage show that support measures account for about 10% of the gross farm receipts in these years. Partly, this is the result of the absence of marketing infrastructure and other support institutions.

b) Tea

India is a traditional exporter of black tea accounting for over 50% of global exports in the 1950s. India's position in the global market has declined consistently over the years from 33% in 1970 to 11.1% in 2006–07. India has been unable to consolidate and maintain its market position despite advantages like dual capacity in producing both Crush-Tear-Curl and Orthodox teas.

One of the important areas that has adversely affected India's tea exports is the ad hoc government policy. During the 1970s, Indian tea exports were subjected to export controls, export duty, and excise duty. Furthermore, the frequent withdrawal and re-imposition of export controls created uncertainty, which affected exports in the long run. And, with significant growth in domestic consumption, black tea imports rose from 1999 onwards.

Consequently, the import duty for tea was raised to 70% in 2001 and to 100% from 2002 onwards. However, tea imports for the purpose of blending and re-exports were exempted from this duty under the advance license scheme. Thus, the effective protection from imports has been limited as most of the imports were routed through the duty free channel.

The overall development of the tea industry is looked after by the Tea Board. Various schemes for production enhancement, marketing, and export promotion are maintained to provide support to the tea industry. As only processed tea is marketed, whether as exports or in domestic market, tea production, processing, and marketing are integrated activities and inefficiencies in any one of these links can adversely affect the tea producers' price.

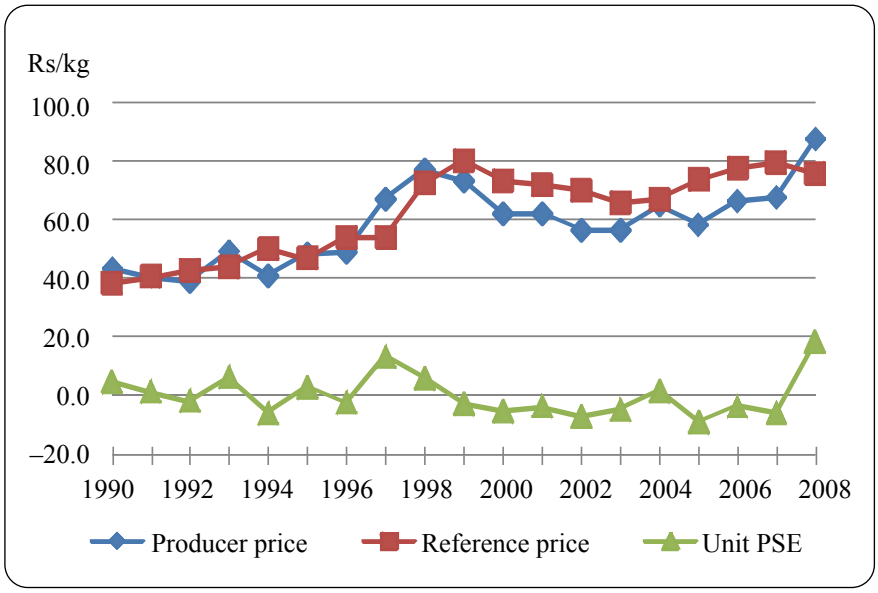

Figure 8. Tea Prices and Unit PSE

A comparison of the producer price and the reference price shows that the domestic prices are lower and thus export oriented. However, as most of tea producers do not export directly, the benefits of these price differentials are reaped by the exporters. In addition, incentives to export are also given to the exporters and not tea producers. Though there are no specific price support measures given to tea producers, there are special production related schemes particularly for increasing the production of Orthodox and Darjeeling teas.

Thus, the composition of the PSE shows that budgetary payments on input use are the most important support measure for tea producers. In addition, there are production based schemes that have significance from 2001 onwards.

c) Black Pepper

India is one of the leading exporters of black pepper. About 20% of the domestic production is exported. There are wide year to year fluctuations in exports primarily due to production fluctuations. Even though India is a net exporter of black pepper, imports have increased consistently from 1999 and India has emerged as a net importer from 2003 onwards.

With the surge in imports, the tariff on black pepper has increased from 31% in 2000 to 70% in 2005. However, for re-exports of value-added products, pepper can be imported at zero tariffs under the advance license scheme. On an average, about 70% of the imports fall under this scheme. Viewed as thus, the tariff measures are virtually ineffective in granting protection to the domestic producers. However, under the India–Sri Lanka FTA arrangement, some protection was given to the producers as pepper imports from Sri Lanka were subjected to TRQs in 2006.[20] In addition, there were other border restrictions, such as not permitting pepper imports from the ports of Cochin and Tuticorn, which are closer to the producing areas. These developments on the policy front would be captured by the MPS/PSE.

[20] Under the India-Sri Lanka FTA, black pepper was put under the concessional list with 50% duty concessions until the year 2003 and thereafter to become duty free. However, after a surge in imports from Sri Lanka, imports were subjected to an annual import cap from 2006. Under this TRQ, maximum annual permitted imports with zero duty from Sri Lanka were 2500 Metric Ton.

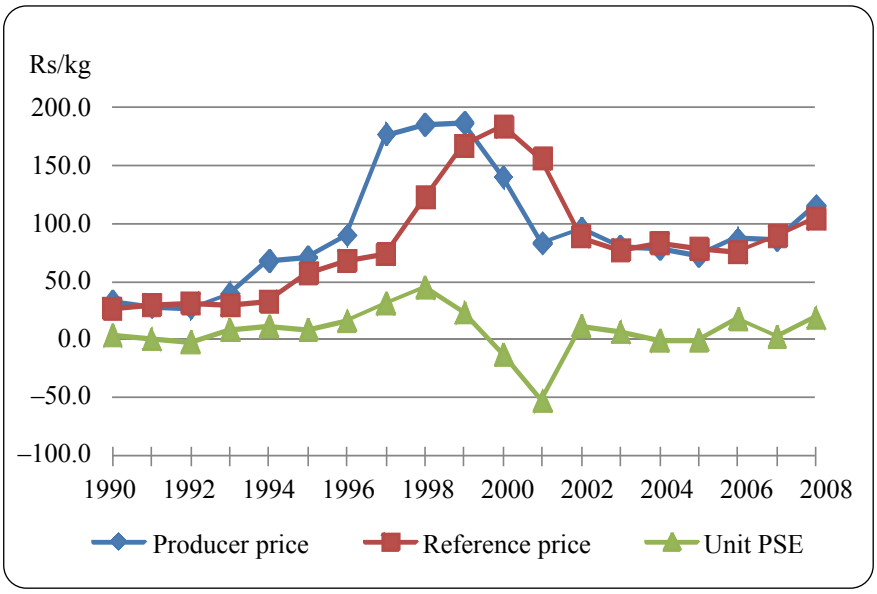

Figure 9. Pepper Prices and Unit PSE

The Spices Board is the nodal agency under which support for all spices is provided in the areas of production, marketing, quality testing, and exports. As black pepper is only one of the spices falling under the Spice Board, the allocation of the expenditure has been completed on the basis of the share of pepper in total area under spices, which is at an average of 9% for the last five years.

A closer look at the producer and border price trends show that when India was a net exporter (1990–1998), domestic prices were higher than FOB prices and when India was a net importer, the domestic prices were below the FOB prices. This fluctuation is rather intriguing. Seemingly, this fluctuation is associated with two important developments. The first is that from 1990 to 1994, the Indian rupee depreciated by almost 80%. Furthermore, in 1999, the rupee depreciated again by 14%. These changes in the exchange rate can lead to differences in rupee denominated domestic prices and FOB prices. Secondly, this could also be a result of the changes in the composition of pepper exports. From the late 1990s, India has been increasingly exporting value-added pepper products (like powered pepper and oleoresins) instead of whole pepper corns. This is evident in the differences between the average unit value of exports and imports. Between 1998 and 2005, the unit value of exports was 15%–20% higher than that of imports. Thus, it would seem that pepper imports are primarily for the purpose of processing. This has been facilitated by the policy of providing tariff exemption for re-exports under the advance license scheme.

The trend in unit PSE drastically fluctuates. Interestingly, these variables turned negative from 1999 onwards, coinciding with the fall in border prices. Also during this period, there was a surge in imports, from which India has emerged as a net importer, contrary to the position of a net exporter in the preceding years.

After 2002, the domestic and international prices coincided, reflecting a perceptible shift in the policy approach. The possibility of duty free imports for value-added exports and concessional duties under the FTA have contributed to this trend.

The composition of the PSE shows that the relative importance of the MPS is low for pepper from 2000 onwards and the support is primarily in the form of input use payments.

d) Natural Rubber

Natural Rubber (NR) is an important industrial input for the tire industry. India is the fourth largest producer of natural rubber in the world. The characteristic feature of the Indian rubber industry is the persistence of high production deficits, especially from 2001 onwards. These deficits have continued in spite of significant production increases and were largely met through imports. Up until 1994–95, imports more or less coincided with production deficits. However, in the subsequent years, particularly in 1997–98 and 1999–2000, imports have taken place even with the production surpluses, as domestic prices exceeded the border prices. To a large extent, this is the result of the Government's pricing policies.

Another important aspect is the composition of imports. From 2000 onwards, imports of value added NR products have been on the rise. There has been a decline in the import of NR latex and smoked sheets and a consistent rise in the imports of Technically Specified NR. Interestingly, during this period, exports of NR latex and smoked sheets have increased. Further, there is substitutability between NR and Synthetic Rubber, the extent of which depends on the size of the production deficit and the relative prices. Thus, these shifts in the composition of consumption and trade are important for understanding the relationship between domestic and international prices.

On the policy front, the two main objectives that shaped the government policies were:

- To enhance production for meeting the growing domestic demand.
- To ensure remunerative price to the growers.

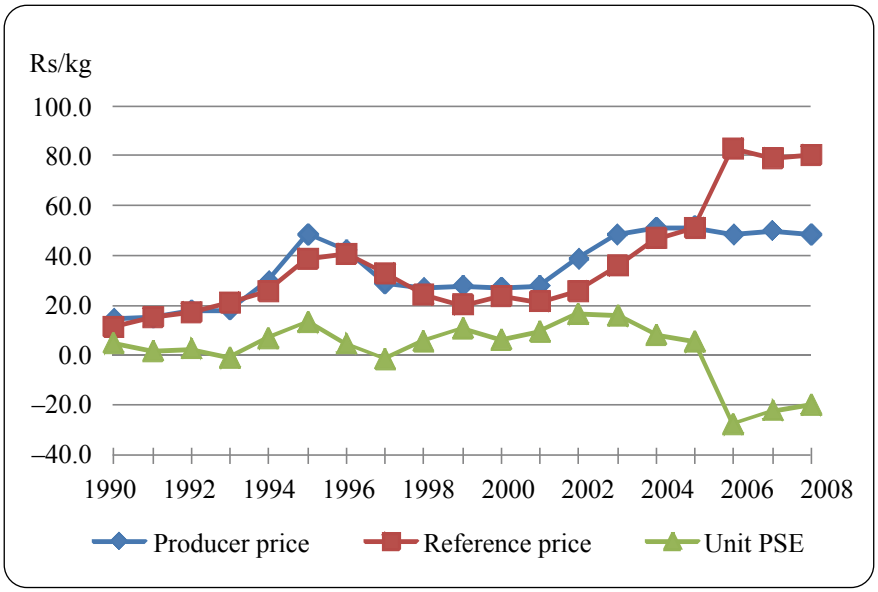

Figure 10. Natural Rubber Prices and Unit PSE

Following this approach, the Rubber Board has introduced various production enhancing schemes like the Replanting Subsidy scheme, New Planting subsidy, supply of HYV planting material, and extension services. These policies have resulted in significant production jumps, the maintenance of which required price regulatory measures. As the overall price strategy was to ensure remunerative prices to the growers, measures such as minimum prices, canalization of imports, and maintenance of buffer stocks, were extensively used. In addition, imports were controlled through tariffs and non-tariff measures. In 1990–91,

a major policy shift took place following which, direct imports by rubber manufacturers was facilitated through the duty-free channels of the Advance Licensing Scheme. This has resulted in a high correspondence between domestic and international prices. To a certain extent, the domestic producers were supported through tariffs and non-tariff barriers.

In the background of these developments, the trend in support to NR is reflected in the behavior of the unit PSE. Even though there are wide year to year variations, the unit PSE was positive and rising when world prices fell, and turned negative when world prices have risen. The MPS for most of the years is positive, reflecting higher domestic prices relative to world prices and these price support measures that have resulted in positive transfers to the producers. The trend in producer NPC also shows that up to the year 2005, the domestic prices were about 10% to 50% higher than the world prices.

e) Tobacco

The tobacco industry in India is highly integrated, covering the production of tobacco leaves, the manufacturing of tobacco products (both unprocessed and chewing products), and the extensive distribution and retailing of tobacco. To a large extent, the returns to the farmers are influenced by the organization of marketing and processing, which in turn depends on whether the traded form is either manufactured or unmanufactured. Due to the structure of domestic demand, which is concentrated in non-smoking tobacco (forms like beedi, hookah, and chewing), the production is concentrated on varieties that support this demand structure. Non-cigarette varieties account for about 75% of the tobacco production in the country.

Another important dimension of the tobacco industry is in its traded form. Most of the non-cigarette varieties fall under the unmanufactured form,[21] of which, India is the largest producer. India is also one of the major exporters of unmanufactured tobacco. The Fuel Cured Virginia (FCV) tobacco accounts for about 75% to 90% of the exports.

Tobacco has experienced major gains in productivity particularly due to the widespread adoption of improved varieties. Furthermore, the government supports this sector in many ways, namely through, institutional & regulatory support, market price support, export promotion, R&D, and fertilizer and credit subsidies. Additionally, the introduction of the auction system for FCV by the Tobacco Board ensured remunerative prices to the farmers and also reduced price fluctuations. But at the same time, it needs to be underlined that the marketing of over 50% of the non-FCV tobacco is unregulated, which subjects the farmers to price uncertainties.

This is evident in the trend of producer prices, which has consistently increased during the reference period. The reference price has consistently remained higher than the producer prices, indicating that India is one of the lowest cost producers in the world. This is reflected in the trend in Producer NPC, which is lower than one in most of the years. However, exports have not increased significantly for various reasons. One, there is little correspondence between the domestic demand structure and the export product mix. Second, due to marketing and processing related problems, the net returns from other commercial crops, like cotton and groundnut, have become higher than tobacco. And third, production variations are high as tobacco is mainly grown under rainfed conditions.

[21] Unmanufactured tobacco directly covers consumed products like chewing tobacco and the input used in the production of cigarettes, cigars, and beedis. This is based on end-use and curing methods, which are broadly categorized into seven types, namely, FCV, Burley, Oriental, Dark air/sun cured, Light-air cured, Dark air-cured, and Dark fire cured. In contrast, manufactured tobacco products are used for smoking such as cigarettes and beedis.

The unit PSE is negative and follows this trend in the MPS. The negative MPS highlights that despite higher world prices, exports have not taken place due to the domestic demand structure. However, it is interesting to note that there has been a significant increase in the support for input use from 1995 onwards.

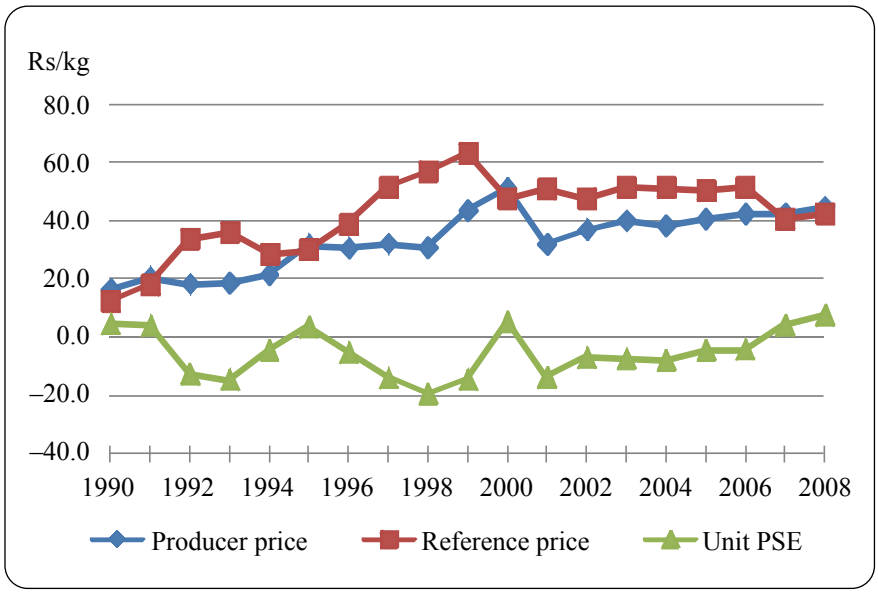

Figure 11. Tobacco Prices and Unit PSE

Producer Support: Milk and Meat Products

Table 12. PSE Estimates for Meat and Milk

Beef and Veal	1991	1995	2000	2005	2008
1. PSE	15,462	5,782	–9,924	–12,083	–6,723
(a) Market price support	13,642	3,723	–12,457	–15,559	–13,904
2.%PSE	44.1	13.4	–22.8	–24.9	–11.7
3. Producer NPC	1.8	1.1	0.7	0.7	0.7
Pigmeat					
1. PSE	234	–277	1,422	1,538	2,953
(a) Market price support	–102	–641	893	768	1,284
2.%PSE	3.6	–3.6	15.5	14.2	22.2
3. Producer NPC	1.0	0.9	1.1	1.1	1.1
Poultry					
1. PSE	–647	7,065	13,652	20,072	118,723
(a) Market price support	–1,322	5,059	9,421	9,452	83,486
2.%PSE	-5.0	16.5	18.7	13.5	42.2
3. Producer NPC	0.9	1.1	1.2	1.1	1.5
Milk					
1. PSE	–8,785	–50,945	138,735	84,610	–198,972
(a) Market price support	–21,926	–72,978	89,198	8,739	–377,396
2.%PSE	–3.5	-10.8	16.2	8.0	–14.0
3. Producer NPC	0.9	0.9	1.1	1.0	0.8

Source: Authors Calculation from Template.

Note: PSE and MPS figs are in INR million. Producer NPC is ratio.

a) Milk

India is the largest producer of milk in the world, with an average annual growth of 4%. The consumption of milk and milk based products has grown at 7.6% annually, i.e., at a faster rate than that of production.

Unlike other developed countries, the organization of milk production in India is small farmer dependent. Approximately, 70 million rural households are engaged in milk production. In 1970–71, India launched the Operation Flood Programme. In this program, through a network of cooperatives, a marketing link is established between rural producers and urban consumers. Over 11 million farmers are organized into about 0.1 million village Dairy Cooperative Societies. Buffalo milk accounts for about 57% of the total milk production in India. About 35% of milk produced is processed mainly by unorganized sectors.

The domestic production was protected from imports by measures like quantitative restrictions, non-tariff barriers, and canalization (i.e., routing the imports through the Indian Dairy Corporation). Exports were also restricted. In the early 1990s, the dairy industry was deregulated to encourage private investments. Imports of non-fat dry milk, butter oil, yogurt, whey, and cheese were permitted under a open general license at a tariff of 30.4%. By 2003, most of the restrictions were withdrawn and only regulations relating to food safety & hygiene were retained. Effective from June 2000, TRQs on Skimmed Milk Powder (SMP) was established with an over-quota tariff of 60%.

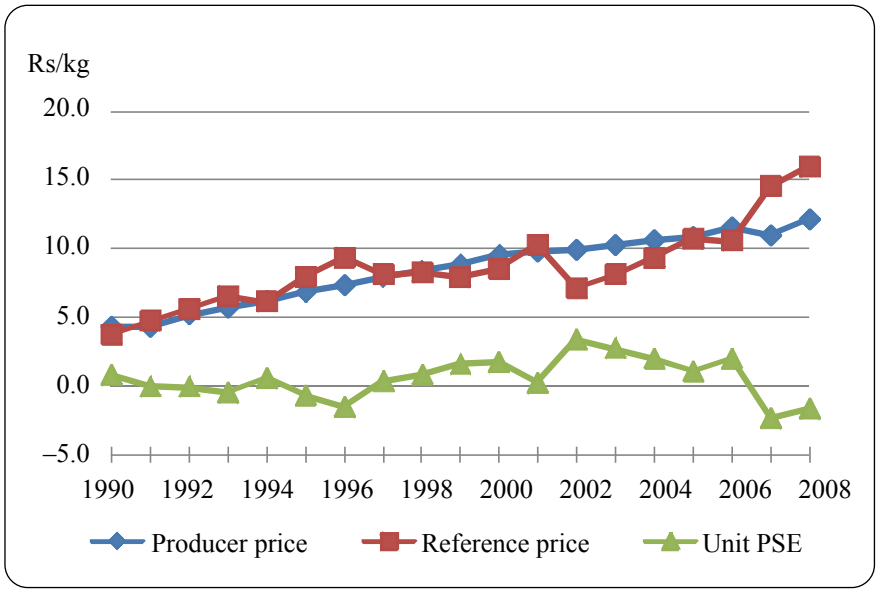

Figure 12. Milk Prices and Unit PSE

Support to the milk sector is provided to encourage production and processing capacities. Production related support is aimed at addressing issues like the productivity of milch animals, quality control, and mechanisms across the supply chain.

India has an insignificant share in world trade despite being the largest producer. One of the constraining factors is the dominance of subsidized exports of butter, cheese, and SMP by developed economies like the EU and the USA.

The unit PSE was largely negative until 1998 and turned positive from 1999 until 2006. This shift was on account of rupee depreciation, which took place in 1999, thereby providing an indirect protection for imports. Interestingly, India's Producer NPC based on SMP and butter oil, is negative and lower than one, indicating a higher competitiveness of domestic milk powder with imported milk powder, particularly during 1990 and 1998. From 2000 onwards, there was a significant fall in world prices; but this did not impact the domestic prices as there was a secular increase during this period. As a result, India emerged as an attractive market for dairy imports.

The composition of the PSE highlights that price support accounts for the largest share in the overall support. Between 2002 and 2006, price support accounted for about 40% of the gross farm receipts of the farmers.

b) Meat and Poultry

The meat industry in India is still in a nascent stage. Amongst the different varieties of meats, poultry meat is the fastest growing industry followed by buffalo meat and sheep meat, both in terms of production and consumption. Between 1991 and 2003, the estimated production of poultry meat was 1.5 million tons, registering an average growth of 11%. The estimated production of buffalo meat was 1.9 million tons with an average growth of 5% (MFPI, 2005). About 21% of the buffalo meat is exported primarily to the Philippines, Malaysia, Egypt, and the Middle East. Mutton and lamb is a small segment with a production level at 950,000 Metric Ton and annual exports of less than 10,000 Metric Ton. This segment is characterized by high domestic prices as the demand has been outstripping supply.

Consumption preferences highly favor poultry, followed by buffalo meat, goat, and mutton. Affordability is an important driver, which is why buffalo meat, being the cheapest meat, is consumed the most. Religious factors also underline meat consumption in India. About 80% of India's population follows Hinduism, which prohibits the consumption of beef. Even though cow slaughter is banned, buffalo meat is consumed. The Muslim population does not consume pigmeat, which is as such, also not a preferred meat in India.

Government support to the meat industry is mostly in the form of investment for developing infrastructure. The poultry sector receives less government assistance compared to other sectors as it is highly disorganized. Protection to this sector is mainly in the form of border measures. Quantitative restrictions on poultry meat imports existed until 2001, which were subsequently converted to tariffs ranging from 40% to 108%. In addition, SPS measures and custom procedures provide support to this industry.

The overall support to the poultry industry has been rising with the unit PSE increasing from INR20.86 in 1990 to INR69.51 in 2008. The producer prices have been maintained at a higher level than the international prices and there is a direct correlation between unit PSE and producer prices. On an average, support measures account for over 60% of the gross farm receipts of the farmers. The producer NPC figures seem to indicate that India is not internationally competitive in poultry meat production.

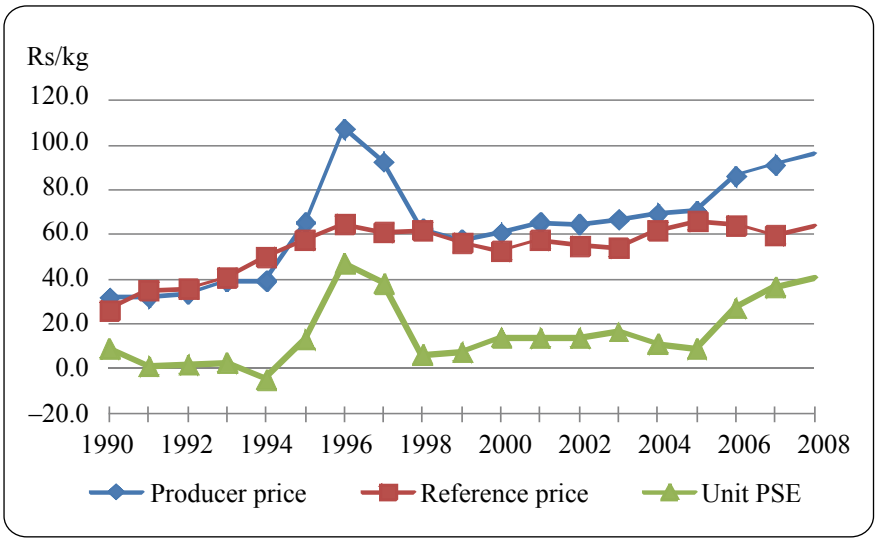

Figure 13. Poultry Meat Prices and Unit PSE

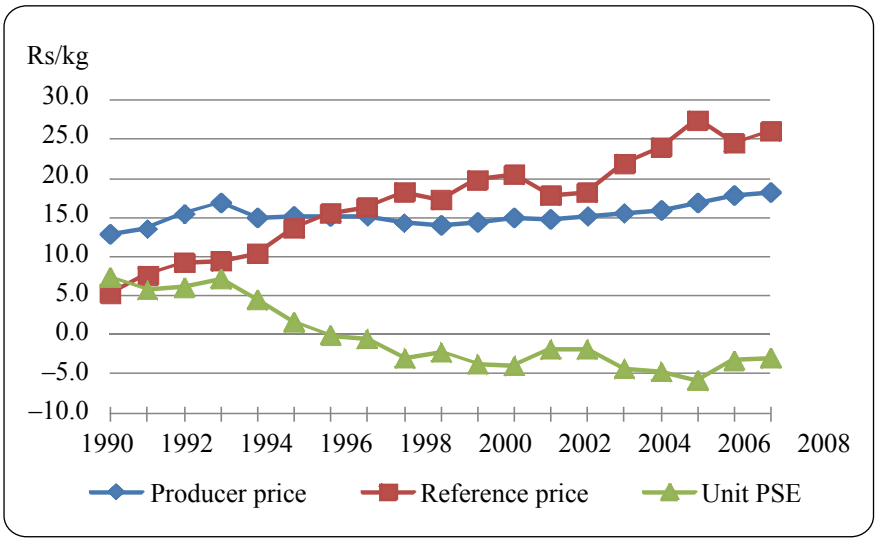

Figure 14. Beef Prices and Unit PSE

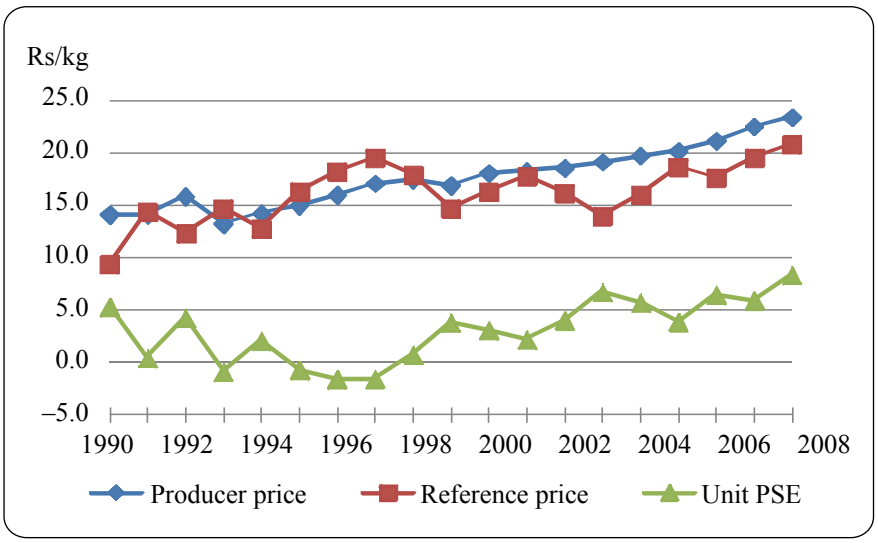

Figure 15. Pigmeat Prices and Unit PSE

In the case of beef, the producer prices remained constant during the reference period. The unit PSE declined, with a steeper fall from 1998 onwards. This seems to be on account of the reduced incidence of MPS measures. There is, however, an increase in the support for input use, particular that of capital investment. The trend in the MPD and producer NPC seems to suggest that beef production in India was not internationally competitive until 1999. However, from 2000 onwards there are indications suggesting that India can emerge as a competitive supplier in the world market. In this regard, it needs to be highlighted that this seems to be the effect of the rupee devaluation in 1999 and is not necessarily on account of production efficiency improvements.

Annex Table 1. Details of the Selected Agricultural Products and %share in GAO

Sl.No.	Product	Rationale	1990	2000	2008
1	Rice	Major food crop and is important for food security	14.00	13.44	12.26
2	Wheat	Major food crop and is important for food security	8.35	8.23	8.31
3	Maize	Coarse cereal. Important for food and feed	1.13	1.23	1.40
4	Soybeans	Important consumer product with emphasis on Import substitution	0.86	0.87	1.70
5	Sugar cane (Sugar)	Important consumer product. Exported only if surpluses are available	3.68	3.20	2.57
6	Groundnut	Important consumer product and major exportable	3.64	1.63	1.76
7	Cashew	Major exportable and important for rural livelihood	0.20	0.27	0.28
8	Tea	Major exportable and important for rural livelihood	0.77	0.74	0.56
9	Natural rubber	Import substitution and important for livelihood	0.26	0.37	0.83
10	Tobacco	Major exportable	0.56	0.30	0.27
11	Pepper	Major exportable and important for rural livelihood	0.08	0.17	0.05
12	Beef & veal	Minor exportable. New consumer product	0.33	0.48	0.49
13	Pigmeat	Minor product	0.27	0.18	0.25
14	Poultry meat	New consumer product	1.52	2.09	1.80
15	Milk	Important consumer product	15.52	18.63	17.78

Source: Authors Calculation from Template.

GOA=Gross Agricultual Output

Annex Table 2. India's PSE Products: Production and Trade Status

		1990	1991	1995	2000	2005	2008
Rice	Production	74,290	74,680	76,980	84,980	91,790	96,430
	Net trade	–439	–171	–884	–1839	–4,646	–6,143
	Production value	264	330	479	646	812	1,090
Wheat	Production	55,140	55,690	62,100	69,680	69,350	69,350
	Net trade	–77	–658	–624	–809	–708	1,769
	Production value	124	139	236	425	451	749
Maize	Production	8,962	8,060	9,534	12,043	14,710	19,300
	Net trade	0	0	–19	203	–1,081	–2,723
	Production value	21	27	40	59	83	154
Soybeans	Production	2,600	2,490	5,090	5,280	8,270	9,990
	Net trade	–1,235	–1,404	–2,462	–1763	–3,149	–3,792
	Production value	15	20	43	51	104	191
Sugar cane	Production	241,050	254,000	281,100	295,960	281,170	340,560
	Net trade	–151	–293	1,190	5,562	10,617	–28,094
	Production value	53	66	118	178	224	279
Beef	Production	2,403	2,452	2,716	2,858	2,834	2,754
	Net trade	–127	–163	–319	–576	–920	–966
	Production value	31	33	41	41	45	50
Pigmeat	Production	417	434	495	476	497	497
	Net trade	0	0	0	0	0	0
	Production value	6	6	7	9	10	12
Poultry meat	Production	372	389	624	1,136	1,968	2,562
	Net trade	0	0	0	0	–3	0
	Production value	12	12	41	69	139	246
Milk	Production	53,296	55,686	66,197	84,406	91,059	102,923
	Net trade	8	116	316	–635	–5,116	–4,333
	Production value	230	240	451	807	983	1,245
Cashew	Production	295	305	418	450	573	765
	Net trade	33	33	156	146	352	481
	Production value	3	5	7	15	22	24
Tea	Production	688	720	754	826	893	805
	Net trade	–195	–110	–128	–192	–177	–167
	Production value	30	29	36	51	52	70
Rubber	Production	330	367	507	630	803	880
	Net trade	6	36	4	15	9	35
	Production value	5	6	25	17	41	43
Tobacco	Production	560	580	540	340	550	520
	Net trade	–69	–48	–43	–118	–135	–158
	Production value	9	12	17	17	22	23
Pepper	Production	48	52	62	64	93	69
	Net trade	–27	–11	–34	–32	6	–9
	Production value	2	1	4	9	7	8
Groundnuts	Production	7,510	7,090	7,580	6,410	7,990	9,360
	Net trade	–196	–309	–543	–219	–486	–593
	Production value	67	68	87	85	132	226

Source: Authors Calculation from Template.

Note: Production and net trade volumes are in thousand tons and production values are in INR billion.

Annex Table 3. Producer and Reference Price Adjustments for Selected Products

	Price Category	Rice	Wheat	Maize	Soybeans
1.	Producer Price • Price Used & Rationale	MSP. The government procures at this price thereby providing a floor price to the farmers.	MSP. The government procures at this price thereby providing a floor price to the farmers.	Average Producer Price derived from CSO estimates. Value of Maize output divided by Production of Maize.	Average Producer Price derived from CSO estimates. Value of Soybean output divided by Production of Soybean.
	• Data Source	Reserve Bank of India	Reserve Bank of India	Value of Output: CSO Production: Ministry of Agriculture	Value of Output: CSO Production: Ministry of Agriculture
2.	Border Price • Price Used & Rationale	Thailand 15% broken FOB Bangkok. Due to export restrictions on common rice, alternate FOB price taken.	Soft Red Winter (no.2) US Gulf (April-March). FOB converted to CIF by taking the freight at 5% of FOB.	Average import of Malaysia. Reliable import prices for India not available due to QRs (TRQ).	US maize, CIF. Rotterdam
	• Assumptions for Extrapolation	Assumed that exporting from Bangkok would cost the same as that from an Indian port. Hence Freight cost not considered.		Data for 2008 not available. Hence, FOB of Argentina used and converted to CIF by taking freight as 5% of FOB.	Separate freight not considered as it's assumed to be included in CIF.
	• Data Source	Thai Rice Exporters' Association	USDA	FAO trade stat. For 2008, UNCTAD, International commodity prices	UNCTAD, International commodity prices statistics
3.	Weight Adjustment	Paddy to milled rice is : 0.7	None	None	None
4.	Port Charge & Transportation Cost (to the Wholesale market)	10% of FOB .	17% of CIF (Domestic transportation costs high in India).	8% of Producer price.	5% of CIF.
5.	Processing & Transport Cost (to the Farm Gate)	5% of Producer price.	5% of CIF.	10% of Producer price.	5% of Producer price.
6.	Quality Adjustment	None. Common rice exported from India is similar in quality of Thai 15% broken.	None	None	None

	Price Category	Sugar cane	Groundnut	Cashew	Tea
1.	Producer Price • Price Used & Rationale	Average Statutory Minimum Price as fixed by the government to be paid by the millers.	Average Producer price derived from CSO estimates. Value of output divided by Production of Maize.	Average Producer price derived from CSO estimates. Value of output divided by Production of Cashew.	Average Producer price derived from CSO estimates. Value of output divided by Production of Tea. For the years 2007 and 2008, average auction prices (national).
	• Data Source	Dept of Food, Ministry of Consumer Affairs.	Value of Output: CSO Production: Dept of Agriculture.	Value of Output: CSO Production: Ministry of Agriculture.	Value of Output: CSO Production: Tea Board.
2.	Border Price • Price Used & Rationale	Average Export price of raw sugar.	Average export price (HS code 170111).	Average Import price of Cashew nuts in Shell (HS code 080131).	Average export price of bulk black tea (HS code 090230 & 090240).
	• Assumptions for Extrapolation	Trade status: net exporter in most years.	Trade Status: Net exporter.	Net importer of raw cashew nuts and net exporter of cashew. kernels.	Trade status: Net exporter.
	• Data sources	CMIE, India Trades	CMIE, India Trades	FAO	CMIE, India Trades
3.	Weight Adjustment	0.085 (as given by the Dept. of Food)	0.7	None	0.23 (4.44kg of tea leaves required for 1kg of Tea)
4.	Port Charge & Transportation Cost to Wholesale point	5% of CIF	5% of FOB	10% of CIF	5% of FOB+2INR (excise tax)
5.	Processing & Transport Cost (Farm gate)	30% of Producer price	10% of Producer price	15% of Producer price	None (producer price is already for processed tea)
6.	Quality Adjustment	None	None	None	None

	Price Category	Natural Rubber	Tobacco	Pepper	Beef & Veal
1.	Producer Price • Price Used & Rationale	Producer price RSS3	Average Producer price derived from CSO estimates. Value of output divided by Production of Maize.	Average Producer price derived from CSO estimates. Value of output divided by Production of pepper.	Producer price.
	• Data Source	Rubber Board	Value of Output: CSO Production: Ministry of Agriculture	Value of Output: CSO Production: Ministry of Agriculture	FAO
2.	Border Price • Price Used & Rationale	FOB Singapore. Due to border restrictions, reliable import prices not available.	Average export price	Average export price	Average export price
	• Assumptions for extrapolation	Data available for RSS1. Converted to RSS3 by a factor 0.08	Data of HS Code 240110 (Tobacco not steamed) and 240120 (Tobacco wholly or partly steamed) and then taken the average.	Data of HS Code (090411) pepper neither crushed or ground.	Data of Export value and Quantity were taken.
	• Data sources	UNCTAD, International Commodity prices	CMIE, India Trades	CMIE, India Trades	FAO
3.	Weight adjustment	None	None	None	0.5
4.	Port Charge & Transportation Cost (to wholesale point)	5% of FOB	5% of FOB	5% of FOB	5% of FOB
5.	Processing & Transport Cost(to Farm Gate)	25% of Producer price	15% of Producer price	5% of Producer price	20% of Producer price
6.	Quality Adjustment	None	0.8 (export quality is superior by 20%)	None	None

	Price Category	Pigmeat	Poultry	Milk
1.	Producer Price • Price Used & Rationale	Producer price.	Producer price.	Producer price of Cow milk
	• Data Source	FAO	FAO	FAO
2.	Border Price • Price Used & Rationale	CIF China, Hongkong, pigmeat	CIF Singapore	CIF Singapore for Butter, CIF Singapore for SMP
	• Assumptions for Extrapolation	No reliable export and import data.	No reliable export and import data.	Border price adjusted for fat and non-fat content.
	• Data sources	FAO	FAO	FAO
3.	Weight Adjustment	0.5	None	0.12
4.	Port Charge & Transfer Cost	10% of Border price	5% of Border price	5% of weighted average price of butter & SMP x 0.12
5.	Processing & Transport Cost	20% of Producer price	20% of Producer price	20% of Producer price
6.	Quality Adjustment	0.7	None	None

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INDONESIA

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MAJOR CHALLENGES FOR THE AGRICULTURAL SECTOR

An Overview of the National Agriculture and Its Performance

Background

The agricultural sector is a prime mover of national and regional economic development by contributing to GDP growth and export earnings, providing food and raw materials for industry, creating job opportunities, and increasing income for the people. This sector also has features of forwards and backwards multiplier effects through input-output linkages among industries, consumption, and investment. Due to agriculture's vital role in the national and rural economy, agriculture revitalization is one of six priority areas for economic development, identified by the new cabinet second unity.

The empirical evidence shows that during the economic crisis, the agricultural sector has proven to be more resilient to the external shocks than other sectors; thus, it has been a buffer in the national economy, particularly in terms of food supply, export earning, job opportunities, and poverty alleviation. In addition, agriculture has been a leading sector in regional development through the development of agriculture-based enterprises. With its consistent growth and absorption of huge numbers of employment, the sector has been contributing to a sustainable growth of the national economy.

To maintain sustainability and the momentum of growth in the agricultural sector, various agricultural development policies and programs have been implemented during and after the economic crisis. They have focused on efforts to overcome the economic crisis and rebuild a strong foundation of agricultural development.

The purpose of this paper is to review and analyze the effect of changes in agriculture policies implemented in Indonesia during 1990–2008. A special attention is paid to the changes before and after the economic crisis of 1997/1998.

The analysis covers 19 commodities i.e., paddy, corn, soybean, cassava, beef and veal, pigmeat, poultry meat, hen eggs, milk, palm oil, sugar cane, cocoa bean, tobaccos, rubber, pepper, banana, coffee, tea, and pineapple. The commodities were selected based on their importance in the national economy and high absorption of the workforce in rural areas.

Characteristics of Indonesian Agriculture

In 2008, Agriculture represented 15% of Indonesia's GDP and 44% of the labour force. Agricultural trade accounted for 14% of exports and 9% of imports in 2007. Indonesia is the world's largest producer of coconuts, palm oil, and natural rubber, and the third largest producer of rice. Production is concentrated in the islands of Java, Sumatera, and Sulawesi. Smallholder farms (with an average size of one hectare) occupy the largest share of the cultivated land (87%) and mostly grow food crops, of which rice and maize output account for 90%. Large-scale, state or privately owned farms, account for a small share of agricultural output, but they cover the larger share of agricultural exports, such as rubber, palm oil, coffee, and cocoa. Volume of agricultural production is shown in Annex Table 1.

Production Promotion (input subsidies, credit, etc.)

Major measures to promote agricultural production include research and extension services, subsidy to production facilities such as seeds and fertilizers, concessional loans, improvement on capital services through loan guarantee, and the empowerment of organizations for farmers. It is expected that: (1) increased production can meet domestic and export demands; and (2) farmers' welfare can be equal to that of stakeholders in other sectors, particularly by improving productivity, competitiveness, and quality of agricultural products.

The fertilizer subsidy takes the form of a gas subsidy in the nitrogen/urea factories and amounted to IDR3,006 billion in 2006. The gas subsidy reduces factory prices and enables smallholder farmers (mostly food crop farmers) to obtain fertilizers at affordable prices. The amount of gas subsidies is limited to the production needs of the smallholder farmers. The government determines the ceiling prices for the outlets where farmers obtain the fertilizer.

The government also subsidizes seeds for rice, maize, and soybean. Two state-owned companies, PT Sang Hang Seri and PT Pertani, were assigned as suppliers of subsidized seed for the period of 1986–2006 (regulated in the Minister of Finance Decree No. 100/PMK/2005). In 2006, the amount of the subsidy was IDR165 billion, enabling farmers to pay lower prices. In 2007, the Ministry of Agriculture (MOA) provided subsidized seeds directly to farmers.

To facilitate access to financial services, the government provides subsidized credit to smallholder farmers. Farmers pay interest at 9% per annum, and the government pays the difference between the commercial and the subsidized rates. With this scheme, smallholder farmers are expected to have more access to commercial bank loans because credit risks are shared among the government, commercial banks, and farmers.

Domestic Price Support/Control

Rice is the most important food crop and has always been the main focus of Indonesia's policy on agriculture and food security. Maintaining a stable price of rice is critically important for the poor, as rice constitutes 24% of their consumption expenditures. Two thirds of farming households in Indonesia are net consumers of rice, that is, they consume more rice than they produce. The government makes efforts to stabilize the price of rice through the market intervention, which includes defending a ceiling price for consumers, guaranteeing a floor price for producers, and controlling trade. The main arm for carrying

out these actions is the Badan Urusan Logistik Nasional (BULOG), which had held an explicit mandate to ensure price stability and had been given a monopoly status on import until end the 1990s. The BULOG, although it lost the monopoly, still maintains the status of state-owned enterprises and carries out market stabilization activities such as procurement, sales/distribution, external trade, and stockholding. The authorities indicate that the BULOG has the capacity to absorb around 8–10% of total domestic rice production.

To provide an incentive to rice farmers, the government sets the rice procurement price (HPP), usually before the beginning of planting season (around October). In 2007, the procurement price of milled rice was IDR4,000/kg or around USD436/ton. The HPP has been set higher than international prices in most years.

Currently, the government is facing difficulties in imposing high import tariffs on rice to protect its domestic farmers and rice industries. The specific import duty of IDR430/kg was applied from 2000 to 2007 and was raised to IDR550/kg in 2008. However, illegal imports and the black market are two major challenges for the domestic market control. Due to the low prices of rice outside the borders, tariff protection and restrictive import policies are rendered as less effective.

There was a brief period of free trade of rice between January 1999 and December 2003, initially with no tariff and then with a specific tariff of IDR430/kg. Beginning in January 2004, the government announced a seasonal import restriction, which has been extended repeatedly so that is has effectively become a permanent restriction.

Sugar has also been subject to a specific duty since 2003, in order to protect domestic producers. The rate was at IDR790/kg in 2008.

Structural Policies

Agricultural land availability in Indonesia is relatively limited. The average land per capita is only 0.09 ha. Eighty-eight percent of the nation's farm households have less than 0.5 ha per household. Agriculture census data also shows that the number of smallholders with land of less than 0.5 ha has increased from 10.8 million households in 1993, to 13.7 million in 2003; an increase of 2.6% per annum. The above phenomena are attributed to the high population growth of 1.3% per annum and the high rate of agricultural land conversion to non agricultural purposes. Of the 188 million ha of Indonesian landmass, 64% has been used for agricultural land. Potential land to be used for agriculture without disturbing the country's ecological balance is about 32 million ha, scattered in provinces of Riau, South Sumatera, Bangka-Belitung, and in the islands of Kalimantan, Maluku, and Papua. In addition, there are 9.7 million ha of idle lands that are could be rehabilitated and used for agriculture.

The issues of land ownership are becoming more controversial particularly in relation to: (1) the existing inheritance system that further subdivides already small farm size; (2) a high number of landless population being food dependant on agriculture; (3) the farmers having no land certificates due to the complicated bureaucratic processes and the lack of funds to finance the processes; and (4) unhealthy farming practices like the excessive use of chemicals and fertilizers which in turn creates a high diversion of land to non-farm functions.

The problem with farmer's organizations is basically derived from the lack of awareness among farmers of the benefits of organizations for the development of their agricultural activities. A farmer's interest in

joining an organization or group tends to be based on the external assistance to be provided to the group. Existing farmer organizations are generally dependent on facilities and assistance given by public sectors. Being less independent and self-reliant, their activities may cease without help.

Infrastructure Development

The agriculture sector requires good agricultural infrastructures including irrigation, roads, power supply, telecommunications, and public market facilities. The government constructs most of these infrastructures, but private sectors are given the opportunity to participate in certain fields that may be commercially ventured. This policy direction needs to be supported by a closer coordination between the Ministry of Agriculture, the Ministry of Public Works, the Ministry of Trade, and the Local Government.

Provision of Public Services

Innovative agricultural systems developed by government research institutions are the main part of public services, complemented by private research institutions. The agricultural innovation system integrates R&D institutions and extension institutions. The efficient system accelerates the process of the adoption of the innovation by farmers so that the agricultural production capacity is enhanced and the competition capacity is strengthened. The main actor for this policy is R&D institutions under the Ministry of Agriculture, while its dissemination is made by the collaboration between the Ministry of Agriculture, the Ministry of Education, and the Ministerial Office of Communication and Information.

RECENT CHANGES IN AGRICULTURAL POLICIES

Agro-food Trade Policies

In the Uruguay Round, Indonesia bound 100% of all its agricultural lines; the number of bound tariff lines increased to 1,500, compared with a number of only 65 before the round. In general, Indonesia's tariffs are applied at levels well below bound rates. In 2007, the average bound tariff was 47% but the average applied tariff was 8.7%. The difference between bound and applied tariffs varies among sectors. There is little difference between bound and applied tariffs for beverages and spirits but in other sectors, the applied tariff is about one tenth of the bound rates.

In September 1998, the BULOG, which had been a government agency regulating the trade of key agricultural products, turned into a semi-profit-making organization. Since then, it has no longer had import monopoly rights on rice, sugar, wheat and wheat flour, soybean, garlic, and cloves. As a result, imports of some of these items have increased even though they are still subject to tariff quotas or other trade restricting measures. The authorities indicated that their intention is to use tariff quotas for managing imports of rice, sugar, and corn.

Initially set at zero (under Indonesia's IMF commitment on food items), the tariffs on rice and sugar were raised when the BULOG's monopoly was eliminated. Tariffs on the various types of sugar have been reduced in conjunction with a plan to restructure the sugar processing industry, including the closure of inefficient state-owned sugar mills. In particular, in 2003, the government switched from an ad valorem to a specific tariff in order to deal with under-invoicing practices. In the case of rice, the tariff was set at

a specific rate of IDR430/kg in 2000 (with an ad valorem equivalent at around 30%). The rate was raised to IDR550/kg in 2008 but reduced to IDR450/kg in 2009. Although intended to be temporary, the tariffs on sugar and rice are still in effect. Applied tariff rates for the 19 commodities in this research are shown in Table 2.

Sanitary Phytosanitary and food quality regulations have led to import restrictions, particularly on: animals and animal products, and other food items requiring a halal certificate. In the case of live animals (ruminant and products), they should be free from bovine spongiform enthephalopathy and foot and mouth disease based on the risk analysis and the recommendations of the World Organization of Animal Health.

Direct Income Support

In order to address capital shortages among farmers, the government has developed a direct assistance scheme for farmer groups in the form of stimulants for group capital strengthening, known previously as Direct Community Assistance. The group capital strengthening activities are carried out simultaneously with institutional strengthening, partnership, improvement of access to resources, technology and the market, and the improvement of human resource quality.

Another form of facilitation is through the Capital Development for Rural Economic Institution. The program is primarily directed to stabilize the price of rice at farmer level, as rice is a strategic commodity. Rice prices show extreme seasonal fluctuation, specifically, during the major harvest season when the price declines.

Agro-environmental Policies

Sustainable agricultural development may be defined as an effort to manage resources and agricultural entrepreneurship through continuous technological implementation and institution building. Agricultural development is also concerned with environmental conservation, so that technological choices and its management are not based on short term profit. Environmental degradation in river basin areas, for instance, will become worse if land utilization is focused only to obtain high profit without considering conservation aspects. Environmental friendly technologies, which have been developed and applied, are Integrated Pest Management (IPM) and Integrated Crop Management (ICM). Sustainable agricultural development needs the application of Good Agricultural Practices (GAP), which emphasize low external input use. Various efforts that will be carried out in the future either using government budgets or community participation are: (1) the extension and socialization of GAP; and (2) the conservation for critical land and river basin area.

Indonesia understands organic farming as a production system that is tied to sustainability. Covering 16 million acres of land, organic farming in Indonesia mostly follows traditional practices. Indonesia has had government organic standards since 2003. The goal for 2010 is the development of the framework for organic certification and accreditation. As a step towards this goal, a competent authority for organic food was created in 2006, with its main task being to formulate policy for organic and traditional food systems and to develop a certification program. This initiative fits within the revised strategy of the Indonesian Agricultural Ministry, which is to focus, in addition to production, on the marketing of products in order to support farmers and their ability to produce and sell quality food.

Export Policies

Indonesia is an exporter of many farm products including palm oil, rubber, coffee, cocoa, coconut oil, and pepper. For promoting exports, due attention has been paid to the improvement of quality, volume, and product diversification, both in fresh and processed products. Efforts are being made to develop better post-harvest technology and processing, quality assurance through licensing procedures, GAP application, tariff harmonization, and improved standards and labelling. Exports are also promoted through marketing information development and the strengthening of diplomacy in negotiation towards the opening of foreign markets. Improvement of international cooperation in various forums like the WTO, the AFTA, and the FAO (CODEX), is expected to be able to facilitate the interests of Indonesian products in global competition.

MAJOR FINDINGS FROM THE PSE ANALYSIS

Data Sources and Key Assumptions in Measurement

Data and information have been collected from national and international sources including the FAO, the World Bank, agricultural statistics, and various directorates of the government (DG), as shown in Table 1. PSE indicators such as %PSEs and nominal assistance coefficients (NAC) have been measured based on the standard formats for the 19 commodities and their national averages.

Table 1. Major Data Sources of the Study

No	Data	Sources
1	Gross Agriculture Output; Production volume; Farm gate prices; Export and Import	FAO Statistics, Indonesian Statistics
2	Exchange rate	World Bank, Bank of Indonesia
3	Tariff	DG of Custom, Ministry of Finance
4	Budgetary Transfers Commodities Specifics; Budgetary Transfers Non Commodities Specifics; Budgetary Transfers General Services	Annual Budgets from Bureau of Planning, DG of Food Crops, DG of Livestock, DG of Plantation, MoA, MoF and other sources
5	Weight adjustment (traded/farm gate); Quality adjustment coefficient (local/traded)	Commodities Experts, Traders, Exporters and/or Importers; Research Publications
6	Port charges and transportation cost to wholesale; Processing and transport	DG of Customs, Exporter and/or importer

In the actual measurement of the PSE, a number of assumptions have been made for practical reasons. First, budgetary support from local governments has been disregarded because of data availability. Second, market price differentials (MPS) of a commodity have been estimated for a standard case although actual prices vary by province, by season, by grade, and so on. Third, appropriate adjustment

factors (coefficients) have been applied to accommodate physical and quality differences of products at farm gate and their trading point. Fourth, for livestock products, except for milk, the MPS has been compared at the wholesale point and converted to the farm gate prices. Table 2 summarizes the major coefficients and transportation costs applied.

Table 2. Key Assumptions for the PSE Measurement

No	Commodities	Weight adjustment (traded/farm gate) (ratio)	Port charges and transport cost to wholesale (%)	Processing and transport costs at farm gate (%)	Quality adjustment coefficient* (local/traded) (ratio)
1	Rice	0.6	5	5	0.9
2	Maize	1	5	5	0.9
3	Fruit (Palm oil)	0.1	5	5	0.9
4	Sugar cane	0.09	5	5	0.9
5	Beef and veal	1	5	5	0.9
6	Pigmeat	1	5	5	0.9
7	Poultry meat	1	5	5	0.9
8	Milk	0.12	5	5	1.0
9	Soybean	1	5	5	1.0
10	Cassava	0.3	5	5	0.9
11	Cocoa	1	5	3	0.9
12	Tobaccos	0.6	5	5	0.9
13	Rubber	0.8	5	5	1.0
14	Hen eggs	1	5	3	1.0
15	Pepper	1	5	5	1.0
16	Banana	1	5	5	1.0
17	Coffee	1	5	5	1.0
18	Tea	1	5	5	1.0
19	Pineapple	1	5	5	1.0

Note: *If a quality coefficient is 0.9, domestic products are supposed to be of lower quality by 10% compared with import ones.

Trends in Agricultural Support

Overall Level of Support to Producers (19 commodities)

a) Evolution of %PSE during 1990–2008

A degree of support to producers can be measured by %PSE. Figure 1 shows the weighted average of %PSE measured for the 19 commodities.[1] In 1990–1997, the average %PSE was 12.1%, which means

[1] If we assume all commodities in Indonesia are supported as equally as the 19 commodities for which PSEs are measured, the national average %PSE is the same as the weighted average %PSE of the 19 commodities. If we assume that other commodities are not supported by the policies, the size of the national average %PSE becomes 20–30% lower than the weighted average for the 19 commodities. In the TSE table and the synthesis report of the study, we have applied the latter assumption because most minor crops are not subject to support policies other than the general support services.

that producers received positive transfers from consumers and taxpayers through agricultural policies. At least three policies influenced the transfers, namely: (1) government interventions through the BULOG that controlled trade and the distribution of major food commodities in reference to floor and ceiling prices; (2) input subsidies to the producers; and (3) applied tariff rates. However, in 1998, in the wake of the economic crisis, the average PSE dropped to –28.6%, due to the devaluation of the rupiah against the US dollar from IDR2,499/USD to IDR8,025/USD. This affected the prices of all agricultural products with an average increase of 2.8 times compared to the price of previous year 1997. The government focused on the price stabilization of main foodstuffs (Sembako) through market operations by the BULOG.

Despite the termination of the BULOG's import monopoly at the end of 1998, the government managed to stabilize prices through the ceiling price instrument, which focused more on consumer interest during the five year period after the crisis. The average %PSE quickly returned to a positive value, at 7.5% for 1999–2002. In the latest 6 years from 2003–08, the average %PSE was 10.6%, indicating that the government was more concerned about the support given to producers as economy recovered. The level is similar to the pre-crisis period as shown in Table 3.

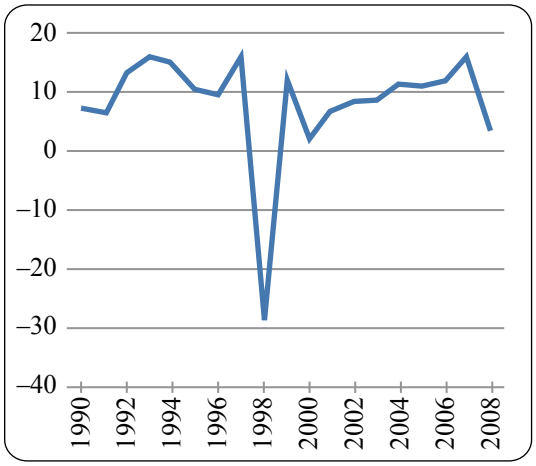

Figure 1. Average %PSE: 19 commodities

Table 3. Average %PSE and Producer NAC (19 commodities)

	Before the crisis 1990–97	During the crisis 1998	4 years after the crisis 1999–2002	Latest 6 years 2003–08	Whole period 1990–2008
%PSE	12.1	–28.6	7.5	10.6	8.5
Producer NAC	1.14	0.78	1.08	1.12	1.10

b) Evolution of Producer NAC

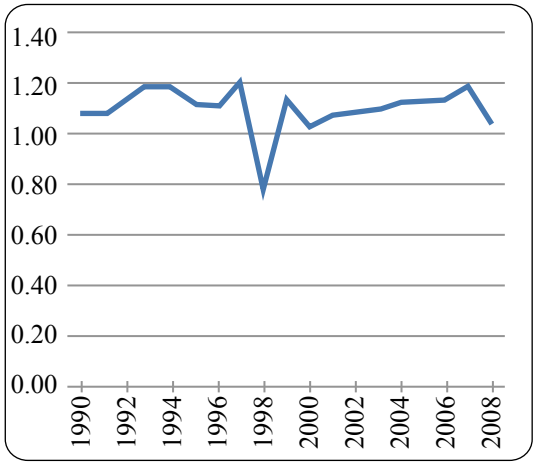

Figure 2. Producer NAC: 19 commodities

Figure 2 shows changes in the weighted average of producer NAC for the 19 commodities. The pattern is similar to %PSE because both are interlinked. The average producer NAC for 1990–97 was 1.15, which means the average producer receipt was higher than the border price by 15%. It dropped to 0.78 in 1998, suggesting that producer prices were 22% below the border price due to the sudden devaluation. The average producer NAC was larger than one after 1999 (see Table 3).

Support to Producers by Commodity

a) Rice

Until now, incentive policies for paddy are of prime importance to the Indonesian economy because rice still has a major strategic role and specific meaning in Indonesia. Several reasons for this exist: (1) rice is a staple food in Indonesia, which provides more than a half of total dietary energy supply to its population; (2) the demand for rice is always increasing due to population growth; (3) the absorption capacity of labor is still high as the agricultural sector accounts for around half of the national workforce; and (4) its contribution to GDP is also relatively high. Indonesia has been, and still is, a net importer of rice except in 1984 when sulf-sufficiency was achieved owing to the Green Revolution.

The average %PSE of rice for the pre-crisis period of 1990–97 was estimated at 18% with a producer NAC of 1.23 (see Table 4 and 5). This implies that producers received 23% more than the gross values measured at border prices. Three policies attributed to: (1) price stabilization policies handled by the BULOG in reference to floor and ceiling prices, which has been applied since 1969; (2) tariffs applied; and (3) input subsidies.

Table 4. %PSE by Commodities, 1990–2008

	Before the crisis 1990–97	During the crisis 1998	4 years after the crisis 1999–2002	Latest 6 years 2003–08	Whole period 1990–2008
Rice	18.2	–38.8	18.4	26.6	17.9
Maize	16.5	–62.7	0.3	0.2	3.8
Oilseeds	16.0	–37.5	–10.0	–4.6	1.2
Sugar cane	4.5	–86.9	12.9	4.0	1.3
Beef and veal	9.9	0.3	2.8	5.2	6.4
Pigmeat	0.3	0.3	0.3	0.3	0.3
Poultry meat	1.7	0.5	1.5	3.7	2.2
Milk	15.5	1.7	5.6	5.7	9.6
Soybeans	42.2	6.5	25.9	12.4	27.5
Cassava	0.5	0.3	0.2	0.2	0.3
Cocoa bean	3.9	0.8	0.6	0.4	2.0
Tobaccos	6.4	0.8	0.6	0.7	3.1
Rubber	1.0	0.8	0.7	0.8	0.8
Hen eggs	1.5	0.2	0.1	1.5	1.1
Peppers	0.7	0.5	0.4	0.4	0.5
Banana	0.1	0.1	0.1	0.1	0.1
Coffee, green	0.1	0.1	0.1	0.1	0.1
Tea	0.3	0.2	0.3	0.4	0.3
Pineapple	0.4	0.2	0.1	0.0	0.2
Weighted average (19)	12.1	–28.6	7.5	10.6	8.5

Table 5. Producer NAC by Commodities

	Before the crisis 1990–97	During the crisis 1998	5 years after the crisis 1998–2002	Latest 6 years 2003–08	Whole period 1990–2008
Rice	1.23	0.72	1.13	1.27	1.25
Maize	1.21	0.61	0.92	0.97	1.07
Oilseeds	1.20	0.73	0.87	0.92	1.04
Sugar cane	1.05	0.54	1.03	1.06	1.05
Beef and veal	1.12	1.00	1.02	1.04	1.07
Pigmeat	1.00	1.00	1.00	1.00	1.00
Poultry meat	1.02	1.00	1.01	1.03	1.02
Milk	1.22	1.02	1.05	1.06	1.13
Soybeans	1.73	1.07	1.32	1.23	1.44
Cassava	1.01	1.00	1.00	1.00	1.00
Cocoa bean	1.04	1.01	1.01	1.01	1.02
Tobaccos	1.07	1.01	1.01	1.01	1.03
Rubber	1.01	1.01	1.01	1.01	1.01
Hen eggs	1.02	1.00	1.00	1.01	1.01
Peppers	1.01	1.01	1.00	1.00	1.01
Banana	1.00	1.00	1.00	1.00	1.00
Coffee, green	1.00	1.00	1.00	1.00	1.00
Tea	1.00	1.00	1.00	1.00	1.00
Pineapple	1.00	1.00	1.00	1.00	1.00
Weighted average (19)	1.14	0.78	1.02	1.08	1.10

In 1998, the %PSE declined to –39% and the NAC dropped to 0.72. The value of MPS turned minus IDR18 trillion. The devaluation of the rupiah made local prices of rice much lower than international prices, even though farm gate prices increased due to higher input prices. At the same time, fertilizer subsidies were abolished and the rice import tariff was reduced to 0% under the Letter of Intent (LOI). In 1997–1998, El Nino and La Nina (a long dry season and wet season) came together and caused rice production to drop by 4% and rice imports to increase by 34.4%. As a result, farmers' net earnings declined drastically. Producers were unable to compete with imported rice because the advantages of the devalued rupiah quickly disappeared with domestic inflation.

However, rice %PSE rebounded sharply in 1999. The average %PSE for 1999–2002 was 18%, exactly the same as pre-crisis period. Two policies were the main reasons for these effects: (1) the BULOG bought paddy and/or rice from farmers at support prices (HPP), while it continued rice imports to replenish buffer stocks; and (2) rice import tariffs were reintroduced on 1 January 2000 at 30% ad-valorum or IDR430/kg. The %PSE rose further in the latest six years, reflecting a seasonal import ban and higher import tariffs. In 2002, subsidies for fertilizer and seeds resumed. The Government introduced rice import control starting in January 2004 to protect farmers during the peak harvest season. The average %PSE for rice in 2003–08 was 27% even though it declined to 9% in 2008. Producer NAC moved in parallel with the %PSE and resulted in an average of 1.38 for 2003–2008. The annual average MPS reached IDR29 trillion for this period.

b) Maize

The demand for maize has been increasing every year in line with the rapid growth of the livestock sector. Before 1990, Indonesia was a maize exporter but since the early 1990s, Indonesia has become a net importer. In recent years, imports accounted for nearly 60% of the total consumption, of which 55% are used in animal feed industries; 30% for human consumption; and the rest for other food industries and seed. Maize is now traded based on the market mechanism, although before 1997, maize imports and prices were regulated by the BULOG. In 1990–1997, the average %PSE was 16.5% with producer NAC at 1.21 and a MPS of IDR449 billion. Maize producers were protected through regulated trade and production inputs.

In 1998, the economic crisis caused the %PSE to drop to –62.7%, the producer NAC dropped to 0.61, and the MPS dropped to (–) IDR4.42 trillion. Maize imports decreased by 62.4% because they became expensive and many small animal feed companies went bankrupt. When the BULOG's import monopoly was terminated in 1998, importers began directly applying for imports. Maize price has been set by market forces and no tariff has been applied to prevent the trade (zero tariffs) since then. %PSE has remained at almost zero.

c) Oil Palm

Indonesia is the biggest producer and exporter of palm oil in the world. In 2007, areas developed for oil palm plantation were around 6.3 million ha, of which 40.7% was planted by smallholders, 11.0% by government plantations, and 48.4% by the private sector. 71% of the planted areas are located in Sumatera, 23% in Kalimantan, and the remaining 6% in other islands. Total production of oil palm has increased since 2000 due to the improved yields and new plantation areas. However in 2006–2007, the growth slowed due to climate change. In 2007, the production of palm oil was 16.8 million tons, of which 34.5% was supplied by smallholders; 13.6% by government plantations, and 51.9% by the private sector. Currently, no tariffs apply for imports.

The estimated %PSE in 1990–97 was 16.0%, with producer NAC at 1.20 and an MPS of IDR1.0 trillion. This means that the government was supporting oil palm producers (smallholders) by providing incentives for new investors and/or plant rehabilitation, such as availability of land concession, provision of seedling, credit facilities, etc.

As in other commodities, the %PSE dropped in 1998 to –37.5%, with producer NAC at 0.73 and a MPS of (–) IDR7.05 trillion, as a result of the economic crisis. Exports of palm oil dropped by 50%. For the period of 1999–2002, the %PSE stayed below zero (–10%) but palm oil exports recovered quickly and surpassed the pre-crisis level, partly due to favourable exchange rates for exports. For the latest 6 years of 2003–2008, the average %PSE was slightly negative, at –4.6%. This was mostly due to export taxes. Indonesia imposes the export tax on crude palm oil and its derivatives based on Regulation PP No.35–2005. The objectives of these export duties are: (1) to ensure domestic consumption; (2) to protect natural resources; and (3) to prepare for the drastic changes in international market prices.

d) Sugar cane

Sugar cane has been an important cash crop in Indonesia for farmers and sugar processing industries. In 1998, however, eight sugar companies in Java were shut down because of difficulties in collecting sufficient amounts of sugar cane and inefficiencies arising from obsolete processing facilities. Since then,

sugar cane production has been declining, which has forced the government to import sugar to meet domestic consumption. Trade and production policies have played a significant role in determining the performance of the Indonesian sugar industry. Three basic stages of policies can be identified, namely: (1) support and stabilization (1971–1996); (2) liberalization (1997–2001); and (3) controlled/managed imports (2002–present).

For 1990–1997, the estimated average %PSE was 4.5%, with producer NAC being 1.05, and a MPS of IDR93 billion. The government provided sugar cane farmers with input subsidies for seedlings, fertilizer, and credits, as well as market price guarantees to sugar cane factories. The BULOG controlled sugar trade as an import monopoly. In 1998, the %PSE declined as low as –87%, putting producer NAC to 0.54, and a MPS of (–) IDR3.18 trillion due to devaluation of the rupiah. Imported sugar became exceptionally expensive, at almost 3 times higher than before the crisis. The import tariff of sugar was reduced from 10% to 0% and the BULOG's import monopoly was dismantled, but it maintained its role in order to stabilize market distribution in reference to the ceiling prices of sugar.

For the period of 1999–2002, the average PSE was 13%, with the average producer NAC at 1.15 and a MPS of (–) IDR511 billion. Government policies to ensure market distribution and stabilize the price of sugar were found effective. In this period, three notable policies were applied: (1) since January 2000, the government re-imposed import duty for sugar at 25%, as domestic sugar prices were depressed; (2) in 2002, the import duty switched to a specific duty of IDR700/kg, equivalent to 40% of the ad-valorem, and for raw sugar with IDR550/kg, equivalent to 30% of the ad-valorem; and (3) the Ministerial decree No. 643/MPP/Kep/9/2002 limited the importers either to Producer Importers (IP) or Listed Importers (IT). By the end of 2002, the Tariff Rate Quota was introduced; however, it has not been fully effective until now.

For the period of 2003–2008 the average PSE was 4%, with producer NAC at 1.08. The government has strictly controlled sugar imports in terms of traders (IP and IT only), timing of imports and quality of sugar. The reference price for raw sugar at farm gate was IDR3,800/kg (Ministerial Decree No. 08/M–DAG/Per/4/2005). Six new sugar factories have started sugar production in and out of Java and domestic production has increased by 8.1% per year and sugar imports have declined by 5.2% per year. The government is planning to be self sufficient for sugar by 2015.

e) Milk

Indonesia is a net importer of milk and around 70% is imported from Australia and New Zealand. Before 1998, the government controlled milk imports under a system called the 'Busep' system, which required the ratio between domestic production and imports to be 1:2. After 1998, the Busep system was no longer in place so milk industries were able to import raw materials with no obligation to buy milk from domestic farmers.

The average %PSE for milk in 1990–1997 was 15.5%, with producer NAC at 1.22, and a MPS of IDR29 billion. Farmers received positive support from Busep policies. In 1998, the %PSE decreased to 1.7%, with producer NAC at 1.02. There has been no protection except a 5% ad valorem tariff because the Busep system was terminated, even though Indonesia has maintained the right to impose import quotas on dairy products of up to 414,700 ton per year, with the import tariff quota up to 30%. Indonesia also has a right to implement an applied rate up to the ceiling bound tariff of 210% for milk products. However, this has never been triggered as of now. Currently, the importation of dairy products is free for

general importers with the applied tariff of zero to 5%. The estimated %PSE has been around 5% because a 5% tariff rate was assumed, however this may be a case of over-estimation.

f) Soybeans

In recent years, Indonesia has imported 2–4 million tons of soybeans per year. Imported soybeans are used to produce Tempe (dried fermented soybeans), Ketchup, and oil, while local soybeans are mostly processed for the production of tofu (soybean curd). Before 1998, the BULOG controlled trade through bank guarantees linked to an import credit from the USA. After 1998, no BULOG control has been applied, but a licensing system has still remained.

In 1990–1997, the average % PSE was 42%, with producer NAC at 1.73, and a MPS of IDR703 billion because of the control by the BULOG and input subsidies. In 1998, %PSE fell to 6.5%, with producer NAC falling to 1.07, and a MPS of IDR200 billion, due to the devaluation of the rupiah. Furthermore, Soybean imports dropped by 50%. The import tariff was reduced to 0% and the BULOG's import monopoly was dismantled.

In 1999–2002, the average %PSE bounced back to 26%, with producer NAC increasing to 1.39 and a MPS of IDR695 billion. Government policies for supporting soybean production resumed. Two specific policies were introduced to support soybeans: (1) the reintroduction of the import duty of 10% initiated in January 2000, as domestic prices fell; and (2) input subsidies provided to encourage farmers to increase their production.

For the period of 2003–2008, the average %PSE for soybeans was 12.4%, with a producer NAC of 1.15, and a MPS at IDR562 billion. These figures mean that the government has supported soybean producers through border measures including tariffs and licensing. The Government of Indonesia plans to achieve soybean self sufficiency by 2015.

Transfer from/to Consumers

Evolution of CSE from 1990–2008

Table 6 shows the changes in %CSE for the 19 commodities over the examined period. In 1990–1997, the weighted average of %CSE for the 19 commodities was –13.7%. It turned positive 19.6% in 1998 due to the devaluation of the rupiah. Prices of imported products became 2.83 times higher compared to the prices in 1997. The government attempted to stabilize the prices of main foodstuffs (Sembako) through market operation by the BULOG and the reduction of tariffs. For the four year period of 1999–2002, the average %CSE was –9.1% as the government continued stabilizing prices. In 1999–2008, the average %CSE was –3.61% indicating that the economy was gradually recovering and the government was more concerned with providing support to producers and consumers. For the entire period, the average %CSE was –9%.

Table 6 indicates that the average %CSE in 1990–1997 was either negative or zero for all commodities. It suggests that policies such as an import monopoly or tariffs genarated transfers from consumers and taxpayers to producers.

Table 6. Average %CSE for 19 Commodities

	Before the crisis 1990–97	During the crisis 1998	4 years after the crisis 1999–2002	Latest 6 years 2003–08	Whole period 1990–2008
Rice	–17.8	39.3	–18.2	–26.4	–17.6
Wheat	–	–	–	–	–
Maize	–16.1	65.3	0.0	0.0	–3.3
Oilseeds (Palm oil)	–25.7	48.8	23.4	34.5	7.6
Sugar cane	–3.9	87.6	–12.7	–3.7	–0.9
Beef and veal	–9.5	0.0	–2.5	–5.0	–6.1
Pigmeat	0.0	0.0	0.0	0.0	0.0
Poultry meat	–1.3	0.0	–1.3	–3.3	–1.8
Milk	–13.7	0.0	–4.8	–5.0	–8.4
Soybeans	–42.0	–6.2	–25.7	–12.2	–27.3
Cassava	0.0	0.0	0.0	0.0	0.0
Cocoa bean	0.0	0.0	0.0	0.0	0.0
Tobaccos	–5.8	0.0	0.0	0.0	–2.4
Rubber	0.0	0.0	0.0	0.0	0.0
Hen eggs	–1.3	0.0	0.0	–1.3	–1.0
Peppers	0.0	0.0	0.0	0.0	0.0
Banana	0.0	0.0	0.0	0.0	0.0
Coffee, green	0.0	0.0	0.0	0.0	0.0
Tea	0.0	0.0	0.0	0.0	0.0
Pineapple	0.0	0.0	0.0	0.0	0.0
Total	–13.7	31.9	–9.1	–9.9	–9.1

Evolution of Consumer NPC

Table 7 shows changes in the consumer NPC. In the period of 1990–1997, the average consumer NPC was 1.16. This implies that a nominal rate of market protection for consumers was around 16%. In 1998, the average NAC fell to 0.76, which implies that the consumers paid 23% less compared to border prices. For 1999–2002, the average consumer NPC returned to positive (1.03) and for the latest six years period, the average NPC was 1.11.

Table 7. Consumer NPC by Commodities

	Before the crisis 1990–97	During the crisis 1998	4 years after the crisis 1999–2002	Latest 6 years 2003–08	Whole period 1990–2008
Rice	1.23	0.72	1.23	1.38	1.25
Wheat	–	–	–	–	–
Maize	1.21	0.61	1.00	1.00	1.07
Oilseeds (Palm oil)	1.38	0.67	0.81	0.78	1.03
Sugar cane	1.05	0.53	1.15	1.08	1.05
Beef and veal	1.12	1.00	1.03	1.05	1.07
Pigmeat	1.00	1.00	1.00	1.00	1.00
Poultry meat	1.01	1.00	1.01	1.04	1.02
Milk	1.20	1.00	1.05	1.05	1.11
Soybeans	1.73	1.07	1.38	1.15	1.44
Cassava	1.00	1.00	1.00	1.00	1.00
Cocoa bean	1.00	1.00	1.00	1.00	1.00
Tobaccos	1.06	1.00	1.00	1.00	1.03
Rubber	1.00	1.00	1.00	1.00	1.00
Hen eggs	1.01	1.00	1.00	1.01	1.01
Peppers	1.00	1.00	1.00	1.00	1.00
Banana	1.00	1.00	1.00	1.00	1.00
Coffee, green	1.00	1.00	1.00	1.00	1.00
Tea	1.00	1.00	1.00	1.00	1.00
Pineapple	1.00	1.00	1.00	1.00	1.00
Weighted average	1.16	0.76	1.10	1.11	1.11

General Services to the Agricultural Sector

Figure 3 and Table 8 show the changes in the GSSE during 1990–2008. The GSSEs in Indonesia include government expenditures on various programs targeting rural infrastructure, research, training and extention, marketing and promotion, inspection, public stockholding, etc. During 1990–2008, the GSSE has increased from IDR1 trillion to IDR3 trillion. The largest component of the GSSE was infrastructure, followed by public stockholding, agricultural schooling, and research and development, accounting for 46%, 16%, 16%, and 12%, respectively.

The average GSSE for 1990–97 was IDR0.92 trillion, and declined in 1998 to IDR0.58 trillion. During 1997–98, expenditures on construction and maintenance for agricultural development fell sharply. This adversely affected rice production and other crops thereafter. The first priority of the government was to overcome the crisis by providing enough food (Sembako) to the people. The government allocated IDR10.6 trillion for tackling poverty (Raskin) and thus, public stockholding of basic food quickly expanded.

After the crisis, the government planned to provide an extra budget particularly for the maintenance of infrastructure (rehabilitation on farm irrigation, rural roads, etc.) to increaseproduction for food security.

This was reflected in the fast expansion of expenditures for infrastructure since 2000. For instance, expenditures for agricultutral infrastructure rose sharply from IDR300 billion to over 1 trilion from 2000 to 2007.

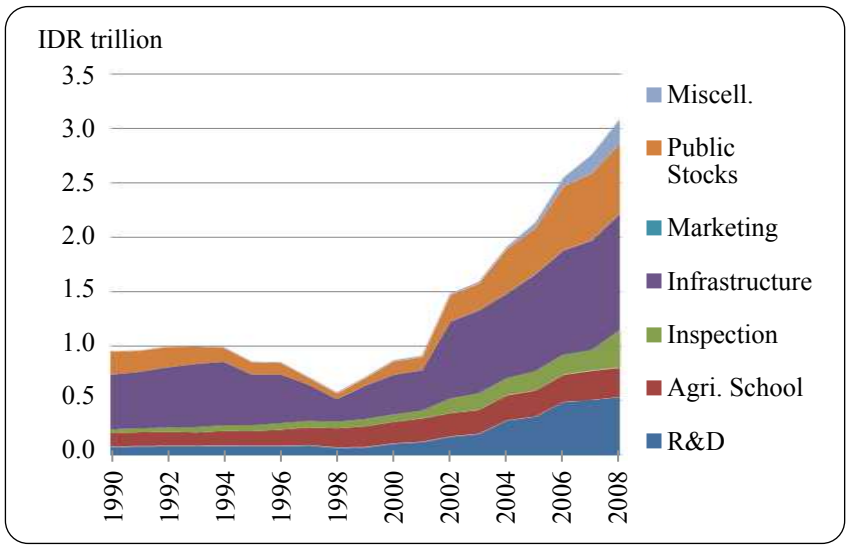

Figure 3. Changes in GSSE

Table 8. Average GSSE in 1990–2008 (IDR billion)

	Before the crisis 1990–97		During the crisis 1998		4 years after the crisis 1999–2002		Latest 6 years 2003–08		Whole period 1990–2008	
Research and development	85.2	9%	69.7	12%	119.1	12%	402.0	17%	191.6	12%
Agricultural schooling	136.0	15%	177.1	31%	204.3	22%	246.1	11%	187.3	16%
Inspection	50.2	6%	62.7	11%	87.8	9%	201.5	9%	106.5	8%
Infrastructure	497.4	54%	207.6	36%	435.6	43%	907.5	40%	598.7	46%
Marketing/Promotion	2.0	0%	1.9	0%	2.1	0%	2.7	0%	2.2	0%
Public stock holdings	144.9	15%	51.9	9%	137.3	13%	483.0	20%	245.2	16%
Miscellaneous	3.6	0%	8.1	1%	10.8	1%	91.8	3%	33.2	2%
Total	919.4	100%	578.9	100%	996.9	100%	2,334.6	100%	1,364.7	100%

Support to Agriculture in the Overall Economy

The TSE is an indicator used to represent the total annual monetary value of all gross transfers from taxpayers (government) and consumers, arising from policy measures that support agriculture at national level. In short, the TSE measures the overall cost of agriculture support financed by consumers (transfer from consumers) and taxpayers/government (transfer from taxpayers) after adjusting the import receipts.

Table 9. Total Support Estimate/Total Transfers

		Before the crisis 1990–97	During the crisis 1998	4 years after the crisis 1999–2002	Latest 6 years 2003–08	Whole period 1990–2008
I.	Total value of production	65.58	165.84	242.91	409.58	216.82
	Share of selected commodities	72%	64%	0.00	0.00	69%
	Selected commodities	46.74	106.76	150.80	291.64	149.14
II.	Total value of consumption	62.98	163.54	241.61	393.08	210.12
	Selected PSE commodities	44.90	105.28	150.11	279.76	144.40
III.1	Producer Support Estimate	6.26	–32.26	9.46	12.89	7.00
	Market price support	6.05	–32.61	9.04	12.23	6.60
	Export refund for market price support	0.41	–1.60	–2.03	–9.64	–3.38
	Payments on output	0.00	0.00	0.00	0.00	0.00
	Payments on area/animals	0.00	0.00	0.00	0.00	0.00
	Payments on input use	0.19	0.32	0.32	0.49	0.32
	Payments on input constraints	0.01	0.01	0.01	0.02	0.01
	Payments on farming income	0.00	0.00	0.00	0.00	0.00
	Miscellaneous payments	0.01	0.02	0.08	0.14	0.07
	%PSE	9%	–19%	4%	4%	5%
III.2	Producer NAC	1.10	0.84	1.04	1.04	1.06
III.3	GSSE	0.92	0.58	1.00	2.33	1.36
IV.	CSE	–6.35	33.63	–13.98	–24.59	–11.61
V.1	Transfers to producers (–)	–5.64	31.01	–11.07	–21.88	–9.98
	Transfers to Govt. etc (–)	–0.71	2.63	–2.91	–2.72	–1.63
	Transfers from taxpayers	0.00	0.00	0.00	0.00	0.00
	%CSE	–10%	21%	0.00	0.00	–6%
V.2	Consumer NAC	1.11	0.83	1.06	1.07	1.07
V.3	Total Support Estimate (TSE)	7.18	–31.69	10.46	15.22	8.36
VI.	Transfers from consumers	6.35	–33.63	13.98	24.59	11.61
	Transfers from taxpayers	1.53	–0.68	–0.61	–6.66	–1.62
	Govt. revenues (=import tax) (–)	–0.71	2.63	–2.91	–2.72	–1.63

Note: Unit used above is IDR trillion except for producer NAC and consumer NAC.

Table 9 shows the estimated TSE and its major components. This table is, in a sense, a summary of all PSE measurements. It includes budgetary expenditures, the estimation of the transfers arising from market price support, and derived indicators. All figures are consistent with those that we have used in the preceeding sections for the 19 commodities. However, there is a notable change between the PSE indicators for the 19 commodities and those for the TSE table. Total values of production and consumption are 'inflated' by the use of % share of selected commodities in the national gross agricultural output while the values of producer/consumer support remain unchanged. The main reason for this is that in Indonesia, no specific market support measures apply to minor commodities such as

perishable vegetables and fruits, or minor animal products. %PSEs and %CSEs in this TSE table are thus smaller than the average %PSEs and %CSEs computed for the 19 commodities.[2]

The average TSE in 1990–1997 was IDR7.18 trillion but declined to (–) IDR31.69 trillion in 1998 because of the economic crisis. The agricultural sector was penalized by the abrupt drop of the rupiah and the ensuing economic crisis. For the four year period after the crisis, it returned again to a positive value at IDR10.46 trillion per year, indicating a recovery of agricultural support. For the six years of 2003–2008, the average TSE rose to IDR15.22 trillion.

Directions of Agricultural Policies as Reflected in the PSE Indicators

The TSE table shows that the value of agricultural support expressed by the PSE and the TSE has increased over the past 19 years, except in 1998 but this is so only in nominal terms. Support to agriculture has declined substantially in real terms. Table 10 shows the real term values of the TSE, PSE and GSSE, adjusted by GDP deflators. The %PSE and %CSE are also listed for reference, which remains unchanged from nominal value cases.

Table 10. TSE, PSE, and GSSE in real terms (2000 constant IDR trillion)

	Before the crisis 1990–97	During the crisis 1998	4 years after the crisis 1999–2002	Latest 6 years 2003–08	Whole period 1990–2008
TSE	22.65	–43.58	10.48	10.40	12.73
MPS	18.85	–44.86	9.14	8.68	10.24
GSSE	3.14	0.80	0.94	1.34	1.99
%PSE	9	–19	4	4	5
%CSE	–10	21	–6	–7	–6
%TSE/GDP	1.9	–3.3	0.8	0.6	1.0
%GAO/GDP	17.5	17.4	16.5	13.0	15.9

From this table, we can find a clear trend of agricultural support in Indonesia over the past 19 years, a substantial reduction in overall support after the crisis. In real terms, both the TSE and that PSE was halved in the wake of the crisis and retained the same level thereafter. It is no coincidence that %PSE and %CSE show similar trends to these moves because they are not affected by inflation. Reduction in agricultural support is a result of shock therapy or policy reform that Indonesia had to accept to overcome the crisis. Dismantling the BULOG's import monopoly, reduction in tariff rates, and other reform measures, as well as the sharp drop in government expenditures, led to the contraction of agricultural support.

The average GSSE has somewhat recovered in the last six years, but in real terms, it is still less than half of what it was in the pre-crisis period. A gradual roll back in trade measures occurred in the 2000s, such as resumption of applied ad valorem tariffs, switches to specific tariffs, and a seasonal import ban for rice. However, they do not seem to have drastically affected the overall level of agricultural support. The TSE as a percentage of GDP, declined faster than %PSE even though reduction in the ratio of agricultural output to GDP was much slower. This trend seems to be continuing in recent years.

[2] The OECD PSE manual suggests the extrapolation of both PSEs and the value of production and consumption, assuming that the same degree of support applies to other commodities, for which PSEs are not estimated.

Table 11 indicates the % share of various policy types in the PSE for the 19 commodities. As the value of market support is sometimes negative, while other payments are always positive, the % share can exceed 100%, as exemplified in 1998. The main message is clear: Market support is predominant in total transfers to producers. Input subsidies are less than 5% and other payments are less than 1% of the total. Direct financial support to producers is insignificant in Indonesia, as is in many developing countries. There is no marked shift in policy type as well. Market price support still accounts for more than 95% of total transfers to producers irrespective of whether they are positive or negative.

Table 11. Trend of PSE Composition by Policy Type (%)

	Before the crisis 1990–97	During the crisis 1998	4 years after the crisis 1999–2002	Latest 6 years 2003–08	Whole period 1990–2008
MPS	95.3	101.2	94.3	97.4	96.0
Payment on output	0.0	0.0	0.0	0.0	0.0
Payment on area	0.0	0.0	0.0	0.0	0.0
Payment on input use	4.5	–1.1	4.8	2.2	3.5
Payment on input constraint	0.1	0.0	0.1	0.0	0.1
Payment on income	0.0	0.0	0.0	0.0	0.0
Miscellaneous	0.1	0.0	0.8	0.4	0.3

We can make a similar table for the commodity composition of total PSEs (19 commodities). Table 12 suggests: (1) support to rice has an outstanding share; (2) support to soybeans and maize was also important in the pre-crisis period but has declined in recent years; (3) palm oil and sugar cane give a considerable but erratic impact on total PSEs; and (4) livestock products do not affect total PSEs. The volatility of palm oil and sugar cane may be attributable to an export tax (palm oil) and large fluctuations of international prices.

Table 12. Trend of PSE Composition by Commodity (%)

	Before the crisis 1990–97	During the Crisis 1998	4 years after the Crisis 1999–2002	Latest 6 years 2003–08	Whole period 1990–2008
Rice	58.7	58.7	102.3	96.9	79.9
Maize	7.9	14.4	0.4	0.2	4.2
Palm oil	10.9	17.7	–19.0	–7.3	–0.8
Sugar cane	0.7	10.3	5.9	1.6	2.6
Meats	3.5	–0.1	1.8	5.1	3.5
Milk	0.9	0.0	1.1	0.4	0.7
Soybeans	14.9	–0.7	6.3	1.6	8.0
Others	2.6	–0.2	1.3	1.5	1.8

POLICY IMPLICATION

This study has shown that agricultural policies in Indonesia transformed substantially before and after the economic crisis in 1997/98, which is in line with general policy reforms. The devaluation of the rupiah against the US dollar was exceptionally large, at nearly 80%. Capital flights paralyzed the general economy, as well as financial sectors. The government had limited options, but managed to launch sweeping economic policy reforms. Agricultural policies were not excluded from these reforms. Import monopoly by the BULOG was dismantled and import duties for food were reduced or exempt to minimize the import-led inflation. These policy responses looked timely and appropriate. Agricultural support, which was measured at 12% in terms of %PSE before the crisis, fell sharply to minus 29% in 1998 and returned to a positive value again in the 2000s. %PSE has been around 4% in recent years, which shows a substantial reduction compared with the pre-crisis period. Agricultural policies seem to be moving towards the right direction.

However, we may have to ask one basic question; why were PSEs higher before the crisis? A direct answer could be due to high border protections. Yes it is true, but it masks the root cause which is an overvalued currency. Overvalued exchange rates necessitated relatively high border protections for agricultural products before the crisis because otherwise food could have been imported at discounted prices. This made book values of MPSs between local and international markets positive and lead to relatively high %PSEs, on the surface. There was a possibility that Indonesia's agricultural sector could have survived without border protections if the rupiah had not been overvalued. Indeed, food imports did not substantially pick up after the crisis despite of a sharp devaluation and reduced border protection. Many agricultural commodities in Indonesia can, in fact, compete internationally.

This study has also revealed that price support has been, and still is, the single most influential measure for agricultural support in Indonesia but the levels are relatively low in terms of %PSE. Government spending for GSSE have been rising since the crisis but in real terms, still fall below the pre-crisis period. No visible changes have occurred in the PSE composition of policy type. These observations imply that Indonesia's agricultural policies are so far, fairly neutral, less costly, and centred on a few strategic commodities such as rice, sugar, and palm oil. If there is a risk, it may arise through the continuation of price support for these commodities.

SUMMARY AND CONCLUSIONS

i) Various policy measures have been mobilized to support producers and consumers in Indonesia over the past 19 years. The most notable was the price support measures that have had a significant impact on Indonesian food and agriculture. Agricultural support concentrated on a few key commodities including rice, sugar, palm oil, and soybeans.

ii) Before the economic crisis of 1997/98, local production of key commodities used to be regulated by the state agency BULOG through its import monopoly and market interventions.

iii) The economic crisis completely altered the situation. A dramatic devaluation of the rupiah made food imports less competitive and border protection less required. The BULOG's monopoly was

dismantled, while import duties were reduced if not exempted. Government spending for agricultural support dropped.

iv) Recovery from the crisis was fast as the government concentrated on the stabilization of currency and domestic inflation through sweeping economic/financial reforms. Although some border protections resumed, overall agricultural support has remained relatively small in the 2000s.

v) The estimated PSE indicators suggest that support to agriculture in Indonesia has been largely positive except in the crisis years when the %PSE dropped to as low as minus 29%.

vi) The overall level of protection was relatively low and declined in the wake of the crisis. The %PSE dropped from 9% before the crisis, to 4% after the crisis. Major causes were the sharp drop in the rupiah, reduced trade regulations, and smaller input subsidies.

vii) Throughout the examined period, market price support accounted for more than 95% of transfer to producers. Rice was the major target of agricultural support, followed by sugar cane, palm oil, soybeans, and maize.

viii) There is a possibility that reduction in the %PSE is masked by the impact of overvalued exchange rates. Higher border protection might have been less required in the pre-crisis period if rupiah values had been much lower.

Annex Table 1. The Production Volume of 19 Major Agricultural Commodities, 1990–2008 (1000 ton)

Commodities	1990	1995	2000	2005	2006	2007	2008	Average 1990–2008
Rice	45,179	49,744	1,898	54,151	54,455	57,049	60,251	1.8
Wheat	0	0	0	0	0	0	0	0.0
Maize	6,734	8,246	9,677	12,524	11,611	12,382	16,324	7.5
Oilseeds	1,227	2,464	4,002	7,068	7,700	8,580	18,680	30.9
Sugar cane	27,980	28,999	23,900	29,300	25,200	25,200	26,000	–0.4
Beef and veal	259	312	340	359	396	418	393	2.7
Pigmeat	545	572	413	550	588	597	637	0.9
Poultry meat	498	854	804	1,126	1,260	1,331	1,350	9.0
Milk	346	433	498	536	617	637	647	4.6
Soybeans	1,487	1,680	1,018	808	749	746	776	–2.5
Cassava	15,830	15,441	16,089	19,321	19,928	19,610	21,593	1.9
Cocoa bean	142	278	421	643	580	620	793	24,05
Tobaccos	156	140	146	153	178	180	170	0.5
Rubber	1,275	1,532	1,601	2,271	2,350	2,540	2,922	6.8
Hen eggs	364	582	642	857	1,011	1,095	1,267	13.0
Peppers	70	59	69	94	80	80	80	0,74
Banana	2,411	3,806	3,747	5,178	5,037	5,454	5,741	7.3
Coffee	413	458	555	640	682	676	683	3.4
Tea	156	154	163	17,770	147	150	151	–0,17
Pineapple	390	703	399	925	1,428	2,238	1,273	11.9

Source: FAO and Central Bureau of Statistics Indonesia.

SD=specific duties

Annex Table 2. Applied Tariff Rates for 19 Commodities (%)

Commodities	1990	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Rice	10	10	10	10	10	0	0	0	SD	SD	SD	SD	SD	SD	SD	SD
Wheat	10	10	10	10	5	0	0	0	0	0	0	0	0	0	0	0
Maize	5	5	5	5	5	5	0	0	0	0	0	0	0	0	0	0
Palm oil	10	10	10	10	10	10	5	5	5	5	5	5	5	5	5	5
Sugar cane	10	10	10	10	10	0	0	0	10	10	10	SD	SD	SD	SD	SD
Beef and veal	20	20	20	20	20	5	5	5	5	5	5	5	5	5	5	5
Pigmeat	20	20	20	20	20	5	5	5	5	5	5	5	5	5	5	5
Poultry meat	20	20	20	20	20	15	5	5	5	5	5	5	5	5	5	5
Milk	25	20	20	20	15	15	5	5	5	5	5	5	5	5	5	5
Soybeans	10	10	10	10	10	0	0	0	10	10	10	10	10	0	0	0
Cassava	10	10	10	10	10	10	5	5	5	5	5	5	5	5	5	5
Cocoa bean	10	10	10	10	10	10	10	5	5	5	5	5	5	5	5	5
Tobaccos	10	10	10	10	10	5	5	5	5	5	5	5	5	5	5	5
Rubber	10	10	10	10	10	5	5	5	5	5	5	5	5	5	5	5
Hen eggs	10	10	10	10	10	5	5	5	5	5	5	5	5	5	5	5
Peppers	10	10	10	10	10	5	5	5	5	5	5	5	5	5	5	5
Banana	10	10	10	10	10	5	5	5	5	5	5	5	5	5	5	5
Coffee	10	10	10	10	10	5	5	5	5	5	5	5	5	5	5	5
Tea	10	10	10	10	10	5	5	5	5	5	5	5	5	5	5	5
Pineapple	10	10	10	10	10	5	5	5	5	5	5	5	5	5	5	5

Source: DG of Custom, Ministry of Finance, Republic of Indonesia.

SD=Specific duties

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MALAYSIA

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MAJOR CHALLENGES FOR THE AGRICULTURAL SECTOR

An Overview of the National Agriculture and Its Performance

The Malaysian agricultural sector can be primarily grouped into: (1) the agro-industrial subsector comprised of oil palm, rubber, cocoa, and timber; (2) the food subsector comprised of paddy, fruits and vegetables, livestock and fishery; and (3) the miscellaneous group consisting of tobacco, pepper, coconut, sugar cane, cassava, sweet potato, tea, and coffee. Another subsector consists of the 'newly-emerging' agro-industries such as floriculture, sago, aquarium fish, and aquatic plants. The structural composition of the agricultural sector has not drastically changed for the last ten years, especially with the agro-industrial subsector, which mainly serves the export market, dominating the agricultural scenario (Table 1).

Table 1. Agricultural Land Use (ha) Malaysia, 1990–2005

Item	1990	1995	2000	2005	Average Annual Growth Rate (%) 1990–2005
Rubber	1,836,700	1,679,000	1,430,700	1,250,000	–2.6
Oil palm	2,029,464	2,539,900	3,460,000	4,051,374	5.6
Cocoa	419,050	190,700	105,000	33,313	–12.0
Paddy*	661,953	667,563	572,196	666,003	0.2
Coconut	315,596	248,900	220,000	121,000	–5.6
Pepper	11,467	10,200	11,480	12,722	0.9
Vegetables*	35,180	42,240	51,420	40,320	1.4
Fruits	204,560	257,654	297,436	314,966	3.4
Tobacco	10,168	10,525	15,000	7,941	–0.1
Others**	85,177	90,356	67,534	150,231	7.4
Total	5,609,315	5,737,038	5,949,934	6,647,870	1.3

Source: FAOSTAT and Dapartment of Statistics, Malaysia.

Notes: * Paddy and vegetables are based on harvested area.

** Others include sugar cane, coffee, sago, tea, and floriculture.

In 1990, rubber, oil palm, and cocoa accounted for 76% of the total land use in agriculture. For the period of 1990–2005, there was a substantial decline in rubber and cocoa acreage while there have been significant increases in land area devoted to growing oil palm. Rubber and cocoa areas have declined at an average rate of 2.6% and 12% per annum, respectively. This is due to the continuing decline in international prices of both commodities and a general shortage of labor in the agricultural sector, which

made these enterprises less economically attractive. Strengthening prices of palm oil has resulted in substantial areas of rubber and cocoa being converted for the production of oil palm. For the period of 1990–2005, the area used to grow oil palm increased from about 2.0 million hectares to 4.0 million hectares, and registered an annual growth rate of 5.6%. Oil palm now accounts for about 61% of the total land area devoted to agriculture (Table 1).

Next to industrial crops, the most important crop is paddy. The total planted area in 1990 was 661,953 hectares. Area under paddy has marginally increased over the years at about 0.2% annually for the period of 1990–2005 (Table 1).

Growth and GDP

In the early periods, expansionist policies on Malaysia's main export crops of rubber, oil palm, and later followed by cocoa, had enabled the agricultural sector to grow at 7% per annum throughout the 1960s and 5% annually during the 1970s, through new land developments by both the public and the private sector. Growth in the sector has been consistently on a downtrend since then. In the 1980s, growth slowed down to 4.1%, while in the 1990s, the sector's growth barely reached 1.5% annually, with some years registering negative growth. The slowing in growth was the most apparent during the period of 1996–2000, which registered growth of only 1.2% per annum (Table 2). For the period of 2001–2005, the growth increase was about 4.0% per annum, as every year marked positive growth from 0.3 % to 7.1% per annum.

Table 2. Growth (% per annum) in the Agricultural Sector, 1961–2008

Period	Growth Rate (Agriculture)	Growth Rate (All sectors)
1961–1970	7.0	9.5
1971–1980	5.0	7.8
1981–1990	4.1	8.1
1991–1995	1.8	8.7
1996–2000	1.2	4.7
2001–2005	4.0	5.6
2006–2008	2.8	5.7

Source: World Bank, World Development Indicator for 2006-08.

It appears that based on the long term and recent trends, the capability of the agricultural sector in Malaysia to sustain growth is uncertain. However, the Ninth Malaysia Plan 2005–2010 emphasizes the revitalization of agriculture sector as the third engine of growth with the 84% increase in budgetary allocation from the Eighth Plan. The focus will be on the development of the New Agriculture which involves expanding large-scale commercial farming, cultivating high quality and value-added agricultural activities, as well as unlocking the potential in biotechnology. Specific policies will be implemented to expedite the transformation of the country's agriculture sector into a modern, dynamic and competitive sector. The policy thrusts include: Increasing agricultural production, including venturing into new sources of growth with greater private sector participation; Expanding agro-based processing activities and diversifying products; Strengthening marketing and global networking; Enhancing incomes of smallholders, farmers and fishermen; and Improving the service delivery system.

Major Challenges for the Agriculture Sector

From the Malaysian perspective, the performance of the agricultural sector cannot be solely based on pure economic parameters. This is because initially, programs in the agricultural sector were not designed solely for economic growth but also included programs that were aimed at providing a more equitable distribution of income. In this respect, poverty eradication programs in the sector formed a core component of the whole program and were also critical components in the issue of sustainability within the agricultural sector.

Published data subsequent to 1990 on the incidence of poverty by sub-sectors was not available. However, the incidence of poverty in rural areas could be used as a proxy for the incidence of poverty in the agricultural sector since the majority of the population in rural areas can be associated with agricultural activities (Table 3). The incidence of poverty in rural areas declined from 21.8% in 1990, to only 12.4% in 1999, and 11.4% in 2002. Hence, it can be acclaimed that the New Economic Policy (NEP), implemented through programs in the agricultural sector, has been successful in its objective of poverty alleviation.

Table 3. Incidence of Poverty (Rural and Urban), 1990–2009 (%)

Year/Sector	1990	1995	1999	2002	2009
Rural	21.8	16.1	12.4	11.4	8.4
Urban	7.5	4.1	3.4	2.0	1.7
Total	17.1	9.6	7.5	5.1	3.8

Source: World Bank, World Development Indicator (for 2009).

BASIC POLICY FRAMEWORK AFFECTING AGRICULTURE: KEY POLICY OBJECTIVES AND INSTRUMENTS

Agricultural Policies

The strategic thrust for the development of agriculture in Malaysia is embodied in the National Agriculture Policy. Since the formulation of the policy in 1984, the National Agriculture Policy has undergone two reviews to update the changes of the economic and socio-political landscape. The First National Agriculture Policy (1984–1991) was launched in 1984 with a strong focus on an expansionary policy on export crops, especially those of oil palm and cocoa. With abundant land and adequate agriculture manpower during that period, this policy saw the government investing heavily on infrastructure, institutional building, and new land developments. These investments were made in order to develop these two crops as well as in-situ development to resolve the problems of uneconomic farm size and low productivity among small holders.

The Second National Agriculture Policy (1992–1998) gave greater focus to addressing the issues of productivity, efficiency and competitiveness, and linkages with other sectors of economy. The development strategy under the Second National Agriculture Policy shifted from new area development to in-situ development due to the limited availability of land area as well as the high cost of land establishment.

The Third National Agriculture Policy (NAP3) (1998–2010) called for the further development of the agriculture food sub-sector and the growth of agro-based industries. This was to ensure the capability of the agricultural sector in national development in light of new and emerging challenges. The lessons learned from the Asian Financial Crisis of 1997–98 have accelerated the strategic need to seek a new engine of growth that can sustain the economy during periods of economic uncertainties. The crisis has shown that the manufacturing sector is prone to vagaries of global economic slowdown.

Under the NAP3, specific objectives were emphasized for enhancing food security; increasing productivity and competitiveness; deepening linkages with other sectors; creating new sources of growth; adopting sustainable development; and the utilization and management of natural resources.

Some of the issues in developing the agriculture food sub-sector are: industry resources within which land holdings are small and uneconomic, the competition of agro-food land with estate land, and also the importation of planting materials/input. Farmers are also contributing to these issues because of aging, under employment, and an inadequate labor force in this sector. Private sectors also see that the agricultural sector is perceived as a poor man's sector with low productivity. Another issue is trade liberalization to be implemented under the WTO, APEC, and AFTA.

The development of the national agricultural sector faces the challenge of transforming small scale agro-industry into commercial ventures. Furthermore, to ensure adequate, quality, safe, and nutritious food at a reasonable price, the following initiatives must be set in motion: (1) reducing full dependency on the labor force; (2) ensuring sustainable agricultural development; (3) increasing competitiveness; and (4) encouraging the private sector to invest in agricultural industry.

To transform the agricultural sector into the third engine of national economic growth, new sources of income, like agro-based industry, should be intensively explored and their development should cover all aspects of production and supply chain management.

Agriculture and the agro-based industry as a sector need to be transformed into a modern, dynamic, and competitive sector. The scope of the transformation includes that of farm size, labor force, farm management, competitiveness, and returns on investment. The transformations include: (1) transformation of traditional farmers; (2) sectoral transformation; and (3) horizontal/vertical transformation.

The transformation of traditional farmers covers the issues of land/farm size, the application of technology, mechanization, productivity, supply-demand matching, marketing, farmer cooperation, diversity of economic activity, and modernization. Development of the agricultural sector based on zoning/cluster, investment by the private sector, incentives, and also the implementation of the Good Agricultural Practices program, falls under the sectoral transformation strategies. Horizontal/vertical transformation covers strategies like strengthening the development of food processing industry, value added activities, supply chain activities, and also the strengthening of products themselves.

Some of the strategies under the transformation of the traditional farmer are the development of a collective agricultural project (as a group), the amalgamation of farms towards creating a commercial farm size (sizeable estate), and practicing standard manuals such as technology packages, business plans, and centralized management. To transform, traditional farmers to be more competitive and their application of the latest technology, new crops, modern machineries and environmentally controlled systems need to be enhanced.

Farmers and fishermen also need to transform their associations into a more organized cooperation, which can be done through various methods. These include: building capacity; initiating motivational programs; adding contract farming and integrated farms; processing and marketing; using modern fishing boats/vessels and equipment; creating new market opportunities; and inviting larger companies to establish a grand seafood restaurant as a model.

To ensure that our farmers and fishermen know just how important the quality and safety of their products is, they need to participate in accreditation and certification programs so they can safely produce high quality food products that can conform to international standards and also promote sustainable agricultural development.

There is also need to let them engage in a marketing system, because they can learn the importance of packaging, labeling, and branding. Farmers also need to diversify their economic activities, e.g., the integration of cattle in palm oil plantations, intercropping, mixed farming, and processing activities.

The strategies under the sectoral transformations such as rural development through zoning/cluster, aim at an increase in productivity and efficiency of 'downstream' activities and also the promotion of their integrated development.

The development of zoning/cluster is supported with the following activities: the Good Agricultural Practice Certification; Accreditation Schemes and Malaysia's Best standardization; commercialization and the transfer of technology; supply-demand matching; and pest/disease control.

Sectoral transformations also include the agro-based industry cluster, which consists of the meat based industry, fish based industry, fruit based industry, vegetable based industry, rice based industry, herbs based industry, and coconut based industry.

The promotion of private sector investments is also a part and parcel of sectoral transformations. They include: developing a modern farm project and an incubation center; offering them more attractive financial, fiscal and non-fiscal incentives; promoting the large scale involvement of the Government Link Company; and creating a centralized information center called the AGRI FOOD Business Development Centre.

Activities like food processing/value-added lay out the strategies for horizontal/vertical transformation, which covers winning products such as sauces, snacks, chilled snacks, drinks, and beverages. This transformation includes better branding/design, quality upgrading, scheduled production, aggressive promotion, and advertisement.

The horizontal/vertical transformations include the measures to improve supply chain activities like infrastructure and marketing facilities; farm collection centers; ICT facilities and post harvest handling equipments; information on the market; and the delivery process.

Trade Policies

The major recipient of the trade policies are the paddy and tobacco sub-sector, whilst for other commodities, the protections accorded are very small and insignificant, if any. Specific trade policies for the paddy sector are as follows:

Paddy Trade Regime

a) Guaranteed Minimum Price

The Guaranteed Minimum Price (GMP) was first introduced in 1957, in response to lagging income among paddy farmers. When it was first introduced, a certain floor price was imposed, at MYR250/ton. After several revisions, the current level (2008) is set at MYR750/ton for both long grade and medium grade paddy. The privatized National Paddy and Rice Board (BERNAS), plays the role of 'buyer of last resort' if the prices dip below the GMP. The paddy prices, however, have always remained above the GMP.

b) Paddy Price Subsidy

The Paddy Price Subsidy is an income support program to mitigate the high incidence of poverty among paddy farmers. The price subsidy was first introduced in the early 1980s, whereby paddy farmers were given a subsidy of MYR33/ton of paddy sold. The last revision was in 1990, at the current level of MYR248/ton. It is provided to all paddy farmers in the country who operate farms of 10 hectares and below. As a whole, the cost to the government in implementing the program is about MYR400 million annually.

c) Rice Price Control

The government controls only the price of lower grade, i.e., standard grade and the premium grade. The former is currently set at MYR165/100kg to MYR180/100kg, and the latter is set at MYR240/100kg to MYR260/100kg, based on different geographical locations. These prices were substantially raised in the wake of 2007–08 price hike in the world commodity market. This price control is meant to protect the low income consumer. The prices of other grades and rice types are floated and subjected to market forces. Currently, about 90% of all rice consumed in the country is of Super Grade.

d) Quantitative Restrictions on Rice Import

As the former 'state trading house' before its privatization, the BERNAS has been given the monopoly by the government in the importation of rice, up until the year 2010. In return, the BERNAS is to take over the responsibility of the government in providing social responsibility (i.e., to act as a buyer of last resort), and act as a gate keeper to ensure a fair price to both producers and consumers. The quantum for importation however, is determined by the government, based on the national supply-demand situation. In line with the CEPT-AFTA agreement, this quantitative restriction would be dismantled by 2010, and instead a 20% tariff will be imposed. At the same time, the monopoly accorded to the BERNAS will probably be withdrawn. As such, there is consequently going to be a free flow of rice into the country.

Tobacco Trade Regime

Apart from having a high tariff imposed on imported tobacco in order to insulate the industry from external competition, the tobacco industry is also 'controlled' in the form of a production quota to balance production with demand. Introduced in 1974, this regime intended to prevent the influx of farmers and curers into the industry. Curers were given a production quota of cured leaves, and this was based on the curers' capability to produce the required quantity, as well as quality of tobacco. In return, the curers allocated the quota to the green leaf producers, consisting of small farmers.

Fiscal Policies

Malaysia also offers incentives for investments in promoted products and activities in many sectors, including the agricultural sector. The incentives are designed to grant partial or a limited extent of total relief from the payment of tax. Among the types of incentives accorded for the investment in the agricultural sector are as follows:

- Pioneer status offers a different degree of exemptions depending on the types of promoted products and activities, as well as the location of the operation.

- Investment Tax Allowance is designed to cater to projects that have large capital investments and a long quotation period. Again, it is offered to select promoted products in promoted areas, including for R&D activities.

- Infrastructure Allowance is available to companies engaged in promoted areas, whereby the company will be granted an allowance of 100%, in respect to capital expenditure on infrastructure.

- Double Deduction on Expenses is for the promotion of export of agricultural products (advertising, market research, exhibition, etc.).

- Reinvestment Allowance is given to agricultural companies producing essential food (rice, vegetable, fruits, livestock, and aquatic products) undertaking expansion, modernization, and diversification activities.

- Deduction for Capital Expenditure is on approved agricultural projects. The eligible activities are the clearing and preparation of land, planting, construction of farm roads and bridges, farm buildings, irrigation, and drainage systems. The minimum farm size is between 8–40 hectares for fruits, and 8 hectares for floriculture production.

- Additional Incentives for Food Production is where a company that invests in a subsidiary company engaged in food production is eligible for incentives in the form of tax deduction or tax exemption.

- Import Duty and Sales Tax Exemption is on raw materials or components used directly for the export market.

- Import Duty and Sales Tax Exemption is on machinery or equipment not produced locally.

- Duty Drawback is on agricultural products. Manufacturers who have paid duty on the imported raw materials and components used for the production of goods for export are eligible to claim drawback on the duty paid within a year.

RECENT POLICY DEVELOPMENTS

Recent Development Plans and Policies

General Policies

The post-NEP plan came as a set of initiatives and goals titled "Vision 2020," which was enunciated by the Prime Minister in 1991. Through Vision 2020, Malaysia aspires to be a developed nation by the year 2020. The government envisions that by 2020, Malaysia will be a "United nation, with a confident Malaysian society infused by strong moral and ethical valves, living in a society that is democratic, tolerant, caring, economically just and equitable, progressive and prosperous, and in full possession of an economy that is competitive, dynamic, robust and resilient." Vision 2020 has been translated into a ten-year implementation plan, specifically called the Second Outline Perspective Plan, 1991–2000 (OPP2), which outlines the National Development Policy (NDP) of the nation.

The primary initiative of the NDP entailed striking an optimum balance between the goal of economic growth and equity, ensuring the balanced development of the major sectors of the economy (including the agricultural sector), reducing and ultimately diminishing the social, economic and regional inequalities and imbalance, and ensuring material vulture while instilling positive social and spiritual value. The agriculture sector recorded 0.5% growth per annum during this period, mainly due to the oil palm and food crop sub-sectors. Also during this period, there was a shift in land and labor from rubber and cocoa sub-sectors to oil palm sub-sectors. In line with the Third National Agriculture Policy formulated at the end of the period, the development of the sector was reoriented towards the optimum utilization of security in both the identical commodity and food sub-sectors through improvement in productivity and competitiveness (OPP3, 2001).

The National Vision Policy (NVP) has national unity as its overriding objective. It is aimed at "establishing a progressive and prosperous Bangsa Malaysia (Malaysian Race), which lives in harmony and engages in full and fair partnership." The NVP translated into a second ten-year implementation plan under Vision 2020, called the Third Outline Perspective Plan (OPP3). This most recent long-term plan focused on building a resilient and competitive nation through economic growth, promoted alongside with efforts aimed at poverty eradication and the re-structuring of society. Policies to improve material welfare and prosperity levels will also be accompanied by efforts to instill positive social and spiritual valves, as well as concern for the environment to maintain the long-term sustainability of the country's development.

The key sectoral development thrust during the OPP3 period will be to create wealth and promote new sources of growth in the manufacturing, service, and agricultural sectors, with focus on achieving sustainable growth with resilience. Particularly for the agriculture sector, the restructuring and modernizing of the agriculture sector towards being dynamic and competitive, is the main development thrust. Another relevant thrust is the need to accelerate the development capacity and the capacity in service and technology to further enhance competitiveness and efficiency, and increasing the utilization of information and communication technology (ICT) in the sector to enhance productivity.

Trade and Agricultural Policies

The implementation of the agreements under the World Trade Organization (WTO) and the Common Effective Preferential Tariff (CEPT) scheme of the ASEAN Free Trade Area (AFTA) have created greater competition for Malaysian agriculture. Main export commodities such as rubber and palm oil are faced with increasing competition from emerging lower cost producers, and they continue to experience discriminatory tariff and non-tariff barriers. At the same time, the less efficient food production sector has continued to be vulnerable to external threats within the region from low cost producers. Hence, the focus of the agriculture sector is tailored to increase productivity and competitiveness in order to remain strategically important for the country. The NAP3, which represents the guiding principle in the development of the agricultural sector in the country, took cognizance of this need. As such, the need to be competitive and profitable is one of the main 'pillars' of the plan.

The NAP3 has called for further enhancement in terms of competitiveness and profitability in the agricultural sector and has given focus to the promotion of globally competitive industries in both agriculture and forestry. This requires the development of a competitive world outlook within the sector and an export culture with the underlying commitment to provide what the market wants at a competitive price. The competitiveness of the sector will be enhanced through productivity improvement, developing and strengthening markets, removal of market and trade distorting measures, formulation and implementation of high-quality and safety standards, and selective development of agricultural and forestry enterprises based on present and potential competitive strengths. Further strengthening of competitiveness and profitability will be achieved through the development of new and innovative products and capitalizing on the product value chain that will generate sources of future growth and create new high value-added industries. Reducing labor inputs in agriculture and forestry will also strengthen the competitiveness and profitability of the sector.

Capitalizing on the product value chain requires the reorientation of production and marketing from commodity-based to product-based. This approach, aimed to capture higher margins and increase farm incomes, will involve vertical integration internalizing value-added activities at the farm level. In addressing labor constraints, the thrust will be on capital and technology intensive agricultural production systems, which will utilize labor-saving techniques. Agricultural and forestry development will also be geared towards less labor-intensive enterprises, such as agro-forestry and the cultivation of high-value crops and forest species that require less labor.

In this respect, the paddy sub-sector has been given greater focus due to its socio economic implications with liberalization. In fact, this is one sector that had created much concern for the government due to its strategic importance to the country. On one hand, the levels of support accorded to the sector are way above the allowable level by the WTO. On the other hand, the possible impacts of the withdrawal of the paddy price subsidy, especially with the dismantling of import restriction to conform to the CEPT-AFTA, could result in grave consequences to the farmers. In view of this, the current review conducted by the government aims to position the sector in the light of liberalization and globalization, as their possible impacts to the sector has identified the following elements for possible considerations:

- The proposed concentration of production only on the designated eight granary areas, could result in a reduction in self-sufficiency levels below the current minimum level of 65%. This would require ample effort to enhance productivity, hence the competitiveness of the sector. It is envisaged that with productivity improvement through upgrading irrigation facilities, technological support, and modern

farming practices; it is possible to achieve some level of competitiveness comparable to other producers in the region. Under such a scenario, the withdrawal of paddy price subsidy, which does not conform to the WTO obligations, would not cause serious implications on farm production and incomes.

- The introduction of the 'exit program' coupled with farm enlargement/land consolidation programs, which aims at reducing the number of farmers currently at about 145,000 farmers to 50,000 farmers, has resulted in larger farm holdings for the remaining farmers. The introduction of the 'exit program' is to be supported by the provision of alternative employment, the income guarantee scheme, and the compensation scheme. Credit facilities for large scale operations, as well as incentives to encourage private sector involvement in paddy production, would also be established.

- To Reform/remove market distortion by decoupling between production and poverty eradication program. Again, the introduction of allowable income support program would be the primary mechanism.

SUPPORT TO AGRICULTURE AS REFLECTED BY THE PSEs & OTHER POLICY INDICATORS

Commodities Analyzed

The commodities selected for the estimation of PSE indicators are based on the nine standard commodities, plus other specific major commodities, based on their importance to the national economy. Based on these requirements, the selected commodities are as follows:

Standard commodities: Rice, sugar cane, poultry, pigmeat, beef and milk. However, wheat, maize, and oilseed are excluded from the list because these commodities are not grown/produced in the country.

Specific commodities: Oil palm, rubber, cocoa, pineapple, and mango.

Major Assumptions and Data

PSE indicators have been estimated in line with the APO guidelines, which were prepared based on the OECD PSE manual. If no market support measures apply for a given commodity, budgetary expenditures are the only transfers to be estimated. If some market support measures such as import restrictions, government procurement, and price controls apply for a given commodity, the additional transfers between consumers and producers deriving from the market price differential are estimated on top of the budgetary support. Transfers to the government sector are also estimated through price differentials as import/export taxes.

Data for budgetary expenditures has been derived from various government reports. Because of their limited availability, some figures in the early 1990s have been computed by extrapolation, while the same 2006 budgetary data has been used for the GSSE in 2007 and 2008. For the same reason tax reduction was not included. Figures on production, consumption, trade, and prices have been taken from such sources as national agricultural statistics, reports of marketing boards, and the FAOSTAT. For some

commodities, average import/export prices in Singapore rather than Malaysia have been used as reference prices because Malaysia's trade volumes were too small and thus, prices were erratic.

Imports/exports of some livestock products are subject to licensing/certifications linked to the 'halal' system and thus, attempts have been made to estimate price differentials even if no effective import duties applied. No quality adjustment has been made between local and traded products except for cattle meat. An adjustment factor of 1.8 was used for cattle meat because Malaysia's average import prices have been 30–60% lower than those of Indonesia and Singapore.

Consumer Support Estimate (CSE) Indicators by Commodity

The Consumer Support Estimate (CSE) is an indicator of the annual monetary value of gross transfers to/from consumers of agricultural commodities, measured at the farm gate level, arising from policy measures, which supports agriculture. Accordingly, the %CSE measures the tax (or subsidy in the case where the CSE value is positive) on consumers as a share of the consumption expenditure at farm gates. Among the major findings are:

- The CSE registered negative values for imported commodities such as rice, sugar cane, beef, pigmeat, milk, and mango at least in some years (Table 4). The negative values registered for these agricultural commodities indicated the tax on the consumers. Two major export commodities, i.e. rubber and oil palm, showed positive values throughout the examined period, which indicated a subsidy on the consumers. As we see later in more detail, there was a tendency for transfers to consumers to be negative in most years except for the latter half of the 1990s and in 2007–08. The average %CSE for allcommodities during 1990–2008 was negative 3%. This implies that the averages of 3% of total consumption on all commodities are transferred in the form of tax from consumers to producers. However, the average %PSE for all commodities shows some cyclical ups and downs in each 5 year period.

Table 4. Annual Average CSEs by Commodities (MYR million)

	1990–94	1995–99	2000–04	2005–08	1990–2008
Rice	–281	51	–272	423	–43
Sugar cane	–159	–303	–193	269	–116
Beef and veal	9	–133	–369	–202	–172
Pigmeat	7	252	94	–341	21
Poultry meat	–159	534	–192	30	54
Milk	–170	–394	–381	4	–248
Rubber	57	71	19	87	57
Oil palm	72	162	147	0	100
Cocoa	0	3	–26	117	19
Pineapple	0	0	0	0	0
Mango	–7	–7	–15	–9	–9
Total	–630	236	–1,186	378	–336
%CSE (weighted average)	–6%	1%	–7%	0%	–3%

- The Consumer Nominal Protection Coefficient (Consumer NPC) measures the ratio between the average domestic price paid by the consumers and the border price. Therefore, it is an estimate of the nominal rate of market protection for consumers. Table 5 shows the annual average of consumer NPCs (which is equal to NACs in Malaysia's case) by commodity in each 5 year period from 1990. Consumers

have been paying higher prices than international prices for rice, sugar, beef, and milk in most periods, whereas they have been enjoying lower local prices for exports of the products rubber and oil palm. However, price differentials have remained in a range of plus 40% (for milk and sugar cane in the 1990s) to minus 20% (for pigmeat in the 1995–99 period and sugar cane in the 200–2004 period).

- The Consumer Nominal Assistance Coefficient (Consumer NAC) is the ratio between the value of consumption expenditure on agriculture commodities (at farm gate) and the value at border price (also measured at farm gate). The difference with Consumer NPC is that Consumer NAC includes the effects of not only the market transfers but also of transfers from the government in the form of subsidies/taxes. The Consumer NAC can be computed from %CSE. In Malaysia there were no differences between consumer NACs and NPCs because no specific government consumer subsidies/taxes applied.

Table 5. Consumer NPC (=NAC) of Major Commodities

	1990–94	1995–99	2000–04	2005–08	1990–2008
Rice	1.28	1.01	1.19	0.92	1.11
Sugar cane	1.31	1.36	1.24	0.83	1.21
Beef and veal	0.99	1.14	1.26	1.09	1.12
Pigmeat	0.99	0.83	0.93	1.22	0.98
Poultry meat	1.07	0.87	1.05	1.00	1.00
Milk	1.26	1.39	1.32	1.01	1.26
Rubber	0.92	0.90	0.93	0.95	0.92
Oil palm	0.94	0.94	0.95	1.00	0.96
Cocoa	1.00	0.99	1.06	0.94	1.00
Pineapple	1.00	1.00	0.99	1.00	1.00
Mango	1.26	1.12	1.20	1.17	1.19
Total	1.07	0.99	1.07	1.00	1.03

The Market Price Support (MPS) is the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers arising from policy measures that create a gap between the domestic market price and the border price of a specific agricultural commodity, measured at the farm gate level. In Malaysia, the relevant policies are those associated with the monopoly of agriculture (mainly rice), marketing in the form of the monopoly on imports (which operates as a state-trading enterprise), the Guaranteed Minimum Price for paddy, and the limited price control for beef, poultry, and milk. Palm oil is subject to 15–20% export duties while export licensing is applied to rubber, oil palm products, animal products, pineapples, and rice. The estimates on the value of market price supports are reflected in Table 6. It should be noted that the total values of the MPS in Malaysia have been always negative, as they have been affected by the negative MPS of two major export commodities (rubber and oil palm). This means that producers of export products have been penalized by market support measures. On the other hand, the average value of the MPS for 1990–2008 was positive for rice, sugar cane, beef, milk, and mango with considerable variations by period. It should be noted that the MPS for rice was mostly positive, except in 1997 and 2008 when sudden changes in exchange rates and international prices made local rice prices tentatively lower than international ones.

Table 6. Market Price Support by Commodity, Annual Average, 1990–2008 (MYR million)

	1990–94	1995–99	2000–04	2005–08	1990–2008
Rice	219	–29	201	–237	53
Sugar cane	21	29	20	–3	18
Beef and veal	–2	26	54	31	27
Pigmeat	–7	–250	–92	336	–21
Poultry meat	159	–532	184	–27	–55
Milk	7	17	15	–1	10
Rubber	–181	–247	–177	–321	–227
Oil palm	–380	–948	–652	0	–521
Cocoa	0	–1	7	–21	–3
Pineapple	0	0	0	0	0
Mango	5	3	7	5	5
Total	–158	–1,932	–434	–238	–714

Producer Support Estimate Indicators by Commodity

The Prodcer Support Estimate (PSE) is an indicator of the annual monetary value of gross transfers from consumers and taxpayers to agricultural producers, measured at the farm gate level, arising from policies targeted at agriculture, relative to a situation without such policies. Table 7 and Table 8 show the estimated annual average PSE values and %PSEs by commodity in each 5 year period.

Table 7. Annual Average PSE Values by Commodities (MYR million)

	1990–94	1995–99	2000–04	2005–08	1990–2008
Rice	587	490	772	474	586
Maize	0	0	0	0	0
Oilseeds	0	1	0	1	1
Sugar cane	21	29	20	–3	18
Beef and veal	–2	26	54	32	27
Pigmeat	–7	–247	–91	342	–19
Poultry meat	159	–528	188	–10	–50
Milk	7	17	15	0	10
Rubber	–57	–62	–14	–51	–46
Oil palm	–72	–131	–127	135	–58
Cocoa	0	0	7	–20	–2
Pineapple	0	0	0	1	0
Mango	5	3	7	5	5
All PSE commodities	642	–400	832	906	474

Table 8. Annual %PSE by Commodities (%)

	1990–94	1995–99	2000–04	2005–08	1990–2008
Rice	43	30	42	24	35
Maize	0	0	0	0	0
Oilseeds	0	0	0	0	0
Sugar cane	23	23	20	–5	16
Beef and veal	–1	11	20	9	10
Pigmeat	–1	–26	–10	17	–6
Poultry meat	6	–17	5	0	–2
Milk	20	27	24	0	19
Rubber	–3	–3	–1	–1	–2
Oil palm	–1	–1	–1	0	–1
Cocoa	0	–1	5	–10	–1
Pineapple	0	0	0	0	0
Mango	21	10	16	14	15
All PSE commodities	4	–2	3	2	2

From these tables, we may find that:

- Rice is the single largest commodity for which producers have been constantly receiving high positive support;
- Transfers to producers have been relatively large in pigmeat and poultry meat but volatile with frequent shifts from positive to negative or vice versa by period;
- Unlike the CSEs, the size of the PSE is relatively small for export commodities;
- Average %PSE for 1990–2008 is high for rice (35%) and modestly high for milk (19%), sugar cane (16%), mango (15%), and beef (10%);
- %PSEs are almost always zero or slightly negative for major export commodities(i.e., rubber and oil palm); and
- The weighted average of %PSE for all measured commodities is however, very low staying around zero (–2% to 4%) because positive and negative supports given to individual commodities cancelled each other out.

It is clear from these observations that the sector that is provided with significant support by the country is rice. Imports of the rest of the other commodities had been previously liberalized, with very insignificant direct support provided to them. Although tariff quotas and/or licensing have been applicable to some commodities such as meat, milk, eggs, cabbage, and sugar, they seem to have had a limited impact partly because of the relatively narrow price gaps with imported products and partly because sufficient amount of quotas have been allocated.

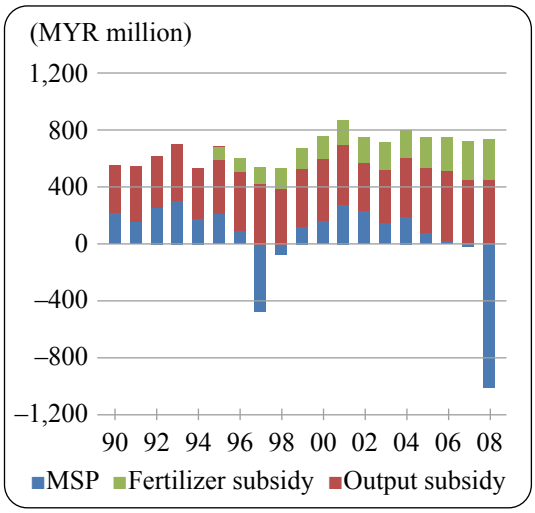

Figure 1. Rice PSE by Policy

The rice sector in Malaysia is supported by three major policy measures: state trading by BERNAS, direct payments to producers (payment on output), and fertilizer subsidies (input subsidy). Figure 1 illustrates the changes in these components for 1990–2008. Transfers from the MPS were positive in most years except 1997 and 2008 when sudden changes in external factors (i.e., a fall in the exchange rate and an upsurge in international prices) occurred. Direct cash payment to rice producers was the largest component, which has been stable with a rising trend. The payment is provided for every ton of paddy produced by the farmers. Hence, the total value of support depends on the level of production. The total payment ranges between the low values of MYR332 million in 1990, to the high value of MYR486 million in 2006 at an average of MYR403 million annually during the period of 1990–2008. A similar program is not in place for other commodities. The highest PSE value for rice was registered at MYR863 million in 2001 with a %PSE of 46%.

Based on the producer support value, several other observations can be derived as follows:

- Overall, the PSE value was at an average of MYR474 million/year and the market price support contributed an average of minus MYR124 million annually during the period of 1990–2008.

- The negative PSE value registered for rubber, oil palm, cocoa, pigmeat, and poultry meat during the years 1990–2008 (Table 7) illustrates that producers have been taxed for their production. The percentage transfer brought about by the tax is indicated as a small negative %PSE, with the lowest value being –6% for pigmeat.

- The Producer Nominal Protection Coefficient (Producer NPC) measures the ratio between the average price received by producers (at farm gate), including payments based on output, and the border price. The average Producer NPC for the years of 1990–2008 was 0.99, suggesting that no substantial price gaps with international prices existed as a whole. However, the price gap has happened to be small as a result of balancing out positive and negative transfers. For instance, the producer NPC for rice was 1.49 and for sugar cane it was 1.24 during 1990–2008, which suggests that producer prices of these products were much higher than international prices. In contrast, the producer NPC for rubber and oil palm was 0.92 and 0.96 respectively, which cancelled out high NPCs of other commodities including rice and sugar cane.

- The Producer Nominal Assistance Coefficient (Producer NAC) is the ratio between the value of gross farm receipts including support and gross farm receipts valued at border price. The Producer NAC for a commodity is larger than the relevant producer NPC because gross farm receipt can include other government payments such as input subsidies, in addition to payments on out puts. However in Malaysia, the Producer NACs were almost always equal to the Producer NPCs because only minor input subsidies have been paid to producers.

Table 9. Average Producer NPC by Commodity

	1990–94	1995–99	2000–04	2005–08	1990–2008
Rice	1.75	1.38	1.55	1.23	1.49
Sugar cane	1.31	1.36	1.24	0.98	1.24
Beef and veal	0.99	1.14	1.26	1.09	1.12
Pigmeat	0.99	0.83	0.93	1.22	0.98
Poultry meat	1.07	0.87	1.05	1.00	1.00
Milk	1.26	1.39	1.32	1.01	1.26
Rubber	0.92	0.90	0.93	0.95	0.92
Oil palm	0.94	0.94	0.95	1.00	0.96
Cocoa	1.00	0.99	1.07	0.94	1.00
Pineapple	1.00	1.00	0.99	1.00	1.00
Mango	1.26	1.12	1.20	1.17	1.19
All PSE commodities	1.01	0.94	1.00	1.01	0.99

General Services Support Estimate

The General Services Support Estimate (GSSE) is an indicator of the annual monetary value of gross transfers to general services provided to agriculture collectively, and not to individual farmers. There are problems in acquiring the data to compute the GSSE since many agencies and departments are involved in these support services, and the total budget allocated for each department and agency is comprised of many activities and programs. Furthermore, some of these activities and programs have changed between years. Hence, it is extremely difficult to have a good and comprehensive indicator of these supports. What is provided, however, is an expenditure for the major departments and the institutions involved in agricultural developments, based on their annual operating and development expenditures. The main inputs are derived for major agricultural R&D institutions, the Department of Agriculture (for extension), the Federal Agricultural Marketing Authority (for marketing), the Farmers' Organization Authority (for farmers' organization), and the Agricultural Bank of Malaysia (for credit and finance). Furthermore, we have assumed the same budget size for the last three years. This information could provide some indicators on the general support services provided by the government.

The average value of the GSSE in the period of 1990–2008 was roughly MYR1.35 billion/year, which is derived from support services such as R&D at about MYR526 million/year, agricultural schooling at approximately MYR132 million/year, the cost of infrastructure at about MYR454 million/year, marketing & promotion, which is among the lowest support at only MYR80 million/year, and other miscellaneous support services valued at around MYR152 million/year. The budget is used for development purposes, which is comprised of the following key elements: new land development; regional development; in-situ development (including Integrated Area Development Programs, replanting, land consolidation, and rehabilitation); and development of agriculture projects for food crop, fisheries, and livestock.

Total Support Estimate (TSE)

The Total Support Estimate (TSE) represents the total annual monetary value of all gross transfers from tax payers (i.e., the government) and consumers, arising from policy measures that support agriculture, net of the associated budgetary receipts, regardless of their objectives and impacts on farm production

and income, or consumption of farm products. In short, the TSE measures the overall cost of agricultural support financed by consumers (transfer from consumers) and taxpayers/government (transfer from taxpayers) net of the import receipt. Among the major findings are:

- The annual average for the total value of production (at farm gate) is around MYR32.6 billion and the total value of consumption (at farm gate) is valued at MYR20.1 billion, which resulted in an 87% share of the selected PSE commodities.

- The value of PSE reflects the positive support for the years 1990–2008 at an average of around minus MYR0.1 billion/year that was derived from the MPS and payments based on output (for rice only) were at an average rate of minus MYR0.71 billion and plus MYR0.4 billion annually.

- The average %PSE registered annually was at minus 0.7% for 1990–2008. During this period, the highest percentage was in 1994 at around 3.6% and the lowest was in 1997 at minus 16.5%. The %PSE stayed around zero with minor ups and downs after 1998. However this stability near zero is largely due to the balancing out of the negative support for major export commodities (i.e., rubber and oil palm) and the positive support to rice.

- The average %CSE annually is negative 2.5%, as the value ranges between negative MYR1.4 billion (2000 and 2003) to MYR3.1 billion (2008). This indicates a tax on consumers as a share of consumption expenditure at farm gates. However, the situation reversed in specific years, such as in 1997 and 2007–08 as they were affected by external factors like exchange rates and the spike in international commodity prices.

- The Consumer NAC (as indication for the nominal rate assistance) registered as a positive value throughout the years of 1990–2008 with a variation range of around 0.89 to 1.09 and also showed an average of 1.03 annually.

- The TSE provided to the agriculture sector in the country is positive, valued at MYR0.815 billion in 1990 and MYR2.7 billion in 2008. The lowest year was in 1997 with a negative TSE value of MYR3.5 billion, while the highest was in 2007 at MYR4.1 billion. For these years, the mean TSE value was MYR1.3 billion annually. This indicates that at the aggregate level, the transfer from the tax payers and budget revenues is much higher than that derived from the transfer from consumers. Subsequently there is an overall 'positive support' as indicated by a positive %TSE to agriculture in the GDP of the country.

SUMMARY & CONCLUSIONS

Our estimates indicate that the overall support to agriculture in Malaysia has been relatively small with an average %PSE of minus 0.7% for the examined 19 years. With government budgetary support, the average value of the TSE became positive. However, it masks the dual structure of Malaysia's agriculture and policy support. Malaysia has the powerful estate sector producing export crops (of rubber and oil palm) on the one hand, and on the other hand, the small family farm sector is growing rice, other minor crops, and animal products. This study indicates that policies penalize the former and support the latter. Relatively high agricultural support has been recorded for rice and to a lesser extent for sugar cane and beef, which are protected by state trading and other trade measures.

The government is committed to liberalizing the agricultural sector, in line with the country's commitment to comply with the WTO and the CEPT-AFTA. Recent policy directions are towards realizing this objective. The paddy (rice) sector, which is one sector that had been heavily protected because of its socioeconomic and strategic considerations, is now under review to ensure that future policies governing this sub-sector will also comply with the above commitments.

The support that is received by agriculture producers in Malaysia is accompanied with the environmental management and environmental friendly production system program through accreditation and certification, standardization, modern technology, sustainable agricultural development, and integrated pest management. The programs are designed for agriculture producers to ensure adequate, quality, safe, and nutritious food at a reasonable price, which is also able to conform to international standards in sequence with our NAP3.

The results of the analysis have been able to provide a fair representation of the impact of the various policy measures on the agricultural sector. The main goal is to manage the agricultural sector in a truly liberalized environment.

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REPUBLIC OF CHINA

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MAJOR CHALLENGES FOR THE AGRICULTURAL SECTOR

An Overview of the National Agriculture and Its Performance

Background

The total value of agricultural production, including fisheries, reached TWD363.79 billion and TWD417.50 billion for 2000 and 2008, respectively. Its share in the total GDP of the Republic of China (ROC) was 2.1% in 2000 and 1.6% in 2008. Agriculture used to be a major part of the economy in the ROC and contributed TWD53.15 billion or 15.5% of the ROC's GDP in 1970. The total value of agriculture kept growing to TWD313.55 billion in 1990. Due to the stronger economic growth in the non-farm sector, the role of agriculture has diminished, which is reflected in its declining share in the GDP, from 7.7% in 1980, to 4.2% in 1990, and to 1.59% in 2008.

The transition of the agricultural sector can be better understood from its compositions, i.e. crop, livestock, fishery, and forestry. The order in which these are listed represents their relative weights among the four major divisions. Crop production has occupied the largest portion in the ROC's agricultural sector but its share has gradually declined. At its highest level of importance, crop production was at TWD30.405 billion or 57.2% of the total agricultural value in 1970, from which it went to TWD138.389 billion in 1990 44.14%. This percentage increased to 45.41% in 2000 and decreased again to 42.9% in 2008.

Livestock production, nevertheless, experienced a different pattern of growth. Compared to the crop sector, livestock was a small sector in the 1970s as it fostered TWD12.81 billion or 24.11% of the total agricultural output value. Since then, livestock has become the fastest growing sector; it created TWD84.51 billion or 26.95% in 1990. The share further increased to 29.57% in 2000. In recent years, livestock produced about a third of the total agricultural output value. The value reached TWD146.11 billion, or 34.99%, in 2008.

The fishery and forestry industries consist of the rest of the agricultural sector, which jointly weigh 22.11% of the entire agricultural output value in the ROC, in 2008. Before 1980, these two divisions had minor roles in terms of the total output value but expanded substantially in the 1980s. In later years, the pace of joint economic growth in these two divisions has slowed. In 2008, the fishery and forestry industries raised TWD91.84 billion and TWD0.45 billion in output values.

Agriculture used to absorb more than a third of the total labor force in the ROC, as agricultural employment was 1.681 million or 36.7% of total employment in 1970. Due to the fact that the non-farm sector demanded more of the labor force, the employment in the farm sector reduced to 1.277 million, or 19.5% of total employment in 1980. The employment in the farm sector has continued to decline and the most current figure shows that employment was down to 0.74 million in 2000 and 0.535 million in 2008.

As for the production factor of land, the total area of cultivated land in the ROC was 0.907 million hectares in 1980, which accounted for 24.86% of the total land area in the ROC. Mainly due to the conversion of agricultural land to nonagricultural uses, the total area of cultivated land has continued to decrease over time. The area of cultivated land which was 0.89 million hectares in 1990 lowered to 0.851 million hectares in 2000 and 0.822 million hectares in 2008.

Similar to the declining trend of agricultural employment, the number of full-time farms had reduced substantially in the 1970s and 1980s. Its level dropped from 277,327 full-time farms in 1970 to 80,598 in 1980. Since the 1980s, the declining trend has reversed. The number of full time farms increased to 113,382 in 1990 and 129,863 in 2000. On the otherhand, the change in the number of part-time farms has also been substantial. The number reached its peak of 815,930 in 1980 and has declined ever since. The number of part-time farms decreased from 746,390 farms in 1990 to 594,782 farms in 2000, and further decreased to 589,521 in 2007.

The average income per farm was TWD504,000 in 1990, which was 2.3 times the level of 1980's of TWD219,000. It increased to TWD918,000 in 2000, and increased further to TWD937,000 in 2007. The ratio of average income of farm households to that of non-farm households was 77.3% in 1990. This ratio was 78.6% in 2000 and 79.3% in 2007.

Table 1. The ROC's Agricultural Situation

Year/Item	1970	1980	1990	2000	2008
Production value (TWD million)					
•Agricultural production value	532	2,124	3,136	3,638	4175
•Contribution to GDP	15.5%	7.7%	4.0%	2.0%	1.6%
•Production value of crops	304	1,007	1,384	1,652	1,791
•Production value of livestock	128	618	845	1,076	1,461
•Production value of fishery	72	450	892	907	918
•Production value of Forestry	28	49	15	3	4
Employment (10,000)					
•Agricultural employment	168.1	127.7	106.4	74.0	53.5
•Ratio to total area of ROC	36.7%	19.5%	12.8%	7.8%	5.1%
Area (000 hectare)					
•Area of cultivated land	905	907	890	851	822
•Ratio to total area of ROC	24.8%	24.9%	24.7%	23.7%	22.8%
Farm number (000)					
•Number of Full-time farms	277.4	80.6	113.4	129.9	161.8
•Number of part-time farms	639.9	815.9	746.4	594.8	589.5
Income (TWD10,000/household)					
•Average farm household income	3.49	21.9	50.4	91.8	93.7
•Ratio to non-farm households	-	79.7%	77.3%	78.6%	79.3%
Trade (USD million)					
•Agricultural export value	-	2,251	3,661	3,279	3,849
•Ratio to total export value	-	11.4%	5.5%	2.2%	1.5%
•Agricultural import value	-	3,089	6,088	7,602	12,121
•Ratio to total import value	-	15.7%	11.1%	5.4%	5.0%
Food sufficient rate (price)	-	-	88.4%	79.7%	71.0%
Food sufficient rate (energy)	-	-	39.4%	35.6%	32.7%

Note: Figures on farm numbers and income are for 2007.

Major Challenges for the Agricultural Sector

WTO Regulation

According to the recent WTO agricultural negotiation, the general consensus among the members towards the overall domestic support is clear. They feel the restriction on the overall level of trade-distorting domestic support should be more stringent. The first step towards the overall reduction in the Aggregate Measure of Support (AMS) is to set a limit on the total sum of all trade-distorting support, as its level should not exceed 80% of the sum of the final bound total AMS plus permitted *de minimis* and the blue box. The components of the trade-distorting support, such as AMS, blue box payments, and *de minimis*, are expected undergo more cuts in future negotiations. Also, product specific AMS will be subject to a reduction. Under the pressure for further AMS reductions and individual AMS caps, the ROC's current price support program is certainly warranted close examination and is under great pressure for reform.

WTO membership brings not only the requirement of limiting domestic support, but also more generous border measures for our trade partners. Under the spirit of the WTO, all of the tariffs and barriers on the imported agricultural commodities have to be reduced to facilitate the flow of goods, which have forced our agriculture sector to face a more stringent challenge. More severe competition, at the same time, is expected to come.

Adverse Impact Caused by Set Aside Program

The opponents have documented many flaws in the current set aside program. It is argued that the increase in the quantity of set-aside land will reduce the supply of farmland in the market and will cause rentals to rise. In turn, it will increase the cost of production and hinder the enlargement of farm size, and therefore undermine the efforts of structural adjustments. Moreover, due to the lack of proper maintenance of set-aside land, pest and disease infection has frequently occurred and has spread to neighboring farms without a proper and effective monitoring system. These side effects of the set aside program has overshadowed its contribution in balancing the rice supply and demand and in stabilizing farmers' income.

Slow Structural Adjustment

Despite considerable transformation of national economy, the overall structure of ROC's agriculture has shown little progress in recent years. According to agricultural census data available in 2005, the average farm size for paddy rice was only 0.67 hectare. Average farm sizes were 0.71, 0.9, and 0.77 hectares for vegetable, fruit tree, and flower farms, respectively. In general, no significant increase in farm size has been observed in the past decade.

The aging problem in the farm sector is considered another serious issue. On average, rice farmers were 62.1 years old in 2005. Vegetable and fruits tree growers were 60.5 and 60.1 years old, respectively. Flower growers or animal rearing farmers were 57.0 years old. The aging problem in the farm sector is considered a serious issue.

The percentage of full time farmers has been decreasing over a long period of time with some interruptions in recent years. While the percentage of full time farmers was 17.92% in 2000, this value

increased to 21.96% in 2006. Even with this short-term increase in the share of full time farmers, it is generally believed that the majority of farmers in the ROC will still be part time farmers in the foreseeable future.

Farm Income

Although, the price support program may enhance farmers' income in the short-run, its impact is insignificant in the long-run. The ratio of farm income to non-farm income was 79.7% in 1980, and was lowered to 77.3% in 1990. The ratio bounced back slightly to 78.6% in 2000 and stayed at this level for a few years. In the long run, the stagnation of this low ratio could be used as evidence of an ineffective policy impact. Without an adequate farm advisory system, farmers can only receive temporary relief from over production and low market prices; the fundamental problems, however, still remain.

Equity Issue

The government budget for the agricultural sector was TWD87.703 billion in 2001, 5.45% of the total governmental budget. It has increased to TWD121.975 billion in 2005, and the percentage has also increased to 7.58%. The share of the agricultural budget has been increasing, while the agricultural share of GDP has decreased from 3.6% in 1992 to 1.66% in 2005. This observation shows that the equity issue regarding the adequacy of the inflated agricultural budget has been raised.

BASIC AGRICULTURAL POLICY FRAMEWORK: KEY POLICY OBJECTIVES AND INSTRUMENTS

Macroeconomic/General Policies

Fiscal Policy

The sluggish economy after the new millennia has diminished the inflow of government revenue. To save the economy from slowdown, the authority has prescribed strategic tax-cutting measures, which has also, to a large extent, squeezed the pocket of the government. Moreover, the improvement of social welfare and the massive reconstruction funding required after a devastating earthquake on 21 September 1999 imposed an extra load on already fragile government finances. In 2002, the ratio of the ROC's public deficit stood at 13.8% to its budget, or 3.3% to its GDP. Due to the financing of this deficit, the outstanding public debt had climbed to 31.5% of GNI. To alleviate the sinking public finance, the authority has engaged in accumulating income and holding back unnecessary spending. A cabinet-level task force was formed and has aimed for a balanced budget within the next five to ten years (APEC, 2003).

Since then, the public deficit has decreased for the following years. Statistics show that the deficit was TWD314.7 billion in 2003 and TWD77.5 billion in 2006. When its ratio to GDP is computed, the figures were lowered from 3.0% to 0.7%. A similar result occurred to the ratio of the public budget to GDP, as well. In 2007, the government tax revenue grew by 8.3% for the first 9 months and spending was in control. With near zero in international debt, the ROC's public finance has advanced.

Monetary Policy

After expanding at an average rate of 25.1% per year from 1970 to 1982, and 19.4% per year from 1983 to 1994, the broadly defined money supply (M2) still grew at a lower than average rate of 7.1% from 1995 to 2002. In 2002, the ROC's Central Bank maintained an expansionary policy targeting on fostering economic growth. In the two years up to June 2003, the Central Bank cut the discount rate 15 times, reducing it by 337.5 basis points from 4.75% to 1.375%. Both long-term and short-term interest rates were at historic lows. The growth of the broadly defined money supply (M2) was remarkably slow. In 2002, the M2 grew by a mere 3.55%. Moreover, the Central Bank and the Ministry of Finance set up a taskforce to carry out a series of financial reforms called "2-5-8 Financial Reform Plan in September 2002" (APEC, 2003). Since October 2004, the Central Bank began its contracting practice to ease domestic inflation followed by raising the prices of imported materials and metals. The interest rate had risen 16 times to 3.625%. On the other hand, the M2 had decelerated and its rate of growth moved from 7.45% in 2004 to 4.25% in 2007.

External Policies

For the ROC, international trade is the lifeline of economic growth. Thereby, the Central Bank took an aggressive attitude toward foreign exchange rates in order to retain the value of New Taiwan Dollar against all other currencies. The foreign exchange rate was basically determined by the supply and demand from the market. However, if there is any intentional disturbance, the Central Bank will intervene to keep the currency in the target range.

In 2006, the chilling domestic consumption and investment drove the New Taiwan dollar to depreciate 0.46% against the US dollar, even though the rest of Asian currencies appeared to be appreciating. Furthermore, the downward sloping trend of the purchase power parity index reflects the long term weakening of the New Taiwan Dollar, where the effective exchange rate was 92, compared to that of the base year of 2000.

Basic Agricultural Policies

The Government has conducted many national agricultural policies that were associated with the macro-economic plans, from 1949 till now. These agriculture policies were designed to address the situation and problems that the agriculture sector faced at the time. For each of these policies, there was a distinct set of measures aimed for improvement in the agriculture sector.

The period from 1985 to 2008 can be broken into 5 stages, if divided by the contemporary agriculture policy. These agriculture policies were: the "Improvement of Agricultural Structure and Increase of Farm Income program" (1985–1990), "Aggregate Agricultural Adjustment Program" (1991–1997), "Cross-Century Agricultural Development Program" (1997–2000), "New Program of the 21st Century" (2001–2004), and "Midterm Agriculture Policy" (2005–2008).

Input Subsidies

To facilitate the modernization of the agricultural sector, current input subsidies include: price support for purchasing agricultural machinery; a fertilizer freight subsidy; a discount rate for the electricity that powers irrigation; and interest subsidies. These are elaborated as follows:

- Support for purchasing agricultural machinery: Farm households may receive up to 50% and 5-year-long purchasing price support if they can prove that the purchased machinery is operable and actually used in field.

- Fertilizer freight subsidy: To reduce the burden on transporting fertilizers, farmers are subsidized for the gap between the factory price and retail prices.

- Discount rate for electricity in irrigating use: Under the Agricultural Development Act, farm households may enjoy a discount on their utility bills in that the progressive rate structure of electricity is suspended as long as the electricity is for powering irrigation.

- Interest subsidies: Besides purchasing price support, the farm households who need credit to buy agricultural machinery may be entitled to receive an interest subsidy or a discount in the interest rate. The interest subsidy is also applied to the loans for acquiring farmland.

Price Support

- Rice price support: Price support is the most direct approach to enhance farmers' income and to stabilize the food supply. Price support has a long history in the ROC. After the first oil crisis in 1973, a paddy rice price support program called the "unlimited quantity purchase under guaranteed price" was first introduced. Due to the heavy financial burden and the sharply increased rice supply, this program was terminated in 1976. A modified program called the "limited quantity purchase under guaranteed price" was later introduced into the rice industry, in which the government purchased rice in two sets: guaranteed price; and quantity per hectare. This modified program has been applied to the ROC's rice market since 1977. By the second half of 2003, the government launched another purchase program called "surplus purchase" to assist rice farmers suffering from a low price level caused by the import of rice.

  Upon reviewing the price support for paddy rice after 30 years of implementation, evidence shows that it did help to stabilize the price of rice and rice farmers' income. However, it also created an excess supply of rice. The chronic surplus of rice has nurtured serious storage and marketing problems and billions of government expenditures have been wasted in the process of disposing of the surplus of rice. The deficit in the price support program reached its peak of TWD19 billion in 1983. Due to the enlargement of the set-aside program, this figure has declined in the last few years. Regardless, the government still paid TWD3.5 billion in 2004.

- Guaranteed purchases of millet: The government purchased soybean, corn, and sorghum at guaranteed prices of the respective products.

- Sugar cane contract: The Taiwan Sugar Corporation contracts with farmers according to the rules of the purchase of sugar cane and the share in the price of sugar made thereof with farms.

- Deficiency payment: A fund was established to provide a subsidy for summer vegetables in the form of contract guaranteed price. The implementation period is from June 1 to October 31 each year.

Improvement of Infrastructure

Irrigation associations, responsible for water supply management and construction, have been taking the responsibility of constructing and managing the country's irrigation system. Due to such efforts, more than 60% of the farmland is covered by the irrigation system. The development of rural roads is also providing greater accessibility for transporting and marketing farm products. Except for mountainous areas, there is absolutely no issue of accessibility to the markets for all rural villages.

Diversion Payments

A diversion payment was introduced in 1984 to alleviate the rice surplus problem. Under the Program of Rice Production and paddy field diversion, for rice farmers converting rice production to any other non-rice crops, there is a diversion payment. This policy measure was later replaced by the set aside program in 1997.

Set Aside Program

The Utilization and Adjustment Plan for Paddy Fields and Uplands (UAPPFU) was introduced in 1997 to fulfill the ROC's commitments on the AMS reduction and to cope with the potential adverse impact of the import of rice. A set aside program for paddy field was emphasized within this plan. In terms of qualification, those who grew rice, price supported feed grains, or were contract farming on sugar cane over the base period (1994–1996) were qualified for participation in this program. Since 2004, the base period was extended to 2003 (i.e., the base period is 1994–2003).

In 2001, the sequential program of "Continuous Implementation of Utilization and Adjustment Plan for Paddy Fields and Uplands" raised the set aside premium to TWD41,000 per hectare, which was paid to farmers who set aside their paddy fields, grow green manure, or conduct ecological friendly practices. The payment was further elevated to TWD45,000 per hectare in 2004.

The set aside programs were effective. Both the set aside area and its budget outlay has significantly increased over time. The set aside area was 83,563 hectares in 1998 and increased to 19,608 hectares in 2003. Due to a water shortage, more paddy field was forced to set idle to preserve water for non-agricultural uses. For the first time in history, the area of planted rice, which was 237,351 hectares, was smaller than the set aside area of 239,747 hectares in 2004. In terms of the program expenditure, the set aside program cost TWD2.83 billion in 1998 and TWD5.454 billion in 2001. The government spent TWD10.59 billion in 2004, which is about 10% of the total agricultural budget.

Although its goal of the reduction of the supply for rice has been achieved, the implementation of the set aside program has however raised the controversial question of whether the scarce resources of farmland have been adequately used. The opponents of the set aside program raised serious questions concerning the spread of pests and disease on these set aside lands to neighboring fields without proper preventive measures or a monitoring system. Moreover, the price support program of the guaranteed purchase tends to stimulate production, which consequently counteracts the effects of the set-aside program (Fraser, 1988, 1991a, 1991b; Chen, 2000).

Provision of Various Services

Research and development, extension, trainings, market information, quality standards, and food safety are included in this provision.

- Research: General research, research in relation to environmental programs and product-specific research programs.
- Pest and disease prevention: General and product-specific pest and disease control measures.
- Training services: Education and training.
- Extension and advisory services: Programs for the practical application of new technologies, technology improvement of agricultural production, compilation and provision of statistical data and information, and strengthening of the management of agricultural organizations.
- Inspection services: The inspection and control of veterinary medicine, feed, food, pesticide residue, water quality and grading, and the implementation of Chinese Taipei's Agricultural Standard system.
- Marketing and promotion services: Programs for the improvement of marketing, processing, and the consumption of food.
- Infrastructural services: Planning and construction of irrigation/drainage facilities and rural roads, land consolidation for the agricultural sector, and the rural community.
- Aid for natural disasters: Government payments for the relief of damaged farms due to natural disasters.

Trade Policies

Under the spirit of the WTO, all of the tariffs and barriers on the imported commodities have to be cut off gradually. To realize the commitments made to our trade partners, the ROC has made a series of changes to open its agricultural market. A number of key changes in agriculture are cited here:

Lowering the Tariff Rates

As one of the responsible WTO members, the ROC agreed to alter its tariffs on agricultural commodities away from the protective level. The obligation of the ROC was to cut the average rate to 15.2% in one year after joining the WTO. The acceptable long-term level recognized by our trade partners is going to be 12.9% on average for agricultural products.

The ROC kept a good record of the reduction of tariffs; some of the tariff rates were lessened even ahead of the schedule. Most of the tariff rates of the agriculture products were lowered in 2002. 32 of them had been lowered before 2000. For the rest of the 137 sensitive products, the tariff relief was rescheduled to 2004.

Lifting the Ban on the Imported Items

Before the ROC joined the WTO, many non-trade regulations were applied, in which 41 import items were banned or subject to authority approval (e.g., rice, sugar, peanuts, adzuki beans, garlic, mackerel, carangidae fish, sardines, pigmeat belly, chicken, liquid milk, and offals). The non-trade regulations went against the WTO agreements and were intended to be removed after the WTO participation. Several rounds of negotiations around trade members have concluded that the ROC is allowed to limit its quota on rice to avoid immediate import shock. For the rest of the 40 items, either complete opening or tariff rate quotas are promised.

a) Rice special treatment

Rice is the most important staple in the ROC. Any forced trade opening will end in severe damage. Therefore, the ROC is following after the Japanese method, which is to perform a gradual opening for rice.

The Japanese method introduced a timely import transformation. The rice quota was allowed for several years ahead of the practice of the tariff rate quota. Eventually, the tariff rate quota had to apply. The quota was computed based on a certain percentage of the domestic rice consumption in the base year. In 2000, the ROC promised to import 8% of its annual domestic consumption level in the base year of 1990–1992, which was equivalent to 144,720 tons of brown rice. Two years later, the tariff rate quota for rice was formalized. If the amount of imported brown rice was below 144,720 tons, a tariff of zero would be applied. Suppose the amount was over 144,720 tons, each kilogram of imported brown rice would be charged TWD45. Moreover, a special safeguard would be activated if the imported amount was over twice as much as 144,720 tons, or if the price of import rice went below a certain threshold level.

b) Tariff rate quota

Peanuts, oriental pears, sugar, garlic, betel nuts, chicken, fresh milk, offals, mackerel, carangidae fish, sardines, adzuki beans, shiitake (dried), pomelos, longan (dried), coconuts, bananas, pineapples, mangoes, persimmons, day lily (dried), and pigmeat belly used to be the restricted import items. These 22 items have been settled for opening trade under the tariff rate quota, according to the Uruguay round of negotiation. For each item, a progressive tariff schedule has been implemented with respect to the import quota.

c) Complete opening

For several agricultural produces, mainly fruits, the import restriction was laid because of the country of origin. After participating in the WTO, the ROC wiped out all geographic discrimination. Items such as longan, litchis, oranges, lemons, grapefruit, grapes, peaches, plums, apples, fresh mandarins, potatoes, papayas, citrus fruits, guavas, whole ducks, turkeys, ducks, and squid are allowed for trade with the range of tariff rates from 20% to 40%.

RECENT KEY POLICY DEVELOPMENTS

Responding to the challenges within the agricultural sector, a policy strategy called "New Agricultural Movement: Taiwan's Agriculture Brighten up" has been proposed in recent years. The strategic plans are to carry out the traceability for agricultural products, to grow energy crops on set aside land, and other policies.

Traceability of Agricultural Products

The Taiwan Good Agricultural Practice was launched in 2006 to match the agricultural produce standard of those in the major countries. Its objective is to open the market of agricultural products made in the ROC with the same level of quality as developed countries. A tracking system was further established in 2007 to guarantee food safety. The goal is to apply the traceability system, comparable to those of the EU, Japan, and the USA, to all agricultural products by 2015. Additionally, since June of 2007, the government has announced three integrated certifications to replace many current endorsements available by 2010. The new certifications include the Traceability Agricultural Product, Organic Traceability Agricultural Product, and Quality Traceability Agricultural Product.

Using Direct Payments to Replace Price Support Programs

For a long time, the ROC's rice farmers have relied heavily on domestic price support programs for their farm management. Since any cancellation of the current support program may invite panic and strong resistance to the reform process, the basic structure of the support program has been kept intact for a long period of time and, has consequently outlived its usefulness. In 2006, the authority drafted a plan replacing the price support with decoupled payment. Its objective is more than clear: to reduce the ROC's AMS. However, the draft has never been realized due to the pressure from two interested groups, farmers and, surprisingly, the middlemen.

Reform in the Set Aside Program

In the current set aside program, the farmers are required to grow green manure only. Since this is the only requirement, over the years it has been observed that a lot of productive farmland has not been adequately maintained and has appeared to have become devastated. Another criticism of the set aside program is due to the problem of pest disease and the degradation of the agricultural environment.

For more than a decade, the set aside scheme has been implemented to decrease rice production. In terms of reducing the level of rice production and stabilizing the market price, it appears to be a simple and an effective scheme. However, it is also observed that some productive farmland is left idle. Recently, a program has been implemented to grow energy crops and landscape plants on the leftover set aside farmland. As food prices increase with oil prices, the set aside program becomes the center of dispute again. The issues of the inefficient use of scarce resources and its hindrance to structural changes have gathered momentum over time. A new scheme was introduced to encourage farmers to sell or lease their idled land to those who want to engage in agricultural production.

Farmland Service

In most cases, the average farm size is fairly small but stable. A farmland service was launched in 2007. The aim of the farmland service is to enlarge the scale of production through the government assisted tenancy system. Those who want to trade or rent/lease farmland are able to use the system to find a match. This system will decrease the matching cost between landowners/leasee or buyers/sellers. It may be only temporary relief for small scale farming but in the long run, the farmland policy should be thoroughly reviewed to facilitate the transactions in the farmland market. The policy reviews should include items such as the regulations on taxation, land conversion, agricultural environment, and rural development.

SUPPORT TO AGRICULTURE: PSEs AND OTHER POLICY INDICATORS

To align with the OECD standards, 17 commodities are included in the ROC's PSE estimation. Together, these commodities accounted for 63% of the total output value in agriculture and livestock. The first 10 commodities are chosen from the set of 14 standard commodities, whose producers are usually supported by the government according to Melyukhina (2008). Listed by their relevance to the ROC's entire agricultural sector, they are: rice, wheat, corn, soybean, sugar cane, beef, chicken, milk, and egg. The extra 7 commodities belonging to the list are: adzuki bean, banana, pear, cabbage, grape, tea, and betel nut either because of their importance in terms of the share of total agricultural output value, trade protection measures, domestic price support, or data availability.

Table 2. Data Sources

Data	Data Sources
Production values and prices	Agricultural yearbook, Council of Agriculture
Values of import and export	Agricultural trade statistics, Council of Agriculture
Exchange rates	Central Bank of Taiwan
Tariff	Customs Import Tariff, Directorate General of Customs, Ministry of Finance
Government supports	WTO notifications, Agricultural budget by Council of Agriculture
Reference prices	Agricultural trade statistics, Council of Agriculture

Producer Support Estimates: Individual Commodity PSE

Rice

Rice has always been the staple crop for the ROC, which occupies 10% of the total output value in agriculture and livestock (or TWD29 billion in value). Price support to the rice industry has been established since the 1970s. The authority has intended to save the rice farmers from diminishing incomes and activated a guaranteed price purchase program, intentions which have lasted until now. Moreover, to secure the domestic rice price, rice trade is highly restricted under government supervision. The trade limitation for rice was changed after the WTO negotiation. The government was confined to import rice after the participation of the WTO. Ever since, the ROC has become a significant rice importer in the international community. Even though there are several types of rice exports, the rice was

mainly used for international aid. As a result, rice was considered an imported crop in the ROC during the preparation of PSE.

Based on the computations, the rice industry had the largest PSE value among all the other crops, vegetables, fruits, or livestock. The annual average of rice PSE was TWD18.42 billion in 1990–2008 and the %PSE was about 46.4% (Tables 3 and 4), which implies that on average, the government subsides roughly contributed 46.4% of the rice farmer's income. Moreover, 83.7% of the rice PSE came from MPS in 1990–1999 but this share dropped to 45.5% in 2008, which reflected that as the rice fields set aside increased and the expenditure on the set aside program rose, the share of MPS on the PSE declined gradually over time. The average value of Producer NAC still stood at 1.9 (Table 6) showing that the gross farm receipts of rice farmers is 90% higher than what it would be if it was obtained entirely at world prices without any government support.

Also, one can find that the PSE highly fluctuated from 1990–1996 where the guaranteed price purchase program dominated the producer's support. The reported PSE reached a higher value of TWD17.38 billion (or %PSE weighed at 42.84%). Since 1997, the set aside program, which allows farmers to receive subsides when their fields are set aside, has joined with the guaranteed price purchase program to be the second source of rice farm income support. The total output of rice has diminished and so has the PSE. The annual value of the PSE was TWD12.93 billion in 1997–2000 while %PSE was reported at 31.97%.

The PSE for rice rose in 2001 partly because of the widened gap between the stabilized domestic price and the lowered foreign price. Subsidies on the set-aside program expanded, also contributing to the increase in the rice PSE in 2001. Consequently, the PSE went up to TWD19.55 billion (%PSE climbed to 49%). The upward trend of the PSE was contained after 2002 due to the continuing increase of the rice set aside area, which eventually led to a larger total set-aside area than the total planted areas in 2004. In the same year, the PSE was reported at 24.51 billion (or %PSE was reported at 63.9%). The annual average PSE between 2002 and 2008 stayed at 22.4 billion. From the latest statistics available, the rice PSE was 22.5 billion and % PSE was down to 51.7%.

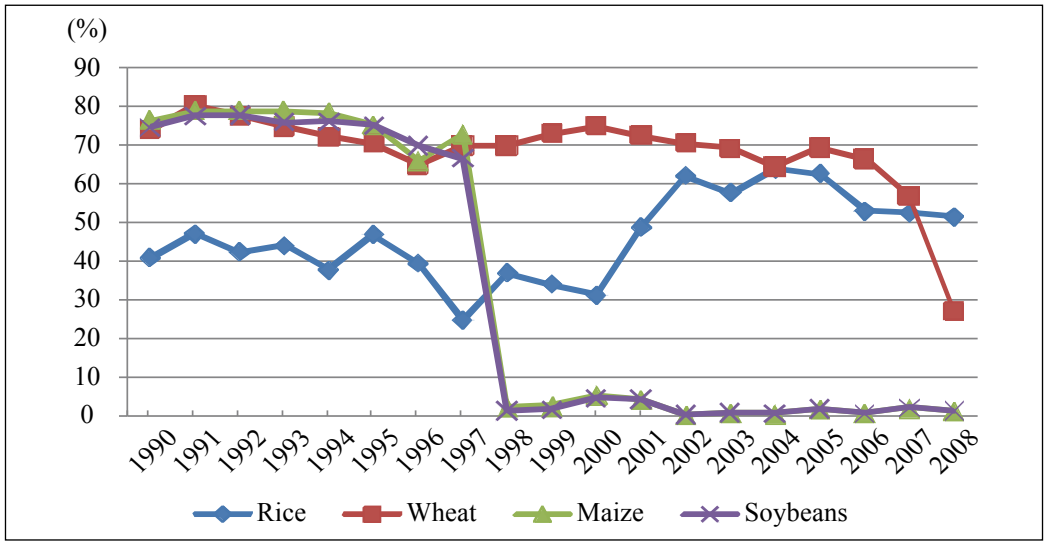

Figure 1. Percentage PSE of Rice, Wheat, Maize, and Soybeans

Wheat, Maize, and Soybean

The ROC has been characterized by a low level of self-sufficiency rate in terms of commodity crops. Except for rice, most commodities have been imported from other countries. Therefore, it is easy to compute the PSEs by applying the CIF prices for the commodity crops as the reference price. The annual PSE for wheat stayed at TWD21.3 million, which was not very large compared to the value for rice. %PSE, however, went up to 68.2% due to the large price gap between the domestic and the international wheat prices (Tables 3 and 4). The PSE for maize between 1990 and 2008 was 1.38 billion (or %PSE was 33%). The feed corn production has been silenced since the implementation of the UAPPFU. During the period of 1990 to 1997, the annual PSE for maize achieved TWD3.5 billion, while the %PSE for maize rose to 76%. Since the termination of the price support program, the PSE went down from 2.45 billion in 1997 to 0.05 billion in 1998. Its %PSE dropped to 3% and has stabilized at around 1% since 2002 (Tables 3 and 4).

The PSE for soybean shares the same trend with that for maize. In 1990–2008, the PSE and %PSE for soybean were TWD80 million and 32.5%. Between the period of 1990 and 1997, the annual average of the PSE for soybean used to be twice as high and its value reached 190 million. Once again, it is apparent that 1997 marked a turning point for the sector. Before 1997, the PSE and %PSE was 84 million and 67%. However, in the following year, the PSE and %PSE dropped to only TWD1 million and 2%, and domestic soybean production has nearly disappeared since then, leaving virtually no PSEs.

It should be noted that it appears that the %PSE stayed very high for wheat, maize, and soybeans before 1998. The unusually large %PSEs for the three crops were actually exaggerated from reality because of their very low output compared to the levels of consumption. Besides the 1.6% self-sufficiency rate for maize, wheat and soybean both share almost zero self-sufficiency rates. The PSE and %PSE conclusion, therefore, have to be carefully interpreted. Also, MPS constitutes the majority of the PSEs for three commodities and over the period of 1990–1997, the average Producer NACs for wheat, maize, and soybean are 3.4, 2.3, and 2.4 respectively (Table 6). These figures imply that the values of gross farm receipts of these farmers were three and a half times of what they would be without government support. However, the elimination of price support in 1998 reduced the average Producer NACs for maize and soybean to 1.0.

Sugar cane

The sugar industry used to be one of the most important industries in the ROC. For a very long period of time, sugar cane farmers were secured by contract farming and price support. Additionally, the heavy restriction on the sugar trade put the third guarantee on the income of the sugar cane farmers. From the beginning of the 1990s, the government had compensated the farmers with the paddy diversion program; this compensation lasted until 1997.

The Taiwan Sugar Corporation used to be authorized with the monopolistic power to conduct international sugar trade. After participation in the WTO, the ROC began importing sugar by TRQ. Restrictions on sugar trade have been released entirely since 2005.

From 1990 to 2008, the average PSE per year and %PSE for sugar were TWD2.02 billion and 41.5% (Tables 3 and 4). These two figures were higher between 1990 and 1997, where the PSE and %PSE obtained were 3.50 billion and 51.5%.

Sugar used to be a profitable good but it was also mounted by heavy production costs. Many sugar factories were closed down in the 1990s, which forced the cultivated area and the amount of the sugar cane output to gradually decline. Moreover, UAPPFU loaded an extra expulsion to sugar cane farmers making the PSE for sugar fall significantly. Records show that the PSE and %PSE were TWD2.16 billion and 52.2% in 1998–2001. These numbers went down further to 417 million and 29.7% during 2002 and 2004, which were marked by TRQ sugar import. After the free sugar trade was applied, the PSE and %PSE eventually dropped to 87 million and 15% in 2008. The share of MPS in the PSE of sugar cane is over 50% in 2005–08; while the average Producer NAC is 1.2 in the same period.

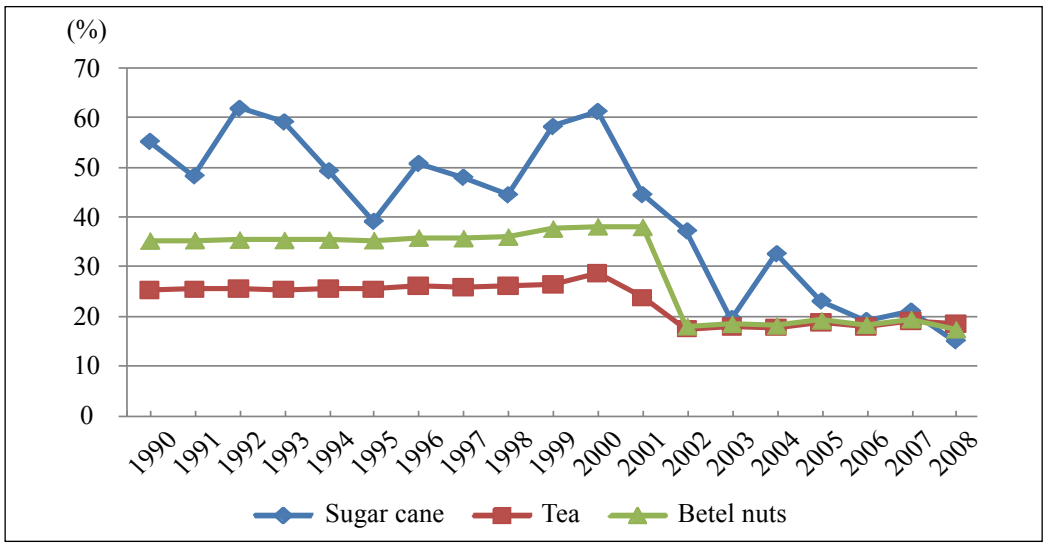

Figure 2. Percentage PSE of Sugar cane, Betel Nuts, and Tea

Adzuki Bean

Since 1996, the misfortunate adzuki bean has been hit by pests, diseases, and natural disasters. The producer's price, as a result, has increased over time as the total output and cultivated area has declined. The total output of adzuki beans in 2008 was 7,000 metric tons or TWD460 million dollars in value. Suffering from the high labor and land costs, the government authority had purchased adzuki beans for an announced price every winter to support the farmers. This guaranteed price purchase lasted until 2002 (Huang, 2003). After 2002, the import of adzuki beans was subject to TRQ for the next four years, in which the Special Safety Guarantee was activated for 2003 and 2005 (Lee, 2006). Moreover, the extra tariff was exercised in 2003 and 2005 as a result of importation beyond the quota.

The producer support of adzuki beans loaded a minor weight to the overall PSE because of its small relevance in terms of output volume, where the average PSE over 1990 and 2008 remained at TWD279 million. Instead, %PSE was marked at 68%, which resulted from the wide gap between the CIF price and the support price of the winter crop in every year before 2004.

Over 1990–2001, the PSE and %PSE was TWD 286 million and 70%. After 2002, the PSE and %PSE began shrinking due to the cancellation of the price support where the average values of the two PSE measures were down to 259 million and 65%. Furthermore, 99% of its PSE was composed by MPS during 1990 and 2008. The average Producer NAC was 3.3 over the sample period.

Banana

Before the 1990s, bananas were one of the most important cash crops for many farm households and most of the bananas produced in the ROC were shipped to Japan. With the competition of other Southeastern Asian countries, bananas from the ROC gradually lost their market share in the Japanese market. By 2008, the volume of banana production reached 208 thousand metric tons or TWD4.5 billion (equivalent to 1.4% of the entire agriculture and livestock production). Banana import was highly restricted but switched to TRQ to comply with the ruling of the WTO after 2002. The average PSE and %PSE over 1990–2008 were TWD126 million per year and 4%. The PSE and %PSE, however, were not amenable around the annual averages. There were impulses in %PSE, which occurred in 2004 and 2005 due to the rising producer's prices after sequential typhoons and diseases occurred. It was not until 2008 that the %PSE for bananas went back to its normal level. The Producer NAC was 1.1, which is relatively small compared to those of other commodities (Table 7).

Grape

Grape output in 2008 was 85 thousand tons in the ROC. Its production value was close to the range of bananas, around TWD3.8 billion. The import of grapes used to be highly preferential and only the grapes from Chile and the USA received the import quota. Since 2002, as encouraged by the WTO agreements on tariff reduction, the ROC has opened up its market for grapes overseas and the PSE and %PSE for grapes have therefore significantly lowered accordingly. Over 1990 and 2008, the PSE and %PSE were 1.07 billion per year and 35%. Most of the grape's PSE was contributed by MPS and its Producer NAC was 1.6 over the sample period.

Pear

The ROC produced 130 thousand tons of pears in 2008, which were valued at TWD 4.8 billion. The import of pears was highly limited and subject to approval by the authority. Most of the import pears came from the Republic of Korea. To comply with the WTO agreement, the import of the pear was restricted by TRQ. Between 1990 and 2008, the annual PSE and %PSE were 1.29 billion and 32%. However, the PSE average does not reveal that the producer support measures went up in three sequential periods. Before 1996, the PSE was often negative. During the Asian Financial Crisis in 1997, the value of the Korean Won was severely weakened and so were the CIF prices of South Korean pears. The PSE and %PSE subsequently escalated to 2.3 billion and 61% just in a year. The PSE measures in the period of 1998 and 2001 rose to 2.12 billion and 56% with the widened price gaps caused by the depreciation of the Korean Won. Even though the import of pears was limited by TRQ, after the ROC became a member of the WTO, the high PSE measures still stood where the PSE and %PSE in 2002 and 2008 were, at 2.18 billion and 54%. The Producer NAC of the pear, on average, stayed at 1.8.

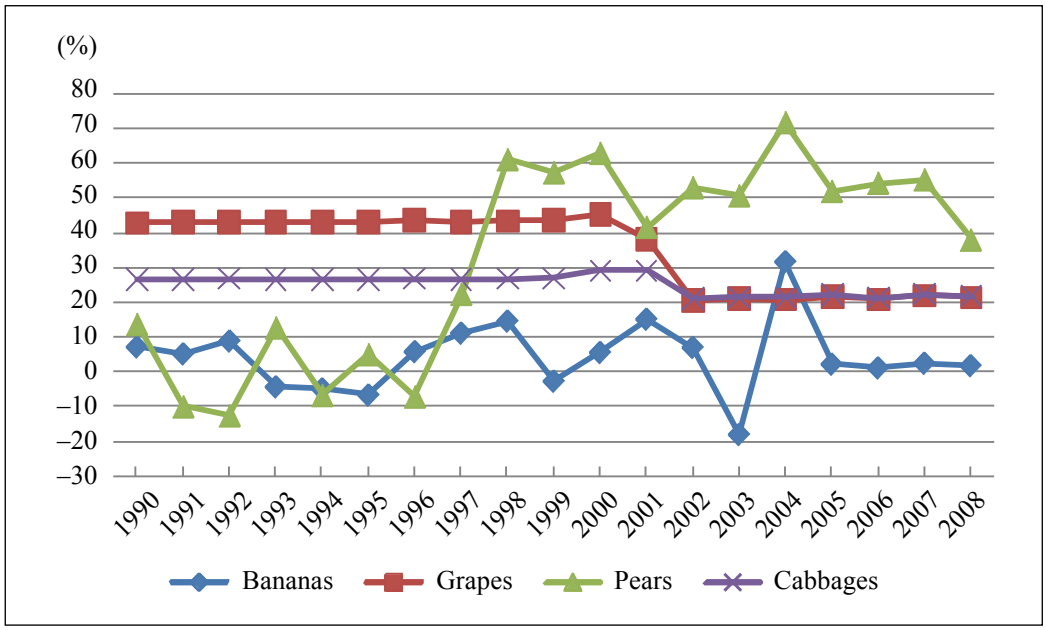

Figure 3. Percentage PSE of Bananas, Grapes, Pears, and Cabbages

Cabbage

The output value of cabbage was about 517 million metric tons in 2008 (or 1.7% of total production value of crops and livestock). The authority kept implementing contracted farming on cabbage in the summer to balance out the shortage of supply in cases of typhoons and heavy rains. The trade of cabbage has only been subject to a tariff since 1990. Except for cabbage from People's Republic of China, the import of cabbage is free from any other restrictions. The PSE and %PSE were TWD1.1 billion per year and 25.1%. The PSE measures did not change very much due to contracted farming in the summer, which maintained the producer's price. Although frequent typhoons in the summer of 2003–2005 disturbed the market price, the PSE measures remained slightly above 20%, reflecting the ad valorem tariff rate. In 2008, the PSE and %PSE were 1.25 billion and 22%. Aside from the year 1999, more than 90% of cabbage's PSE originated from the MPS over 1990–2008. Its Producer NAC has remained at 1.3.

Beef and Veal

The ROC imports most of its beef and veal from other countries. Its self-sufficiency rates on these two products hardly reach 10%, which makes it easy to apply the CIF price as the reference price to compute the PSE. The trend of the PSE for beef and veal agreed with declines in tariffs, where the average PSE per year and %PSE between 1990 and 2008 were 250 million and 22.5%. Prior to 2005, MPS contributed more than 90% of the source of the PSE and the ratio slightly declined to 80% in 2005–2008. The average Producer NAC stayed closed to 1.3 over the sample period.

Pigmeat

Pigmeat dominated every other product in its output value. For example, in 2006, its annual output value achieved TWD55.5 billion, or 19.1% in the total value of agriculture and livestock. Before 1997, pigmeat was an export product. The outburst of Foot-Mouth-Disease (FMD), however, devastated the entire pigmeat industry and the export of pigmeat has disappeared since then. The import of pigmeat came along with negotiation before the WTO entry. Accordingly, pigmeat had been imported to fulfill the requirement

Based on the computation, the annual PSE and %PSE for pigmeat have been maintained at TWD7.7 billion and 10.5%. However, these two measures have fluctuated over the years because of the Pig cycle effect. If we look closely at the PSE and %PSE in the sub-periods, the numbers were 11.34 billion and 12.8% during 1990 and 1997. FMD decreased the PSE to a negative value, due to catastrophic producer's prices, as the PSE and %PSE were at –8.9 billion and –19%. However, after the ease of FMD, the numbers returned to 10.8 billion and 16% for 1998–2001.

After the WTO participation, pigmeat has been imported by TRQ restriction. As a result, the annual PSE and %PSE were raised to 11.36 billion and 21% in 2002–2004. Since the TRQ was removed in 2005, the PSE and %PSE went down accordingly to 8.6 billion and 14.4%. The government has sponsored the pigmeat industry at a relatively smaller amount and its producer NAC was merely 1.2 for the sample period.

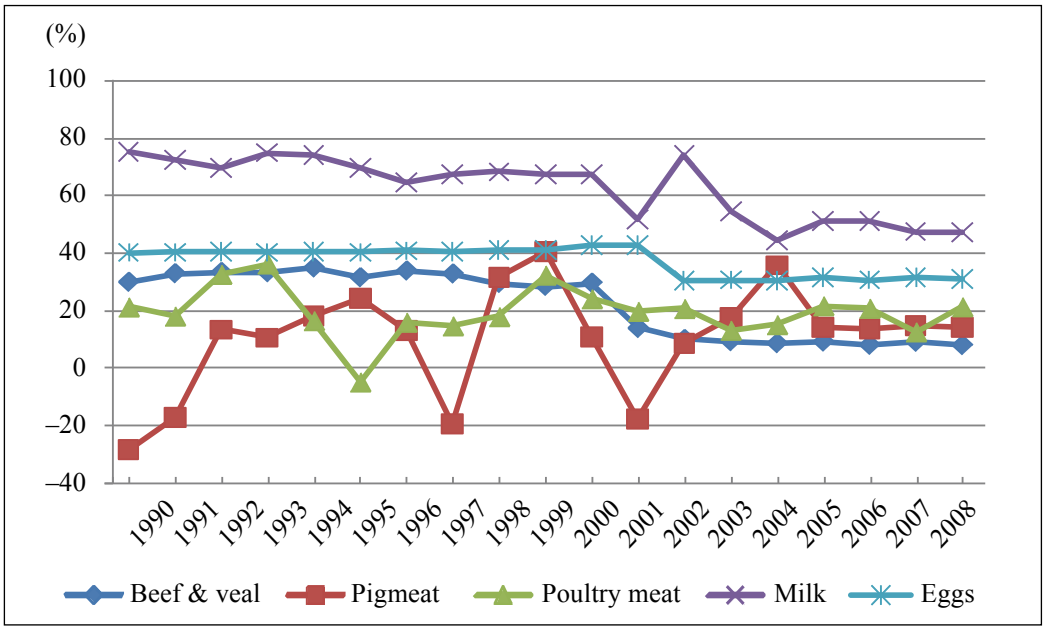

Figure 4. Percentage PSE of Beef and Veal, Pigmeat, Poultry meat, Milk, and Eggs

Poultry

The ROC did not export much of its poultry products, even though it has produced about 500 thousand metric tons a year or TWD 40 billion, which is equivalent to 12% of total crop and livestock output value. Before 1998, imports had been quite limited but since 1998, poultry imports were made to fulfill the down payment agreement with the USA. After 2002, the poultry import restrictions were switched to TRQ and then changed to only tariff in the year 2005. Over the period from 1990 to 2008, the PSE and %PSE for chicken were TWD5.9 billion and 20%, on average. The PSE for chicken is dependent on the adopted international reference prices. Chicken import prices substantially differ in neighboring countries, reflecting a specific demand in each country. For instance, unit import prices of chicken for Japan are two times higher than for Hong Kong. In this study, the unit import price of Singapore was used. The PSE and %PSE fluctuated in the 1990s, between minus 1.1 billion and 5% to plus 12 billion and 32%, reflecting the ups and downs of both domestic and reference prices. Due to the chicken TRQ between 2002 and 2005, the average PSE decreased slightly to 5 billion and %PSE went down to 18%. The values from 2008 were 8.5 billion and 21.4%. Similar to the pigmeat industry, the authority gave little support to the poultry industry while the Producer NAC stood around 1.3.

Milk

Dairy farmers in the ROC have made contracts with the collectors from the dairy corporation and thereby the price of fresh milk has been quite stable and subject only to seasonal demand. On the other hand, dry milk has mostly come from New Zealand. Japan also imports a substantial volume of the dry milk. As a result, the Japanese reference prices over the years were applied here. The PSE and %PSE of dairy products from 1990–2008 were TWD3.97 billion and 63%. The PSE measures travelled upward before 2002 and travelled downward after. The average PSE (%PSE) before and after 2002 were 4 billion (68%) and 3.7 billion (53%). Its Producer NAC for was 2.9 over the sample period, which implied that the industry has been heavily supported by the government.

Egg

The ROC produces 360 thousand metric tons of eggs, which is estimated at TWD18.2 billion, or 5.6% of the total crop and livestock output value. Fresh eggs are seldom traded because they are perishable and unable for long term storage. Only liquid eggs and egg powder can be imported. Before 2001, egg import was limited by the authority approval. After 2002, the egg trade has been opened up. Since the trade volume of eggs is never very significant, the reference price of eggs is then constructed by the domestic price discounted by its tariff. The PSE measures have been declining over time. The PSE and %PSE for eggs over 1990–2008 were TWD3.9 billion and 37%. If the period was sliced in half at the year 2002, the PSE (%PSE) of the first and second period were 3.67 billion (41%) and 4.03 billion (31%), respectively. The Producer NAC for the egg industry stayed at 1.6.

When comparing the commodities based on the level of the PSE, rice in the ROC is ranked on the top of the list, followed by pigmeat, milk, eggs, and betel nuts. By contrast, the %PSE list revealed a different pattern where wheat takes first place followed by the adzuki bean, and milk. This begs the question, does the high %PSE reflect a high degree of domestic support in the ROC? The answer to this question is yes however, this is not the case for the commodities with lesser self-sufficiency rates. Notice that maize, wheat, and soybean are not highly protected in the ROC. Instead, more than 95% of each commodity consumed in the ROC was imported from other countries. The boosted producer's costs however, gouges up the domestic prices and therefore, elevates the %PSEs. Any interpretation of the PSE and %PSE thereby has to be mindful in terms of wheat, maize, and soybeans.

Tea

The ROC is famous for its high quality tea leaves with thriving tea exports. In 2008, the total volume of tea leaf output ranged around 170 thousand metric tons or TWD4.8 billion in value, or 1.5% of the total crop and livestock output value. In contrast, for imported tea, the authority took a conservative view and thereby limited import of tea from PR China. Since 2002, the restrictions on Chinese tea have been removed after the ROC joined the WTO. The PSE computation did not take into account the impact of import restriction against PR China due to the difficulty in estimating the appropriate data. The PSE and %PSE were TWD810 million and 23.0% over 1990–2008. The trend of the PSE measures seems unstable because it kept increasing between 1990 and 1994. It was stabilized until 2001, and turned back down during 2001 and 2004. In 2005, it increased once again. In 2008, the PSE and %PSE were recorded at 909 million and 18%, while its Producer NAC stood at 1.3.

Betel nuts

The ROC produces 140 thousand metric tons of betel nuts per year, which values at TWD9.8 billion, or 3% of total crop and livestock output value. Before 2001, the import of betel nuts was limited by the authority approval. After 2002, the trade of betel nuts has been constrained by TRQ. The PSE and %PSE of betel nuts over 1990–2008 were TWD3.47 billion and 30%. The PSE measures revealed an upward pattern, while %PSE did not change very much because of the increasing volume of output. From 2002, the PSE of betel nuts slid down and the percentage of the decline was parallel to the percentage of the tariff cut. After 2002, the PSE and %PSE have maintained stabilization. In 2008, the two PSE measures were 1.51 billion and 17.5%, while its Producer NAC remained at 1.4.

The Aggregate PSE and %PSE

The aggregate PSE and %PSE for all agriculture and livestock products were TWD78.7 billion per year and 26.9%, which means that 27% of the farmers' income came from the support of the authority. From historic values, the aggregate PSE rose in the first five years, where the PSE was initiated at 33.7 billion and then climbed to 103 billion in 1995. Afterward, the PSE drifted up and down. Since the ROC took part in the WTO shortly after 2002, the PSE continued to fluctuate until 2006, and retained itself thereafter. During 2002 and 2008, the average PSE was retained at TWD83.2 billion, or 104% of its level before the WTO entry. Additionally, the %PSE is easily perturbed by the volume of output values. Both the aggregate PSE and %PSE will change considerably if there is any change in value for rice, pigmeat, and poultry products. For example, the aggregate %PSE elevated when the %PSE for pigmeat stood at higher values in 1995, 1998, 1999, and 2004. In parallel, it declined to 16.0% in 1997 and 20.6% in 2001, while the pigmeat %PSEs were lowered to –19% and –18% correspondingly. The Producer NAC fluctuated over the entire sample period. The average Producer NAC was 1.4 over 1990 and 2008. Thus, in general, the farmers receive 40% higher than they would without government support.

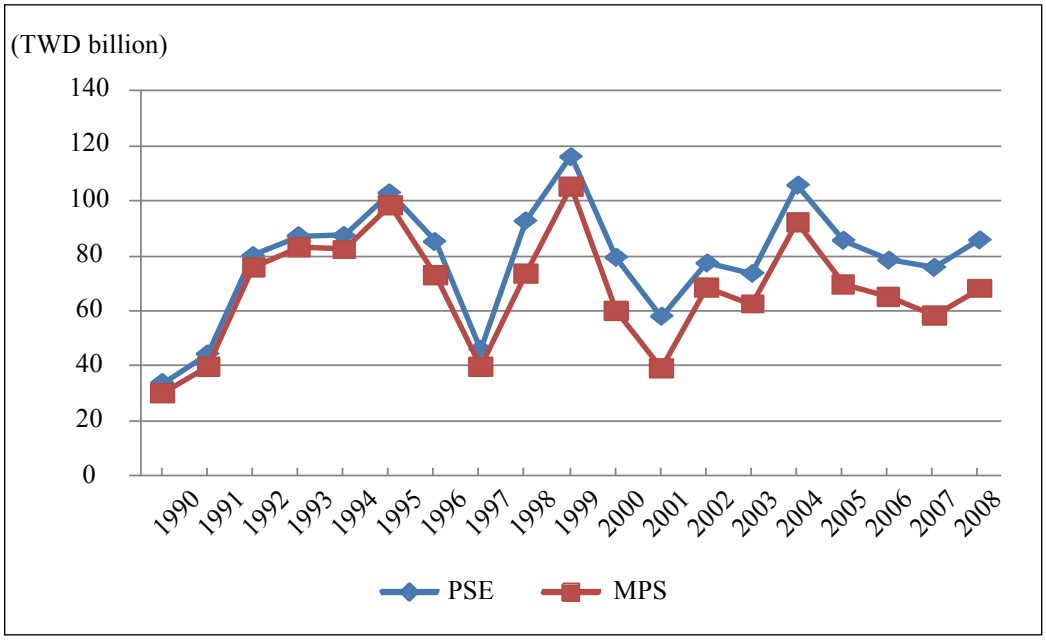

Figure 5. The ROC's PSE and MPS

CSE

Based on the affects of the negative CSE in every year, it can be concluded that the households in the ROC have to pay more to purchase agriculture products with government intervention and border measures. This implies that the authority levies an invisible tax on the customers and causes a loss in the consumer's surplus. Among the commodities analyzed, rice undoubtedly takes the first place on the CSE loss, up to TWD13 billion per year. Pigmeat, chicken, and milk consume 6.1, 5.6, and 5.6 billion per year, respectively because of their large agricultural output shares. Eggs and betel nuts rank fifth and sixth in the list of the CSE loss.

When it comes to %CSE, adzuki beans are at the top with the rate of –68%, followed by milk (–62%), rice (–38%), eggs (–36%), and sugar cane (–36%). Hence by removing the effect on the output volume, it costs the customers more to support the domestic adzuki bean and milk prices than the price of rice.

In short, the annual aggregate CSE and %CSE in the ROC were TWD77.9 billion in deficit and –20% during 1990 and 2008. The total amount was initially –41.1 billion in 1990 and climbed up to its peak of –121.3 billion in 1999. It ended as –81.1 billion in 2008 and its corresponding %CSE was –15%. Since the aggregate CSE or %CSE moves closely with the individual commodity with larger output value shares, it is concluded that the output value share still determines the level of the aggregate CSE and %CSE.

GSSE and TSE

The GSSE for the ROC includes many projects targeting rural infrastructure improvements, technology research and development, training and extension, marketing and promotion, inspection, etc. Our estimates show that the amount of GSSE per year reached at TWD17.37 billion. This figure was 9.3 billion in 1990 and gradually increased to a record high of 36.5 billion in 2001. Its value was down to 18.1 billion in 2008. The largest component of the GSSE belongs to the infrastructure improvement of 7.9 billion (46%) per year, followed by that of agricultural schooling of 2.6 billion (15%), and research and development of 2.1 billion (11%) (Figure 6).

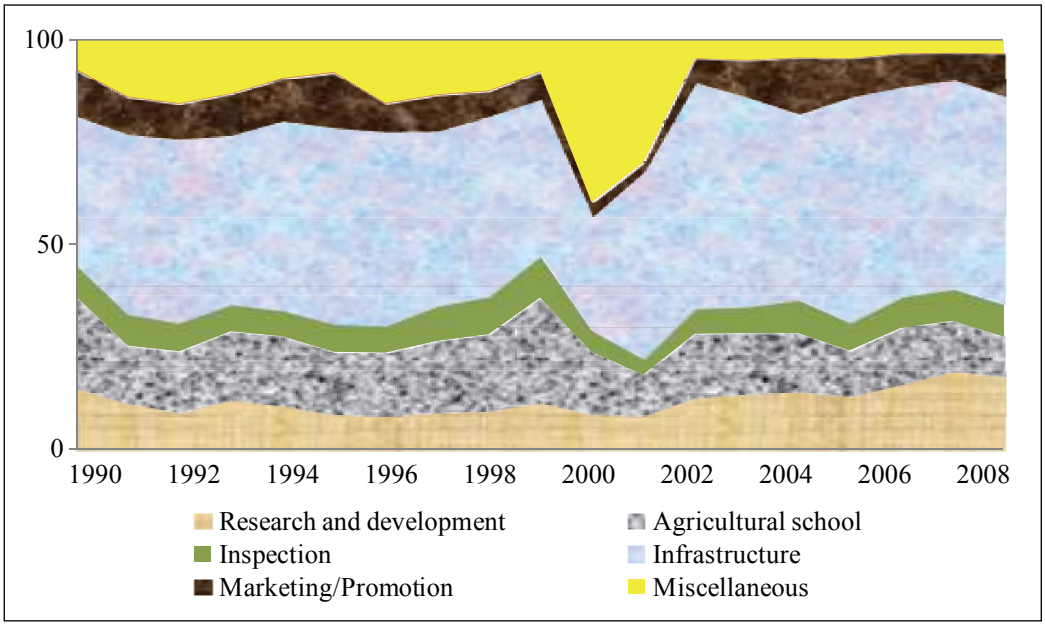

Figure 6. The Composition of the ROC's GSSE (%)

The TSE is mainly composed of the PSE and GSSE given that the ROC did not realize any consumer support measures. According to the result, the TSE reached TWD96.7 billion. About 81% of the TSE comes from the PSE and the rest comes from the GSSE. The PSE and the GSSE per year were 78.7 billion and 17.4 billion.

CONCLUSION

Our research shows that the different agricultural sectors have received a significantly different amount of support from the domestic and border measures. Furthermore, the magnitude of domestic and border support reflected an entirely different prospect when evaluated by the PSE or %PSE. Among the 17 selected commodities, the rice industry received the largest PSE, followed by the pigmeat, poultry, and milk industries, during 2002 and 2008. Still, the PSE was positively correlated with the output value, which reflected the idea that the larger and more important the industry, the more PSE was granted. %PSE demonstrated a distinct outcome in which wheat, adzuki bean, and milk occupied the first three positions. These commodities with higher %PSE also have wider gaps between the domestic and international prices or higher tariff rates.

The aggregate PSE and %PSE of all the agriculture and livestock products were TWD78.7 billion per year and 26.9%, which implies that 27% of the farmers' income came from the support from the domestic and border measures. The aggregate PSE rose at first, but has drifted up and down afterward. Since the ROC took part in the WTO shortly after 2002, the PSE kept fluctuating until 2008. During 2002 and 2008, the average PSE remained at TWD83 billion, or 104% before the ROC's entry in the WTO. In addition, the %PSE is easily perturbed by the volume of output values. Both the aggregate PSE and %PSE will change considerably with any value change in rice, pigmeat, and poultry products.

Moreover, market price support has dominated all the other compositions of the PSE. The average share of MPS on the PSE was 87% in 1990–1999 and lowered to 73% in 2000. Since 2000, payment based on input constraints has emerged as a significant component and it has eroded the importance of market price support. During 2000 and 2008, MPS continues to be the largest component with its average share of the PSE staying at 75%. On the other hand, the payment based on input constraints occupied 20% on average.

The Producer NAC fluctuated over the entire sample period. The average NACs were 1.37 and 1.39 before and after the WTO entry, respectively. There seems to be no significant difference from the annual average of 1.38 over 1990 and 2008. Therefore the farmers, in general, receive 40% higher than they would without the support of the government.

Table 3. Producer Support Estimate (PSE) by Major Commodities of the ROC (TWD million)

Year/Commodity	1990–2001 Average	2002–2008 Average	1990–2008 Average
Rice	16,080	22,446	18,425
Wheat	32	3	21
Maize	2,187	9	1,384
Soybeans	127	0	80
Sugar cane	3,050	251	2,019
Beef and veal	320	130	250
Pigmeat	6,206	10,406	7,753
Poultry meat	5,669	5,900	5,754
Milk	4,104	3,736	3,968
Eggs, chicken	290	260	279
Adzuki beans	113	149	126
Bananas	1,301	670	1,069
Grapes	765	2,182	1,287
Pears	966	1,094	1,013
Cabbages	873	703	810
Tea	3,788	4,064	3,890
Betel nuts	4,348	1,971	3,472
Total	50,218	53,975	51,602

Table 4. %PSE by Major Commodities of the ROC (%)

Year/Commodity	1990–2001 Average	2002–2008 Average	1990–2008 Average
Rice	39.7	57.8	46.4
Wheat	73.0	60.7	68.5
Maize	51.8	1.5	33.3
Soybeans	50.7	1.5	32.5
Sugar cane	51.7	23.9	41.5
Beef and veal	30.3	9.1	22.5
Pigmeat	6.7	17.0	10.5
Poultry meat	20.4	18.0	19.5
Milk	68.7	52.9	62.9
Eggs, chicken	70.0	65.1	68.2
Adzuki beans	4.5	4.0	4.3
Bananas	42.9	21.2	34.9
Grapes	20.1	53.6	32.4
Pears	27.1	21.7	25.1
Cabbages	25.8	18.2	23.0
Tea	41.0	31.0	37.3
Betel nuts	36.1	18.5	29.6

Table 5. Producer NPC by Major Commodities of the ROC

Year/Commodity	1990–2001 Average	2002–2008 Average	1990–2008 Average
Rice	1.5	1.8	1.6
Wheat	3.7	2.7	3.4
Maize	3.0	1.0	2.3
Soybeans	2.7	1.0	2.1
Sugar cane	1.9	1.2	1.6
Beef and veal	1.4	1.1	1.3
Pigmeat	1.1	1.2	1.1
Poultry meat	1.3	1.2	1.2
Milk	3.2	2.2	2.9
Eggs, chicken	3.4	2.9	3.2
Adzuki beans	1.0	1.1	1.1
Bananas	1.7	1.3	1.5
Grapes	1.4	2.2	1.7
Pears	1.3	1.3	1.3
Cabbages	1.3	1.2	1.3
Tea	1.7	1.4	1.6
Betel nuts	1.5	1.2	1.4

Table 6. Producer NAC by Major Commodities of the ROC

Year/Commodity	1990–2001 Average	2002–2008 Average	1990–2008 Average
Rice	1.7	2.4	1.9
Wheat	3.8	2.8	3.4
Maize	3.2	1.0	2.4
Soybeans	3.0	1.0	2.3
Sugar cane	2.1	1.3	1.8
Beef and veal	1.4	1.1	1.3
Pigmeat	1.1	1.2	1.2
Poultry meat	1.3	1.2	1.3
Milk	3.3	2.3	2.9
Eggs, chicken	3.5	2.9	3.3
Adzuki beans	1.1	1.1	1.1
Bananas	1.8	1.3	1.6
Grapes	1.5	2.3	1.8
Pears	1.4	1.3	1.3
Cabbages	1.3	1.2	1.3
Tea	1.7	1.4	1.6
Betel nuts	1.6	1.2	1.4

Table 7. Support Estimate (CSE) by Major Commodities of the ROC (TWD million)

Year/Commodity	1990–2001 Average	2002–2008 Average	1990–2008 Average
Rice	–12,488	–13,118	–12,720
Wheat	–379	–615	–466
Maize	–2,224	0	–1,405
Soybeans	–199	0	–126
Sugar cane	–3,409	–886	–2,479
Beef and veal	–3,332	–1,446	–2,637
Pigmeat	–3,960	–9,764	–6,098
Poultry meat	–5,262	–6,064	–5,558
Milk	–5,815	–5,194	–5,586
Eggs, chicken	–345	–472	–392
Adzuki beans	–69	–100	–80
Bananas	–1,405	–781	–1,175
Grapes	–704	–2,270	–1,281
Pears	–878	–1,061	–945
Cabbages	–1,029	–1,331	–1,140
Tea	–3,621	–3,866	–3,711
Betel nuts	–4,134	–1,845	–3,291

Table 8. %CSE by Major Commodities of the ROC (%)

Year/Commodity	1990–2001 Average	2002–2008 Average	1990–2008 Average
Rice	–36.0	–42.3	–38.3
Wheat	–6.7	–6.1	–6.5
Maize	–10.2	0.0	–6.4
Soybeans	–1.3	0.0	–0.8
Sugar cane	–46.4	–16.8	–35.5
Beef and veal	–29.1	–7.7	–21.2
Pigmeat	–3.7	–15.7	–8.1
Poultry meat	–19.2	–16.8	–18.3
Milk	–68.1	–52.2	–62.2
Eggs, chicken	–69.7	–64.6	–67.8
Adzuki beans	–3.6	–2.7	–3.3
Bananas	–41.9	–20.0	–33.8
Grapes	–18.8	–52.9	–31.4
Pears	–25.1	–20.0	–23.2
Cabbages	–24.9	–17.0	–22.0
Tea	–40.0	–30.0	–36.3
Betel nuts	–35.1	–17.5	–28.6

Table 9. Consumer NPC by Major Commodities of the ROC

Year/Commodity	1990–2001 Average	2002–2008 Average	1990–2008 Average
Rice	1.6	1.8	1.7
Wheat	1.1	1.1	1.1
Maize	1.1	1.0	1.1
Soybeans	1.0	1.0	1.0
Sugar cane	1.9	1.2	1.7
Beef and veal	1.4	1.1	1.3
Pigmeat	1.1	1.2	1.1
Poultry meat	1.3	1.2	1.2
Milk	3.2	2.2	2.9
Eggs, chicken	3.4	2.9	3.2
Adzuki beans	1.0	1.1	1.1
Bananas	1.7	1.3	1.5
Grapes	1.4	2.2	1.7
Pears	1.3	1.3	1.3
Cabbages	1.3	1.2	1.3
Tea	1.7	1.4	1.6
Betel nuts	1.5	1.2	1.4

Table 10. Consumer NAC by Major Commodities of the ROC

Year/Commodity	1990–2001 Average	2002–2008 Average	1990–2008 Average
Rice	–36.0	–42.3	–38.3
Wheat	–6.7	–6.1	–6.5
Maize	–10.2	0.0	–6.4
Soybeans	–1.3	0.0	–0.8
Sugar cane	–46.4	–16.8	–35.5
Beef and veal	–29.1	–7.7	–21.2
Pigmeat	–3.7	–15.7	–8.1
Poultry meat	–19.2	–16.8	–18.3
Milk	–68.1	–52.2	–62.2
Eggs, chicken	–69.7	–64.6	–67.8
Adzuki beans	–3.6	–2.7	–3.3
Bananas	–41.9	–20.0	–33.8
Grapes	–18.8	–52.9	–31.4
Pears	–25.1	–20.0	–23.2
Cabbages	–24.9	–17.0	–22.0
Tea	–40.0	–30.0	–36.3
Betel nuts	–35.1	–17.5	–28.6

Table 11. General Services Support Estimate of the ROC (TWD million), 1990–2008 Average

Year/Commodity	Value	%
Research and development	2,074	11.9
Agricultural school	2,569	14.8
Inspection	1,194	6.9
Infrastructure	7,931	45.7
Marketing/Promotion	1,320	7.6
Public stock holdings	51	0.3
Miscellaneous	2,230	12.8
Total	17,368	100.0

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THAILAND[1]

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MAJOR CHALLENGES FOR THE AGRICULTURAL SECTOR

An Overview of the National Agriculture and Its Performance

Background

The main purpose of this paper is to review, analyze, and evaluate the changes in agricultural policies implemented in Thailand from 1990 to 2008. This paper focuses on the quantitative analysis of various agricultural policies based on the OECD methodology approach. Many parts of the descriptive sections on general policies have been quoted from existing official documents inter alia the WTO reports on "Trade Policy Reviews for Thailand" and other reports from Thai governments in respect to the recent changes in major government policies. The quantitative part discusses the estimated PSE indicators and their implications. The PSE indicators cover eight standard commodities (rice, maize, soybeans, sugar cane, beef and veal, pigmeat, poultry meat, and milk) and two non-standard commodities (rubber and cassava). The commodities were selected based on their production and trade significance, as well as their sensitivity to changes in agricultural policies in the Thai agricultural sector. Based on the estimated PSEs for these commodities, national level PSEs, CSEs, TSEs and other indicators were computed to analyze agricultural policies in Thailand.

Characteristics of Thailand's Agriculture

Thailand is one of the fastest growing economies in Asia. Capitalizing its strengths of abundant national resources, relatively low labour costs, improved education, good governmental support, and liberal trade policies, Thailand's economy has expanded at an annual growth rate of 5.7% in real terms, since 1980. There is no doubt that the main driving force for this growth was a rapid expansion of modern industrial sectors and foreign capital investment. However, we cannot overlook the role of the agricultural sector in providing the foundation for sustainable growth of the Thai economy.

Agriculture has always been a key economic sector in Thailand, and is likely to remain so in the future. The agricultural sector is not only a major source of goods and foreign exchange, it also plays a multifaceted role for the majority of the population. Agriculture provides working places, maintains culture, traditions, and values for rural people who have long lived in harmony with nature. Agriculture is also part of the natural capital of the country in terms of resources, biodiversity, and the environment. Whatever changes occur in the agricultural sector, they are likely to affect the rest of the country in one way or another.

[1] The analytical part of this paper has been written on the basis of the advice and the updated PSE tables provided by the international experts (Mr. Kunio Tsubota and Dr. Boonjit Titapiwatanakun).

One key defining characteristic about the agricultural sector of Thailand is that the sector, which involves about 30 million people or 50% of the population, has a dual structure. Large-scale commercial farmers, who produce goods mainly for agro-industries and export markets, co-exist with small-scale subsistence farmers. These small-scale farmers own about 15–20 rai (2.5–3 ha) of land per household. The poorest group of small-scale farmers are those who reside in rainfed areas with scarce resources and poor access to markets. These farmers are producing food for their own consumption, and selling the surplus to earn some income. Off-farm employment is important but opportunities are limited for such farmers. This group of small-scale farmers is estimated at 8 million households, using about 25 million rais (4 million ha) of land.

Since 1961, socio-economic development in Thailand has been guided by the series of national development plans. Agriculture and rural development has been one of the priority areas because goals of food security, poverty reduction, social justice, and balanced growth cannot be achieved without it. Table 1 shows 45 years of basic agricultural policies from the First National Economic and Social Development Plan (NESDP) in 1961 to the Tenth NESDP starting in 2008.

The policies showed a changing trend from being predominantly production oriented to quality and environment oriented policies, also shifting from infrastructure oriented to human resource oriented policies, and from top-down to participatory policies.

Table 1. Basic Agricultural Policies for Each NESDP

NESDP 1 (1961–1966)	• development of basic economic infrastructures, i.e., roads, water reservoirs for irrigation and electricity generation • research for increasing production • farmer's cooperative promotion
NESDP 2 (1967–1971)	• production increase • rural development • conservation of natural resources • production distribution to balance agricultural system • development of water reservoirs • improvement of crop varieties and animal breeds for higher production • disease control • forest conservation and reforestation • land development
NESDP 3 (1972–1976)	• enhancement of production capacity through research and development • improvement of transportation facilities to link farm to market • improvement of living standards and education
NESDP 4 (1977–1981)	• land development • development of water resources • research and development for production improvement • provision of support for major cereals and other crops
NESDP 5 (1982–1986)	• re-structuring of the agricultural production system • distribution of land tenure • promotion of farmer's cooperatives and rural institutions • partnership between the private and public sector on seed production • improvement of irrigation facilities • amelioration of problem soils • provision of loans to farmers

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NESDP 6 (1987–1991)	• capacity building i.e., manpower, science and technology, and natural resources • improvement on governance and management system with emphasis on one-stop-service • more private sector's participation in country's development • improvement of the production and marketing system, i.e., reduction of production cost, export promotion • development and rehabilitation of agricultural resources • reforestation • development of land and water reservoirs • conservation and rehabilitation of fisheries resources including protection of mangroves
NESDP 7 (1992–1996)	• attainment of balance between quantity and quality • production and marketing • improvement of farmers' living standard • conservation of natural resources
NESDP 8 (1997–2001)	• human development and the replacement of top-down administration with bottom-up processes
NESDP 9 (2002–2006)	• balanced development of human, social, economic, and environmental resources • good governance • alleviation of poverty and upgrading of the quality of life for the Thai people • focusing on areas of economic potential • strong foundations for social and community development • regional economic centre, particularly in primary agriculture, food processing, tourism, education and technology • enhanced linkages with neighboring countries and the region • strengthening Thailand's international competitive position
NESDP 10 (2007–2011)	• human and social development • building strong community • enhanced competitiveness in the global scale • concern on environmental issues • good governance

The agricultural sector in Thailand has shown modest growth during the examined period 1990–2008. Value-added in agriculture grew at an annual growth rate of 2.1% during the examined period (Table 2). As the growth rate of other sectors was more than double, the share of agriculture in the GDP declined from 13% to 9%. During this period, the share of agriculture in total employment fell from 63% to 42%. This is a substantial decline in percentage terms but in real terms, there was actually no reduction in the agricultural labour force of 20 million people. As a consequence, labour productivity remains around one quarter of the national average.

Table 2. GDP at 1988 Constant Price (THB billion)

	1990–92	1993–95	1996–98	1999–01	2002–04	2005–07	2008	Growth/year
GDP total	2,113	2,702	2,979	2,985	3,464	4,057	4,361	4.6%
Agriculture	281	266	286	306	347	362	383	2.1%
(%)	13.3	9.8	9.6	10.3	10.0	8.9	8.8	–

Source: World Bank, World database accessed Jan 2011.

Agricultural production in Thailand has shown a mixed performance in the examined period. Table 3 shows the average production volume per year of the 10 major agricultural commodities during 1990–2008. Rice production was stable until 1998 and increased thereafter. Maize production for this period was constant at around 4 million tons per year, while soybean production was on a declining trend. Sugar cane production increased with a peak in 2002–2004. Beef production rebounded in 1999–2001. An upswing of pigmeat production started in 2005. A rising trend of poultry meat production halted in 1999–2001. Milk and rubber recorded a remarkable production increase of more than six fold, and doubled respectively during the period. Annual cassava production stayed at about 20 million tons with some fluctuations.

Table 3. The Production Volume of 10 Major Agricultural Commodities, 1990–2008 (Thousand tons)

Commodities	1990–92	1993–95	1996–98	1999–01	2002–04	2005–07
Rice	22,070	22,331	22,643	24,259	28,580	29,557
Maize	3,969	3,655	4,435	4,405	4,208	3,892
Soybeans	546	507	361	297	236	208
Sugar cane	40,567	42,416	53,747	51,316	66,423	58,778
Beef	342	380	287	229	252	272
Pigmeat	321	353	332	346	371	509
Poultry meat	860	1,020	1,104	1,237	1,226	1,171
Milk	136	223	372	524	745	870
Rubber	1,543	1,953	2,151	2,385	2,833	3,061
Cassava	20,254	18,504	17,021	17,989	19,342	23,001

Source: Agricultural Statistics, Office of Agricultural Economics.

Major Challenges for the Agricultural Sector

As Thailand's economy has grown quickly, the income gap between the agricultural sector and other sectors is widening. Narrowing the gap through sustainable growth in agriculture is an important challenge. The agricultural sector is still constrained by low productivity arising from insufficient infrastructures, limited area for irrigation facilities, and low investment on agricultural machinery. Budget allocations for research, training, and breeding programs are insufficient, while the destruction of natural resources is advancing.

Thai agriculture is also challenged by the increased competition resulting from globalization, which presses Thai products to become of higher quality, safer, and more environmentally friendly. They not only have to reduce production costs but they also have to meet various international standards and regulations including sanitary and phytosanitary measures (SPS), good agricultural practices (GAP), environmental codes, and food safety and quality standards set by importers.

Under the 2005–2008 implementation plan of the agricultural development strategy, the government aims to increase agriculture's contribution to the GDP to USD22.5 billion by 2008, and raise the annual farm household income to USD1,000. To achieve these goals, the government planned to provide landless farmers with land, carry out farmers' training on technical and managerial skills, encourage the production of commodities with an export potential, and intensify the efficient management of water and other natural resources.

In 2006, the government emphasized its support for implementing the "Sufficiency Economy" philosophy under the sustainable agricultural theory, which was introduced by His Majesty the King in 1998. The essential part of this theory concerns the proper management of land use aiming to reduce farmers' risk of producing only one commercial agricultural product.

BASIC POLICY FRAMEWORK AFFECTING AGRICULTURE

Macroeconomic/General Policies

Fiscal Policy

a) Financial Crisis and Responses

The current fiscal policy in Thailand is a reflection of the Financial Crisis in the late 1990s. Prior to 1997, Thailand's economic performance had been outstanding, with a real GDP growth averaging almost 9% annually since 1990. As domestic savings were insufficient to finance the robust investment demand, the resulting gap was bridged by foreign capital, averaging 10% of GDP annually. The large foreign account deficit had not been a problem as long as investments in Thailand were generating high returns. By 1997, this was no longer the case and the Thai financial system suddenly lost confidence. This was followed by a dramatic flight of capital and heavy losses of foreign reserves, which culminated in a large depreciation of the Thai baht in July 1997. The currency depreciation translated into heavy losses in corporations' balance sheets because of their high reliance on foreign debt, and many subsequently faced bankruptcy. The GDP fell by nearly 2% in 1997 and by over 10% in 1998. Increased unemployment and falling personal incomes resulted in a full-blown economic crisis.

This crisis may be attributed to the weaknesses in the governance of financial institutions and corporations, sticking to a fixed nominal exchange rate until mid-1997, and the encouragement of special offshore banking facilities. Banks and companies borrowed heavily from abroad and unduly exposed themselves to the risk of a sharp decline in the exchange rate.

These lessons have become the base for prudent macro-economic policies formulated thereafter. For instance, four fiscal targets were set in 2005: fiscal balance from FY2005 onwards; public debt to GDP at less than 50%; capital expenditure being more than 25% of the budget; and a debt service share less than 15% of the budget. As for expenditures, external debt service payments, as a percentage of export earnings, fell from 16% in 2003 to 8.3% in 2006 due to retiring expensive debt.

b) Tax System

Thailand has conducted a series of tax reforms aiming to reinforce fiscal sustainability, environmental and socio-economic objectives. The government planned a broad tax reform, to enhance the efficiency of the tax system and support revenues in 2003 and 2005. The Roadmap for Tax Reform was laid down and the structure of the corporate income tax, personal income tax, value-added tax, excise tax, and customs duties were reviewed.

Currently three indirect taxes are levied on goods and services: the excise tax, interior tax, and the value added tax (VAT). These indirect taxes represent about 46.3% of the national tax revenue, compared with 7.4% for customs duties in FY2001. All three are levied on imports at the same rates as on domestic production. The valuation basis depends on the type of tax. The valuation basis of the excise tax for domestic production is the manufacturer's selling price (i.e., the ex factory price).

The VAT, which accounts for more than a fifth of total tax revenue, is set at 7% on goods and services, with exemptions for books, education, hospitals, unprocessed agricultural products, fertilizers, animal feed, pesticides, and certain other social goods and services. For products subject to the excise tax and the interior tax, the VAT is levied on the tax inclusive value. Exports are rated zero for VAT purposes.

Monetary Policies

Monetary policy is conducted by the Bank of Thailand (BOT). The BOT maintains operational independence in the formulation of monetary policy through an independent and open decision-making process.

To achieve price stability the monetary target was adopted with the floatation of the currency in 1997 but it was replaced in 2000 with inflation targeting. The main instrument to achieve the inflation target is the BOT's 1-day repurchase (repo) rate. The BOT chooses to target core inflation, which excludes volatile raw food and energy prices, to move within the range of 0–3.5%. While the target range is relatively low, it is consistent with the inflation trend of Thailand's trading partners and the structure of the Thai economy. Together with a managed float currency regime, the inflation targeting framework gives the BOT the flexibility to respond quickly to changing domestic and external developments, while ensuring price stability in the long run.

For instance, the BOT pursued a monetary policy to encourage demand and foster economic growth in 2003–04. The dismantling of the oil subsidy, rising commodity prices, and increasing capacity utilization, however, resulted in rising inflationary pressure, and prompted the BOT to tighten their monetary policy. With inflationary pressure receding, the BOT has reduced the 1-day repo rate five times since January 2007, from 5% to 3.3%.

The government divested some of its shares in the Krung Thai Bank in 2003. The Bank for Agriculture and Agricultural Cooperatives (BAAC) was transformed into a rural bank in March 2006. This transformation was in line with the government's objective of improving access to financial services in rural areas through measures such as micro-credit operations. Currently, the BAAC provides credit not only to farmers for agricultural purposes, but also to rural people for various purposes. Interest rates charged vary according to each borrower's risk profile. The rates quoted are preferential, the minimum retail rate (MRR) at plus 1% or 2%. The MRR is computed based on the bank's operating cost. The total amount outstanding on micro-credit loans has increased from THB287 billion in 2003 to THB426 billion in 2007.

Price Control/Monitoring

The previous Constitution (1997) asks the government to support a market-based economy and ensure fair competition, consumer protection, and anti-monopoly practices. Despite the repeal of the Constitution, these principles are still respected. Under the Price of Goods and Services Act (1999) the

government tries to ensure the fair price of goods and services, and an adequate supply of goods to meet domestic demand. The Central Commission on Price of Goods and Services has the power to designate any particular goods or services as controlled goods or services, or to fix the purchase or distribution prices of controlled goods or services, and to maintain the prices at a certain level. The Department of Internal Trade (DIT) of the Ministry of Commerce is responsible for implementing the legislation and ensuring fair competition in the domestic market.

Items controlled under the Prices of Goods and Services Act 1999 are shown in the Controlled List and the Monitored List, and are enforced primarily at the manufacturer and distributor level. The DIT can request manufacturers to review their prices if they are deemed too high or too low.

Trade Policies

As Thailand's economic performance has become increasingly dependent on international trade, the primary goal of Thailand's trade policy is to ready the country for a greater role in the world community. Thus, the government has emphasized measures such as conducting a liberal economic policy through a free and open market mechanism, liberalizing trade domestically, and encouraging a constructive and competitive economic structure. Thailand was actively involved in the GATT Uruguay Round negotiations and carried out trade related reforms including tariff restructuring and the reduction in import duties.

a) Export system

Thailand's trade policies have been geared towards promoting exports by limiting export controls to a minimum. As in other countries, Thailand maintains the requirements of prior approval or licensing for reasons such as public health, economic stability, national security, and protection of public morals, or meetings, etc. Some export control measures have been introduced to meet its importers' requirements on food standards or others.

Thailand currently does not provide any export subsidies to its producers. A system of investment incentives is in place. For example, exporters can receive a deduction from corporate income tax for agri-food (and other eligible) industries that increase export incomes over the previous year. These schemes are not, however, specific to the agri-food sector.

Export taxes can be imposed as statutory rates and applied rates. Applied rates involve specific and ad valorem duties. At present, no agricultural product is subject to export duties except for raw hides and skins, and some forms of unprocessed wood. Previously, export duties on rice had been an important source of government revenue; however, they are currently suspended.

A few export items (e.g., orchids, longans, and durian) require registration with the Department of Agriculture, for quality, price monitoring, and food security purposes. Export licensing and prohibitions were eliminated in 2003 on certain commodities including jute and kenaf seed, rattan, live bovine animals, and fertilizer.

b) Import system

The legislative authority for regulating imports is provided by the Export and Import Act B.E. 2522 (1979). The Act empowers the Ministry of Commerce, with the approval of the Cabinet, to restrict

imports for reasons of economic stability, public interest, public health, national security, peace and order, morals, or for any other reason of national interest. Imports may be "absolutely" or "conditionally" prohibited; in the latter case (e.g., those requiring non-automatic licensing), they are allowed if specified conditions are satisfied.

Various other laws stipulate import restrictions. Under the Investment Promotion Act, the Board of Investment may request the Ministry of Commerce to ban imports of goods competing with those produced by a domestic industry, if the Board views that other forms of protection are not sufficient to assist the industry. Imports may also be prohibited under the various laws in place for health and safety reasons.

i) Tariffs

The tariff has been the main trade policy instrument. The tariff structure has remained relatively complex, involving a multiplicity of rates (31 *ad valorem*, 19 specific, and 158 alternative rates in 2006). Recent tariff cuts, covering more than a third of the lines, reduced the overall simple applied most favored nation (MFN) tariff average rate from 13% in 2003 to 11% in 2006.

Thailand has bound 73.7% of its tariff lines. The gap of 16.5 percentage points between the average bound and applied MFN tariff rates, is largely due to unilateral and ASEAN-related tariff restructuring, which provides a scope for the government to raise applied rates within the bindings. For instance, duties on eight tariff lines including edible offal were increased between 2003 and 2006. Nonetheless, applied tariff rates have been on an overall downward trend.

At 32%, the average applied MFN tariff of agriculture (by the WTO definition, i.e., including processed food products) exceeds the overall average for total Thai imports of merchandise, which has only minutely changed since 1995. Three quarters of tariffs exceeding 50% are in agriculture. Furthermore, a range of agricultural products remains subject to non automatic import licensing, including fish meal, gunny bags, jute, and kenaf.

ii) Non-ad valorem *tariff and special import surcharges*

Non-ad valorem (specific and alternative) duties[2] account for 22.5% (1,236 lines) of all Thai tariff lines at the HS seven-digit level. They mainly apply to agricultural and food products, rubber, pulp and paper, textiles, leather products. Thailand also imposes product-specific surcharges. They are levied on out-of-quota imports of maize for feedstuff at a rate of THB180 per ton. Import surcharges seem to take the form of *ad valorem* or specific duties (e.g., USD10 or 20%).

iii) Tariff quotas

In 2006, tariff quotas covered 1.0% of all tariff lines at the HS seven-digit level. All of them are agricultural product groups. The average in-quota tariff rate was estimated at 23% while that of out-of-quota was 43.7%. Tariff quotas were largely not filled up for many products. Although some conditions are attached, tariff quotas do not apply ASEAN countries under the AFTA.

[2] An alternative duty takes the form of the choice between an ad valorem and a specific rate, normally being the higher of the two.

iv) Import licensing and prohibitions

A number of import restrictions are in force for economic purposes, including those on several additional products that are made subject to import licensing or prohibition. Infant industry protection has been the main objective behind import restrictions since the 1970s.

c) Exchange rate policy

A flexible market-determined exchange rate is the base for the policy. The BOT intervenes in the foreign exchange market only when appropriate to smooth out fluctuations. Intervention is to help mitigate exchange-rate overshooting and reduce the adverse impact and the costly economic adjustment.

However, the continuing capital inflows and the current account surplus have been exerting upward pressure on the baht. Between 2001 and 2008, the Thai baht appreciated by around 25% against the US dollar. A higher baht value has eroded the export competitiveness of the labour-intensive industries including agriculture and has exposed them to increased competition with other countries in the region.

Agricultural Policies

Overall Framework of National Agriculture Policies

Agriculture, where labour productivity is relatively low, remains an important component of the Thai economy, external trade and employment, as well as a tool for food sufficiency and poverty reduction. Government policy has been geared towards not only raising productivity and per capita income in the sector, but also for agricultural output and self-sufficiency in basic foodstuffs. Domestic producers have benefited from product specific or non-specific support, including market price intervention, soft loans, price controls for certain inputs, and subsidized electricity tariffs for agricultural pumping; such support is equivalent to about 1% of GDP.

Thailand has been committed to the liberalization of the multilateral trading system, including agriculture, under the WTO regime. It has also committed to "open regionalism" and considers regional trade liberalization as an effective catalyst for freer trade and a complement to multilateralism. The current focus of foreign policy is the strengthening of regional links through free-trade agreements (FTAs).[3] The FTA networks are bringing both new opportunities and new challenges to Thailand's agricultural sector, thus, forcing changes in agricultural policies altogether.

Agricultural policies in Thailand are structured as a combination of free trade policies and domestic support polices that do not rely heavily on market interventions. In other words, the non-price support measures, such as government subsidies and services, have been playing until recently important roles in agricultural support. In recent years, however, income support policies such as paddy pledging program are gaining momentum.

[3] In addition to expanding intra and inter ASEAN FTA, Thailand has participated in the establishment of the Bangladesh – India – Myanmar – Sri Lanka – Thailand Economic Cooperation (BIMST-EC) FTA. Thailand has also established a network of bilateral preferential trading arrangements with several trading partners (i.e. Australia, Bahrain, India, Japan, Peru, and New Zealand).

Production Promotion (input subsidies, credit, etc.)

There are two basic types of policy measures to support agricultural production in Thailand. One type is the direct or indirect provision of services and inputs by the government. This covers a wide range of government assistance: agricultural extension services, farmers training, research, distribution of farm implements, construction and maintenance of rural infrastructure such as irrigation facilities and rural roads, and support to farmers' groups. The government also provides short term loans to low income farmers to meet seasonal requirements (e.g., to buy fertilizers) under the Farming Input Assistance Programme. Electricity tariffs for agricultural pumping are subsidized.

A unique initiative for the production promotion at the village levels, called the "One-Tambon-One-Product (OTOP) Scheme," may also be included in this type of policy measures. Through this scheme, farmers in each village are encouraged to produce their own "local brand goods" by using local materials and selling them under the OTOP brand. Silk, textiles, handicrafts, orchids, and processed food are examples of these products. The government has assisted farmers in developing marketable products through farmers' cooperatives. In our analytical framework, these supports are captured as the budgetary transfers either to farmers (commodity specific and non-commodity specific PSEs) or to the agriculture sector as a whole (GSSE).

The other type of policy measure is the price/income support, which includes a pledging scheme, price interventions, import restrictions, disaster payments, and debt relief. Information on these supports can be derived from the government budgetary documents or web-sites/publications on the relevant programs. One particularly notable case is the paddy pledging program, under which farmers can pledge up to 90% of their crops to the Bank for Agriculture and Agricultural Cooperatives (BAAC) in exchange for low interest loans. Farmers can sell their crops either in the market after loan repayment, or to the government at the guaranteed price (and thus having to make no loan repayment) if market prices are low. The program encourages farmers to produce more paddy crops because a decent income is guaranteed. As in the case for sugar, the government sets the domestic price and determines the price received by sugar planters and millers. Under this arrangement, 70% of the net revenue from sugar and molasses is paid to farmers and 30% is paid to the millers.

Import restrictions can be an effective measure to promote domestic agricultural production. Thailand applies ad valorem or specific import duties, import surcharges, and tariff quotas. However, in most cases the applied rates are low, if not exempted (see "Trade Policies" page 185).

The government also introduced a Farmer's Debt Moratorium Scheme in 2001 to help small farm households who had loans from the BAAC and who were affected by the Financial Crisis of 1997. These programs are implemented by the BAAC, the BOT, and the Farmers Assistance Fund.

Price Support

Except general price control/monitoring policies stated in the previous section, there is no agriculture specific policies to directly intervene in market prices. However, trade restrictions and some income support policies are considered to function as indirect price support measures. Import duties help domestic prices remain high, while minimum guaranteed prices underpin the domestic market prices. The manners and extents to which these trade restrictions and income support policies affect market

prices are complex and have to be examined in individual cases (see "Policies and Specific Measures Applied to Selected Commodities" page 194; "Trends in Agricultural Support" page 200).

Infrastructure Development (irrigation)

For agricultural infrastructure development, the government has placed greater emphasis on water resource development for irrigation, raising animals, and household consumption. Large, medium, and small-scale irrigation systems have been constructed and have helped farmers expand production areas or cropping intensity. Natural water resources, such as canals, have been widely rehabilitated. Although many government agencies are involved in the construction and maintenance of irrigation facilities, the Royal Irrigation Department is the central acting agency, for which about THB30 billion is annually allotted in recent years. In general, public sectors bear the construction and maintenance costs of main systems including dams, canals, weirs, and gates. Farmers are asked to pay a water fee through water users associations to cover the maintenance costs of local facilities.

The government has also helped to improve other rural infrastructures including rural roads and farmland development. In our estimate, expenditures for irrigation and other infrastructure account for about one half of the agricultural budget in Thailand.

Provision of Public Services

The Ministry of Agriculture and Cooperatives (MOAC) is the primary agency that deals with agricultural policies and issues. Under the MOAC, the Department of Agriculture (DOA), the Department of Livestock Development, and the Rice Department are mandated to conduct research and development on crops, livestock, and rice, respectively. Extension and training services are administered by the Department of Agricultural Extension, while the Cooperative Promotion Department promotes marketing for agricultural products. Land and water infrastructure development is within the responsibility of the Land Development Department and the Royal Irrigation Department. The National Bureau of Agricultural Commodity and Food Standards is responsible for consolidating work in various agencies for agricultural commodity and food standards. It is mandated as a single national body to formulate and implement policies for SPS regulations.[4]

The MOAC has improved its agricultural service system in such a way that farmers can now quickly access information on agriculture, as well as benefit from agricultural services provided by the MOAC. Furthermore, they have also established centers for agricultural services and technology transfers at village levels. The centers will provide farmers with agriculture-related knowledge and technology in the field of crops, livestock, and aquaculture. Another notable service is the Agricultural Mobile Clinic Program, which was set up in July 2002. Its major activities consist of providing clinical services for farmers in the fields of crops, livestock, fisheries, soil, and fertilizer.

Agro-food Trade Policies

a) Tariffs

The applied tariff rates in the period 1990–2008 are shown in Table 4. The rates of some of the commodities were reduced in 2004. The tariffs used are specific duty (THB/kg), Ad valorem (%) duty or

[4] WTO document G/SPS/N/THA/93, 4 April 2003.

their combination (e.g., either of them, whichever higher). The applied tariff rates for crop commodities (i.e., for rice and maize) is 2.75 THB/kg, soybean is 0.25 THB/kg or 15% whichever is higher, sugar cane is 3.5 THB/kg or 65% whichever is higher, and cassava is 20 THB/kg, whereas rubber has no import tariff imposed. For livestock commodities, i.e., beef and veal, pigmeat, and poultry meat, import tariff of 40–50% is applied, whereas milk products have 30–40% import tariff rates imposed.

Table 4. Applied Tariff Rates for 10 Major Commodities

Import	1990–1995	1996–1999	1999–2003	2004–2008
Rice	2.75 LC/kg	2.75 LC/kg	2.75 LC/kg	2.75 LC/kg
Maize	2.75 LC/kg	2.75 LC/kg	2.75 LC/kg	2.75 LC/kg
Oilseeds (soybeans)	3 LC/kg	3 LC/kg	B 3 LC/kg or 60%	B 0.3 LC/kg or 20%
Sugar cane	3.5 LC/kg	3.5 LC/kg	3.5 LC/kg	B 3.5 LC/kg or 65%
Beef and veal	60%	60%	60%	50%
Pigmeat	60%	60%	60%	40%
Poultry meat	60%	60%	60%	40%
Milk products	40%	40%	40%	30–40%
Rubber	0 LC/kg	0 LC/kg	0 LC/kg	0 LC/kg
Cassava	20 LC/kg	20 LC/kg	20 LC/kg	20 LC/kg

Source: Customs Department (Thailand) http://www.customs.go.th/Tariff.

Note: Export duties are exempted for these commodities.

b) Tariff quotas

In 2008, Thailand notified the WTO of the application of tariff quotas for 23 agricultural products in 2007. They include: milk and cream, potatoes, onions, garlic, coconuts, oil, coffee, tea, peppers, maize for feed, rice, soybeans and products, palm oil, sugar, raw silk, and tobacco leaves.

The TRQ system established by the government under the WTO Agreement on Agriculture, however, does not appear to constitute a significant barrier to trade. The 23 tariff quotas can be divided into two groups: traditional export commodities (e.g., rice and coconuts) and commodities requiring a large amount of imports for processing industries (e.g., oilseeds and maize). For the former group, their comparative advantage should preclude the need for import protection. For the latter group, when domestic production is not sufficient to meet demand, volumes of these imports may not only exceed the tariff quota volume specified in the Agreement, but also enter at duty-free or applied duties lower than either the in quota or out-of-quota bound rates.

Thailand increased the in-quota volume of potatoes in 2006 and provided unlimited allocations for soybeans and soybean cake in 2006 and thereafter. For some other products, a specific rate was applied instead of an ad valorem bound rate. Tariff quotas were under filled for most products, while imports of four items (milk and cream, potatoes, soybeans, and soybean cake) largely exceeded quota levels.

c) Animal quarantine

In line with the Animal Epidemics Act B.E. 2499 (1956), Thailand has an audit system for the national veterinary service, under which livestock production units (farm or slaughterhouse) are subjected to individual inspection. Importers of animals or animal products must comply with the general instructions

on accompanying certificates, risk analysis, scientific evidence, and recommendations of veterinary inspectors. In case of an outbreak of animal disease in an exporting country, restrictions on imports of livestock or their products from that country may be imposed prior to notification.

d) Plant Quarantine

The Plant Quarantine Act B.E. 2507 (1964) was amended in 1999 with a view to harmonize Thailand's domestic pest control measures with international requirements. Recently, the DOA revised three Ministerial Regulations under the Plant Quarantine Act. The new regulation[5] indicates that the entry of listed articles (such as some fresh fruits from particular country) to Thailand is prohibited or restricted. The importation of restricted articles for commercial purposes must pass the pest risk analysis process. Furthermore, they must be accompanied by a phytosanitary certificate.

e) Labelling requirements and intellectual property rights

A ministerial announcement on genetically modified (GM) food products has been enforced since May 2003. Food products derived from GM or engineered maize and soya, must be labelled as such in a legible form.[6] The announcement also prohibits labelling such products as GM free or non-GM food.

f) Food standards

Thailand's Food and Drug Administration, under the Ministry of Public Health, monitors and regulates the production, sale, and import of food products and drugs with the objective of food safety and the impact on human health. Imports and exports of feedstuffs, fertilizers, hazardous substances, live animals, plants, and seeds are administered by the MOAC. Between 2003 and July 2007, 68 notifications were submitted under the WTO Agreement on Sanitary and Phytosanitary Measures (the SPS Agreement). Thailand is an active participant in the FAO/WHO Joint Codex Alimentarius Commission, the FAO International Plant Protection Convention, the World Animal Health Organization, and the WTO SPS Committee.

Agro-environmental Policies

During the last few decades, valuable natural resources and the environment in Thailand has significantly degraded to the point that it may further impede economic development. Shifting cultivation, urban expansion, and over logging continue to result in deforestation and forest degradation. Meanwhile, the rapid growth of industrial sectors is causing serious air, surface, and groundwater pollution in urban areas. Rural areas are also confronted with excessive deforestation, destruction of critical watersheds, flooding and soil erosion, sedimentation of irrigation reservoirs, cultivation of fragile lands, overuse of pesticides, over fishing, and the loss of genetic and biological resources.

The five environmental issues that deserve highest priority for Thailand are: (1) management of land resources for agriculture and forestry; (2) water resource management within river basins; (3) urban and industrial water quality; (4) industrial waste management and pollution prevention; and (5) air pollution in Bangkok.

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[5] Royal Gazette of 1 June 2007, and effective 31 July 2007.

[6] The requirement applies to food products containing more than a certain amount of modified or engineered DNA. The requirement does not apply to small producers that sell food products directly to consumers.

The government has initiated several projects aiming at protecting the environment and natural resources, and encouraging farmers to adopt environment friendly technologies. Among them were the projects on natural resource rehabilitation, pipe-line irrigation, conservation and natural resources, and promotion of "sufficiency economy."

Regional and Bilateral Arrangements

In recent years, globalization is the most fundamental trend that has been affecting Thailand's agricultural sector. This trend is evident in trade and trade related policies. While the WTO Doha Round is moving slowly, regional or bilateral free trade agreements have been made effective or strengthened. In response, agricultural policies are shifting from those promoting the production of such crops as rice, cassava, coffee, and pepper to encouraging conversion to the production of high value products, enhancing competitiveness, and sustainability.

Regional arrangements

a) ASEAN[7]

The elimination of tariff and non-tariff barriers among member countries is expected to promote greater economic efficiency, productivity, and competitiveness. In consequence of the financial and economic crisis, members agreed in 1999 to work towards the elimination of all import duties among the ASEAN-6 members (Brunei Darussalam, Indonesia, Malaysia, the Philippines, Singapore, and Thailand) by 2010, and for ASEAN-4 members (Cambodia, Lao PDR, Myanmar, and Vietnam) by 2015, with some flexibilities, and except on some sensitive products. Quantitative restrictions and other non-tariff barriers are also to be eliminated.

In 2004, ASEAN decided to establish the ASEAN Economic Community (AEC) by 2020. Its aim is to turn ASEAN into a single market that is production based with the free flow of goods, services, capital, investment, and skilled labour. To ensure concrete progress, ASEAN has accelerated integration in 12 priority sectors including wood-based products, rubber-based products, textiles and apparel, agri-based products, and fishery products. In late 2006, ASEAN leaders decided to shorten the timeframe for realizing the AEC to 2015.

b) Asia Cooperation Dialogue

The Asia Cooperation Dialogue (ACD), a Thai initiative launched in June 2002, aims to serve as a "missing link" for all Asian sub-regions to create strategic partnerships and cooperation by drawing upon and combining Asia's diverse strengths so as to position it as a viable partner for other regions.[8] The 30-country ACD has rapidly enhanced cooperation on dialogue and projects. On the project dimension, many countries have proposed to be "prime movers" in 19 areas of cooperation, including energy, agriculture, biotechnology, tourism, poverty alleviation, information technology development, e-education, and financial cooperation.

[7] ASEAN Secretariat online information. http://www.aseansec.org/ and http://www.aseansec.org/4920.htm.

[8] Members are Bahrain, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, PR China, India, Indonesia, the Islamic Republic of Iran, Japan, Kazakhstan, Republic of Korea, Kuwait, Lao PDR, Malaysia, Mongolia, Myanmar, Oman, Pakistan, the Philippines, Qatar, Russian Federation, Saudi Arabia, Singapore, Sri Lanka, Tajikistan, Thailand, United Arab Emirates, Uzbekistan, and Vietnam.

Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation or Bangladesh-India-Myanmar-Sri Lanka-Thailand Economic Cooperation (BIMSTEC)

Thailand supports the BIMSTEC forum's objectives of facilitating and promoting trade, investment, and technical cooperation among members by forging links between ASEAN and SAARC, and developing a free-trade area. Currently, there are 13 priority sectors of cooperation, involving agriculture, poverty alleviation, fisheries, protection of biodiversity/environment, and natural disaster management. A Framework Agreement on the BIMSTEC Free Trade Area, signed in February 2004, provided the progressive establishment of a free-trade area between July 2006 and June 2012, as well as the launch of negotiations on trade in goods, trade in services and investment.[9] Trade in goods will be liberalized through the progressive elimination of tariffs and non-tariff barriers in two phases.

c) Indonesia-Malaysia-Thailand Growth Triangle

The Indonesia–Malaysia–Thailand Growth Triangle seeks to promote sub-regional economic cooperation to drive growth and development in southern Thailand, northern Malaysia, and Indonesia's Sumatra Island. Its focus is on trade and investment, technology transfer, production cooperation, and transportation linkages in the triangle area, with enhanced involvement of the private sector. Of the six areas of cooperation, Thailand is the lead country for halal products, services, and tourism.

Bilateral arrangements

Thailand has pursued FTAs with major trading partners because FTAs can be an effective catalyst for free trade and a building block for the multilateral trading system. Thailand is using FTA negotiations as a means to maintain and strengthen its shares in traditional export markets such as Japan, USA, and ASEAN, as well as to broaden and deepen its trade and investment access in potential new markets, particularly PR China, India, Australia, and New Zealand. An FTA with a group of South Asian countries (e.g., BIMSTEC) is viewed as a means to intensify regional linkages, while an FTA with a far-off country, like Peru, is hoped to be the major step towards expanded free trade with other regions.

SUPPORT TO AGRICULTURE AS REFLECTED BY THE PSEs AND OTHER POLICY INDICATOR

Major Commodities Included in the Analysis

There are 10 commodities included in the study, based on their contribution to the total Gross Agricultural Output. The percentage composition of the commodities studied ranged from 60–70%, since the value for fruits and vegetables were not included in the analysis. Thailand is a net importer of soybeans and milk, while a net exporter of rice, maize, sugar, palm oil, rubber, cocoa beans, and cassava. pigmeat, poultry meat, hen and eggs are largely self sufficient.

Table 5 shows the export and import volume of the 10 major agricultural commodities studied during 1990–2008. Rice exports showed an increasing trend with its highest value during 2005–2008. Maize

[9] BIMST-EC online information. http://www.bimstec.org/free_trade_agreement.asp.

exports fluctuated with its lowest point during 1996–1998. Soybean imports increased with a peak during 2000–2004. The exports of sugar cane fluctuated and were highest during 2002–2004. The importation of milk had an increasing trend, at its highest during 2005–2008. Rubber exports have been increasing, whereas, cassava exports declined during 1993–95 and remained stagnant thereafter.

Table 5. Exports and Imports of 9 Major Agricultural Commodities, 1990–2008 (Thousand tons)

Commodities	Export/import	1990–1992	1993–1995	1996–1998	1999–2001	2002–2004	2005–2008
Rice	EX	4,446	5,506	5,856	6,297	8,221	8,586
Maize	EX	871	155	79	199	431	356
Soybeans	IM	0	100	497	1,005	1,527	1,577
Sugar cane	EX	3,094	2,927	3,707	3,652	4,787	3,602
Beef	IM	1	2	2	1	1	2
Pigmeat	EX	1	0	1	5	9	4
Poultry meat	EX	169	185	238	417	490	374
Milk	IM	743	969	1,177	1,115	1,293	1,307
Rubber	EX	1,197	1,400	1,569	1,842	2,177	2,062
Cassava	EX	19,788	14,053	11,754	13,239	13,427	12,380

Source: Agricultural Statistics Thailand 2009: Office of Agricultural Economics.

Policies and Specific Measures Applied to Selected Commodities

Rice

There are two rice crop seasons in Thailand, the major and the second. The duration of the major rice season is from May to October, and that of second crop is during November to March, with some delays in Southern Thailand. The major rice is planted during the rainy season and usually consists of photosensitive varieties such as Khao Hom Mali, Glutinous, and Non-glutinous rice varieties. The second rice is mostly planted in irrigated lowland areas.

Thailand is a world leading rice exporter. Major destinations are Asia (Indonesia, Malaysia, the Philippines, Singapore, PR China, Hong Kong, and Japan), the Middle East (the Islamic Republic of Iran, Iraq), Africa (Nigeria, Senegal, and South Africa) and the USA. High quality rice, such as white Khao Hom Mali, is exported to Hong Kong, Singapore, Malaysia, the Islamic Republic of Iran, Dubai, and the USA, while middle quality rice is exported to PR China and others.

Most exports are operated under commercial sales arrangements, which comprise 90% of the export volumes. The remaining 10% are comprised of inter-governmental arrangements. The government of Thailand has trade agreements with several countries under different terms such as loans, barter trade, and foreign aid.

Various policies apply for rice in light of its importance in the national economy. Among them are those measures to stabilize market and supply, increase production efficiency, target the niche market, enhance competitiveness and value addition, and improve trading systems. Most of the production promotion policies, including general government services referred to in the previous section, apply to rice. In addition, policies to support the rice trade are also implemented, such as advance exports, loan provision,

paddy pooling, provision of monetary support for paddy traders and millers, purchase of milled rice, government to government rice export, support for high quality milled rice, etc.

The most notable measure is the Pledging Program. This support program starts at the beginning of each harvest season in order to delay the selling decision of rice farmers. Under this scheme, the government announces the target prices every year. Farmers can pledge up to 90% of their crop to the BAAC in exchange for low interest loans. Farmers harvest and store their crops as collateral, either in their warehouses or in government designated storage facilities. The government announces the reference prices every week based on the actual market prices. Then farmers have a choice, they can either sell their crops in the market and repay the loans, or surrender their collateral crops to the government at the target prices.

If the target price is set relatively low, as is the case in most years, the program works only as a sort of insurance for the farmers, in case market prices plummet. If target prices are set high, as in recent years, it becomes a costly income support measure for the government. In the crop year of 2009/10, the program covered 20 million tons of rice produced by 3.2 million farmers. It is estimated that total government payments would reach THB25 billion, despite the relatively high international rice prices.[10]

Maize

The production of maize remained around 4 million tons with some ups and downs over the examined period. Since 1990, the planted areas have been on a declining trend at about 2 percent per year, however, the average yield has increased at a similar rate.

The consumers of maize in Thailand include the livestock industry and other livestock related industries. 95% of total local production is used by the livestock industry and only 5% is used for cooking oil and as planting material.

There are several marketing problems related to maize in Thailand. Low prices are dictated by processing mills during the harvesting season; there is a lack of storage facilities, which poses the risk of aflatoxin contamination; the access to the foreign market was limited by the low quality of harvest; and there are high transportation costs.

Thailand continues to impose product-specific surcharges. Currently, they are levied 73% or THB2.75 per kilogram, whichever is higher. Imports of maize were also subject to tariff quota. In 2005, 56,000 ton were allowed to be imported under the first duty rate of 20%, but it is said that maize was often imported at duty free, even under out-of quota amount. In recent years, maize has also been subjected to the Pledging Program. In 2009/10 about 4 million ton were pledged by 340 thousand farmers.

Soybeans

Soybeans are planted for three cropping seasons depending on the local cropping pattern. The major production areas are located in the Northern provinces. Soybean production in Thailand is relatively small and on a declining trend. It was at around 200,000 tons in 2008 because farmers are shifting to other crops such as cassava and sugar cane. Soybeans produced by small-holders cannot compete with

[10] Source: Presentation material provided by Dr. Boonjit Titapiwatanakun, in the workshop held in Meiji University in February 2011.

imports in terms of costs and quality, although the government has been regulating the trade of soybeans and soybean products. The demand for soybeans has continuously increased, especially for cooking oil and animal feed, which resulted in the rising demand for imports. Imports of soybeans and soybean products are estimated to account for 70–80% of total consumption in 2007.

In the past, the government has provided incentives to domestic soybean production through price support and local-content requirements, but these were eliminated in the early 1990s. Thailand has recently relaxed its tariff-rate quota allowing unlimited imports of soybean and soybean cake for certain producer groups at lower in-quota rates. Currently, the tariff quota on soybeans is vastly overfilled but according to the authorities, imports enter duty free irrespective of the in-quota and out-of-quota bound rates. In 2006, Thailand provided for unlimited allocations for soybeans and soybean cake. In contrast, no imports of soybean oil took place until 2005 under the tariff quota. Only a few thousand tons were allocated for the first quota, with 20% ad valorem duty and the duty for out-of-quota imports were 146%.

Sugar cane

The government has taken various support measures for the sugar sector to promote sugar cane production, enhance the production capacity of sugar mills, and facilitate marketing. They include research and development for high yield varieties and small-scale harvesters, infrastructure development such as irrigation, and loan provisions.

The government has given no direct support to the sugar producers but they have exerted considerable influence through the intervention of the domestic sugar market. Various indirect supports to sugar producers and the sugar industry have been provided for over two decades. The establishment and expansion of sugar mills are controlled by the Ministry of Industry. The Ministry of Commerce sets the preliminary and actual prices of sugar. The sugar mills pay producers 70% of the net expected revenues computed from the preliminary prices. Adjustment payments are made to producers or mills once actual prices are known through the Cane and Sugar Fund, contributed from the levies on producers and mills. The Cane and Sugar Board, which comprises of farmers, millers, and government officials, monitors the cane and sugar industry. The maximum level of sugar cane output is also set by the government.

The government also influences the market through a Sugar Distribution and Production Control Centre, which is under the supervision of the Sugar Board. Three types of sugar production quotas have been set: quota A sugar is for domestic consumption, which depends mainly on the national consumption growth rate; quota B sugar is for export by the Thai Cane and Sugar Corporation Limited, a company owned by farmers, millers, and the government; and quota C sugar is for export by millers. During the past five years, quota B sugar production has been set at 800,000 tons; the export price of quota B sugar is used as a reference price to calculate the cane price under the revenue sharing system.

The price intervention can result in a considerable difference between the world price and the domestic price. However, our estimates indicate that producers' prices have been mostly comparable to or below the international prices over the past 18 years.

Among the other measures affecting trade in sugar, an automatic export licensing scheme is in place. Exporters have to have a certain capacity in order to export. Imports of sugar, which had been prohibited until 1995, were subject to a tariff quota with a minimum access of 13,760 tons under a 65% duty as

a result of the GATT Uruguay round. Actual imports have been very small since then because of the relative low prices of Thai sugar.

Beef, Pigmeat, and Poultry meat

Two agencies are involved mainly in livestock production and trade: the MOAC and the Ministry of Commerce. Their roles are as follows:

In the MOAC, the Department of Livestock undertakes livestock development, extension programs, livestock research, controls the spread of pests and diseases, and enhances production and quality. The Cooperative Promotion Department provides support to cooperatives including financial assistance, basic production inputs and services, and marketing information. The Thailand Dairy Promotion Organization, a state enterprise under the MOAC, undertakes training, operates business to collect raw milk from farmers to be processed and sold to consumers, and provides services, e.g. artificial insemination, animal health improvement, production and distribution of feeds, and other production inputs.

The Ministry of Commerce regulates exports and imports of livestock products. Its subsidiary, the Committee on Policy Measures for Farmers' Assistance, implements market intervention measures for milk, chicken meat, and swine. The principal measures include: (1) the provision of loans as revolving funds and market intervention to purchase and maintain stock; (2) loan support to purchase supplies and equipment; (3) price compensation paid directly to farmers; and (4) export compensation as price differences between local price and export price.

Tariffs on imports of fresh, chilled, or frozen meat were 60% until 2004 but reduced to 50% (beef) and 40% (pigmeat and poultry meat) thereafter. There are no tariff quotas for meats in Thailand.

Milk

During the past decade, the production of milk increased significantly due to the governmental policy to promote dairy production as an alternative source of income, such as a substitute to the production of cassava, pineapple, rice, swine, etc. The government supported the dairy sector through investment in basic production infrastructures, importation of dairy breeds for research and development, provision of loans at a low interest rate, technology transfer, and assistance to dairy processing plants.

Agencies involved in the collection of fresh milk includes: a) the Thailand Dairy Promotion Organization – a state enterprise that buys fresh milk from nearby producers; b) Dairy Cooperatives – serve as centers to collect fresh milk, with farmers as members; c) dairy products processing plants – the members can sell the fresh milk to the processing plants for further processing; and d) private dairy product processing plants.

Policy measures on the production of milk include the improvement of dairy cows, research and development, establishment of milk collection centers, and farm development programs. Marketing and price policy measures include the promotion of milk consumption including school lunches, milk as a supplementary food program, price compensation for raw milk, and measures for the distribution of raw milk. International trade policy measures include the importation measures for powder milk and milk importation under the WTO agreement.

Dairy products, skimmed milk powder in particular, are a major import item considerably exceeding the tariff quota volume. A tariff of 5% is levied on imports, but quantities exceeding the quota could face a 231% tariff, if the system were applied. Currently, all imports (in- and out-of-quota) enter at in-quota tariff rates. The tariff quota system on skimmed milk powder is approved on an annual basis, and is subject to a quarterly review. Domestic-content requirements imposed on importers of dairy products were abolished by the end of 1999. Under the system, importers of skimmed milk powder must buy twenty times the weight of imported powder in local raw milk. In the case of prepared milk, the local-content requirement ratio is 2 to 1.

The Dairy Promotion Organization maintains a minimum price policy to attract the regular supply of milk. However, the competition by private enterprises to buy raw milk is intense and setting a minimum price has not been necessary. The organization does not engage in the direct marketing of milk products. Instead, it relies on private companies for such sales, which account for about one third of the domestic market for dairy products. The organization is not involved in imports or exports.

Rubber

Rubber products are among Thailand's largest agri-based export commodities, with revenues in excess of USD1 billion annually, placing Thailand as the world's largest exporter.

Rubber policies include market intervention during times of low prices, provision of low interest loans, reduction of export tax, the establishment of rubber warehouses, rubber central market, and marketing information system. Other production policy measures are the provision of fertilizers, pesticides, transfer of knowledge on rubber plantation management, and rubber research and development. The government also provides assistance to the formation of cooperatives, construction of infrastructures, promotion of local rubber products, zoning of rubber production areas, and formation of rubber futures markets. A state-owned organization, the Rubber Organization, is involved in rubber planting, processing, and exporting. However, it accounts for less than 3% of total exports.

Cassava

Among the production policy measures for cassava are the development and multiplication of cassava varieties, distribution of planting materials, transfer of technologies, reduction in land degradation in cassava areas, provision of farmer's training, and demonstration plots.

The government also implemented marketing and trade policy measures such as price intervention, cassava pellets mortgaging scheme, cassava products mortgaging scheme, provision of post harvest facilities, loans for cassava, and processing. The import tariff for cassava is 30–40% with no application of a tariff quota.

Bio-fuels such as bio-diesel and ethanol from palm oil and cassava are important alternative sources of energy for Thailand, and their pump prices have been subsidized.[11] Reportedly, Thailand produces ethanol and bio-diesel from cassava and oil palm; the target production of ethanol is 8.5 million litres per day. The government plans to provide support, such as technical assistance, technology, seeds, and bio-fuel plants, for fuel-related crops.

[11] Source: Presentation material provided by Dr. Boonjit Titapiwatanakun, in the workshop held in Meiji University in February 2011.

Data Sources, Key Assumptions in Measurement

Table 6 outlines the data sources used for the PSE measuremnt. Secondary data such as the GAO, production volume, farm gate prices, and export and import volumes were taken from the FAO statistics, and cross-checked with national agricultural statistics compiled by the Office of Agricultural Economics. Exchange rates were taken from the National Bank of Thailand, and tariff rates are available at the websites of the Thailand Customs Department (http://www.customs.go.th). Data on budgetary transfers, i.e., budgetary transfers commodities specifics, budgetary transfers non-commodities specifics, budgetary transfer general services, were not available in tabular form, hence they were excerpted from the annual reports of the MOAC (1990–2008). For this reason, the study may include some overlapping, misalignment, and omissions.

Table 6. Data Sources Used for the PSE Measurement

No	Data	Sources
1	Gross agriculture output; production volume; farm gate prices; export and Import;	FAOSTAT(production, trade, prices), cross check by Thailand Agricultural Statistics, Office of Agricultural Economics
2	Exchange rate	National Bank of Thailand
3	Tariff	Thailand Customs Department, Ministry of Finance WTO Tariff analysis online
4	Budgetary transfers commodities specifics; Budgetary transfers non commodities specifics; Budgetary transfers general services	Annual budgets of the Ministry of Agriculture and Cooperatives, annual reports of the MOAC
5	Weight adjustment (traded/farm gate); quality adjustment coefficient (local/traded)	Commodities expert, exporter and/or importer; research publications.
6	Port charges and transportation cost to wholesale; processing and transport	Customs Department of Thailand, exporter and/or importer

Thailand is a major exporter of rice, rubber, cassava, and some tropical fruits and thus we could have assumed zero market price differential (MPD) for these commodities. However, Thailand apply various trade restricting (or promotion) measures for them including tariffs, TRQ, licensing and surcharges, even though these measures might have had minimum impact on the actual trade. Therefore, we decided to estimate the PSE by computing MPD if the commodity in question is subject to these trade/price control measures.

Weight adjustments (traded/farm gate) and quality adjustment factors (local/traded) were computed based on the assumptions of commodity experts, exporters or importers, and were cross-checked with various research publications. Port charges and transportation costs to wholesale processing and transport were computed based on data available from the Department of Customs.

Table 7 shows the adjustment factors used. A quality adjustment factor of 1.00 means that the quality of the domestic product is the same as the imported/exported products, such as in the case of maize, soybean, sugar cane, pigmeat, poultry meat, milk, rubber, and cassava. Whereas, for rice, a quality adjustment of 1.05 was used considering the difference of broken contents and a rate of 0.7 was assumed for beef reflecting higher quality of imported beef.

Table 7. Key Assumptions in the Study

No	Commodities	Weight adjustment (traded/farm gate) (ratio)	Quality adjustment coefficient (local/traded) (ratio)
1	Rice	0.66	1.05
2	Maize	1.00	1.00
3	Soybean	1.00	1.00
4	Sugar cane	0.10	1.00
5	Beef and veal	0.75	0.70
6	Pigmeat	0.70	1.00
7	Poultry meat	0.75	1.00
8	Milk	0.04 (butter) 0.09 (dry matter)	1.00
9	Rubber	1.00	1.00
10	Cassava	0.43 (dry) 0.24 (flour)	1.00

Trends in Agricultural Support

Overall National Level of Support to Producers

Figure 1 shows the trend of estimated national percentage PSEs and CSEs. From this figure, we can point out several significant features. First, overall support levels remained low, staying within plus and minus range of 5% in most years. Second, percentage PSEs and CSEs moved symmetrically in many years, which indicates a predominance of price support policies in causing transfers between producers and consumers. Third, there was a clear spike during 1996–99. This was largely due to the sudden depreciation of Thai baht in the wake of the Asian Financial Crisis. Fourth, percentage PSEs were positive from 1999 to 2003 and in 2005.

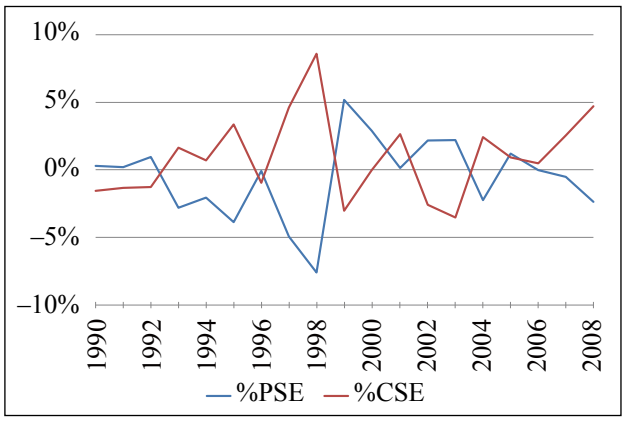

Figure 1. Trend of Percentage PSE and CSE during 1990–2008

Composition of Producer Support by Type of Policy Measure

In Thailand, the normal PSE compositional analysis expressed by percentages to a total does not work properly because some PSE elements are negative. In this case, a bar chart can help illustrate the relative importance of individual components. Figure 2 shows the estimated composition of PSEs by type of policies. It indicates that the price support policy was the largest single influential factor affecting Thai agriculture in the 1990s. During this period, producers seem to have been negatively affected by price support policies.

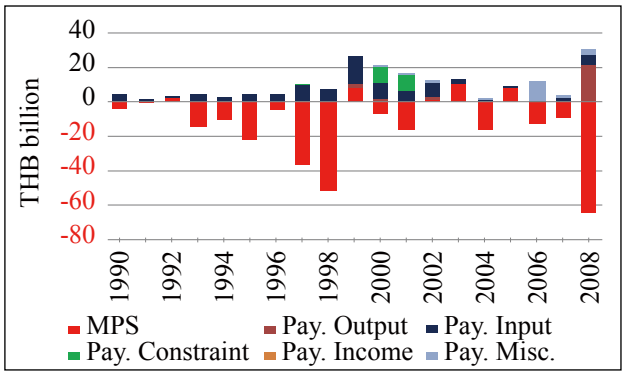

Figure 2. PSE Composition by Type of Policy Measure

Input subsidies played the second most important role, though their size was opposite and much smaller. The composition, however, started to change in the end of the 1990s. For several years in the early 2000s, the government provided subsidies or grants to producers under various projects to partly offset the impact of the WTO commitments and low international prices of export commodities. Price support once again became negative by a large margin in 2008 because soaring international prices widened negative price gaps with domestic prices.

Producer Support by Individual Commodities

a) Commodity Composition of Total PSEs

Table 8 shows the annual average PSE values by major commodities estimated for each five year period, and the entire period from 1990 to 2008. The table indicates that, if averaged out for the entire period, rice and meats received positive support, while sugar cane, rubber, and cassava were taxed. There is a tendency that the shares of rice and rubber are relatively large. However, a closer look at each period tells a different story. The PSE values of some commodities turned from negative to positive, or vice versa in particular periods. For instance, the share of meat PSEs were the largest in 1990–94 but rubber PSEs came to the top in 1995–99, only to be replaced by rice in 2000–04 with the opposite sign. We cannot detect any consistent trend in the PSE compositions by commodity in Thailand.

Table 8. Annual Average PSEs by Major Commodities (THB million)

	Whole period 1990–2008	1990–94	1995–99	2000–04	2005–08
Rice	2,024	–615	1,300	8,711	–5,629
Sugar cane	–1,438	–520	–3,209	–1,763	34
Meats	1,428	1,904	–1,510	1,006	5,035
Milk	–354	79	381	609	–3,016
Rubber	–2,992	–839	–8,992	–2,064	657
Cassava	–470	–40	–696	–690	–450
Others	1,867	1,517	654	3,539	1,732
Total	66	1,486	–12,072	9,347	–1,636

Note: Because of rounding, the total figures do not necessarily match the tally of relevant columns.

b) Rice, Maize, and Soybeans

Figure 3 shows the %PSE for rice, maize, and soybeans during 1990–2008. Since Thailand is a leading exporter in rice, its %PSE for rice should be close to 0%. This was the case until the mid-1990s, and in the middle of the 2000s but this was somewhat buoyant during 1995–2004. A positive PSE was observed during the years of 1995–97 and 1999–2003, while a negative PSE was recorded in 1995 and 2006–08. These moves can be explained largely by such factors as exchange rates and government support.

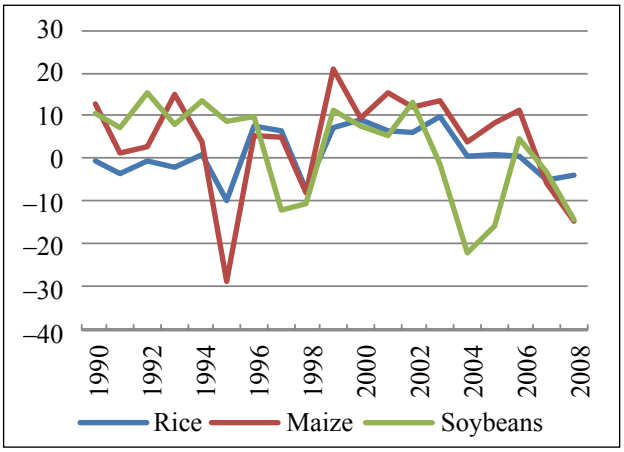

Figure 3. %PSE for Rice, Maize, and Soybeans

The %PSE of maize fluctuates more widely than rice. Positive PSEs were observed in most years except for 1995, 1998 and 2007–08. In normal years, maize is slightly protected by trade measures and input subsidies. However, the support turns negative when international prices surge (as in 1995 and 2007–08) or the exchange rate of the baht plummets (as in 1998).

The same factors influence the soybean PSE but the patterns of movement are different. This was partly because the international prices of soybeans were determined by other factors such as the demand for vegetables oils. Another reason was the operation of a tariff quota for soybeans. The Government of Thailand has relaxed the conditions on the tariff quota since 2004, allowing imports of duty free soybeans even for out-of quota, in order to meet the domestic demand for feed and oil. The negative %PSE of soybeans in 2004–05 is attributed to the combination of this policy and the price hike in the international market.

c) Sugar cane, Rubber and Cassava

The estimated %PSEs for sugar cane, rubber and cassava – three major export commodities – present somewhat different pictures (figure 4). The %PSEs were negative in most years with a sharp downward spike in 1996–08 for sugar cane and rubber. This suggests that these two export sectors have been often taxed by government policies, such as licensing. The %PSE of cassava has been very close to zero except in 1997 and 1999–2000, which is more natural as Thailand is an exporter. However, a more detailed analysis may be required because our estimates rely on several simplified assumptions. For instance, we have assumed the weight conversion factor from sugar cane to raw sugar of 0.1 for all years. In reality, sugar contents vary from year to year and so do the actual prices that farmers receive. Quality adjustments for rubber sheets may also need to be checked.

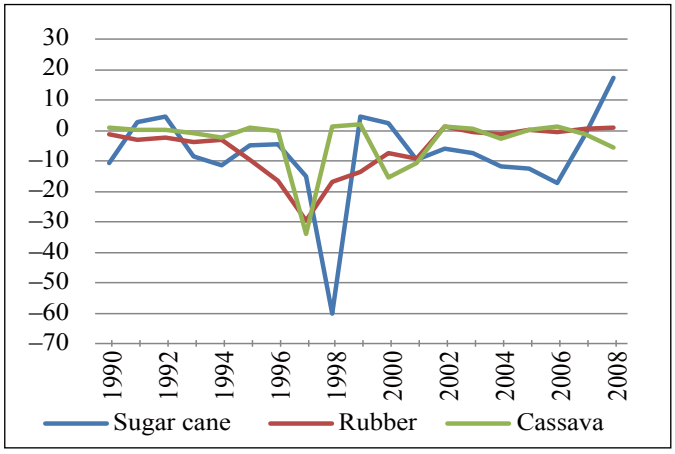

Figure 4. %PSE for Sugar Cane, Rubber, and Cassava

d) Beef, Pigmeat, and Poultry Meat

Figure 5 shows the percentage PSE for beef, pigmeat, and poultry meat during 1990–2008. We can see a general trend for beef and pigmeat – positive %PSE in the early 1990s, large negative PSEs in 1996–98, and a return to positive in the 2000s. On the other hand, the PSE of poultry meat has stayed around zero with some minor deviations by year. This difference arises from the fact that Thailand is a net importer of beef and a net exporter of poultry meat. A few thousand tons of pigmeat is exported, but Thailand is essentially self-sufficient in

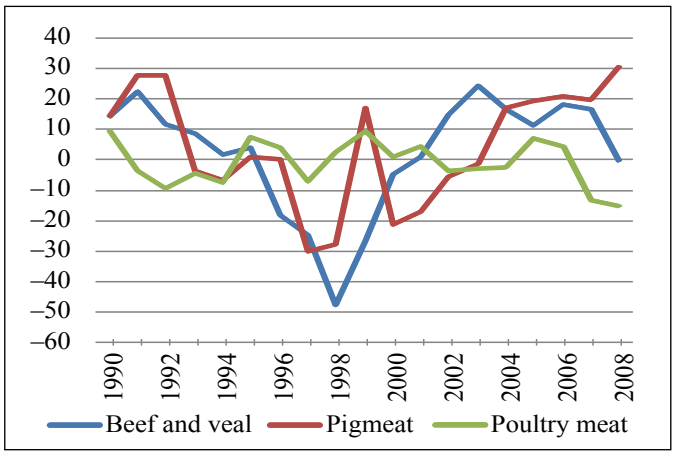

Figure 5. %PSE for Meats

this commodity. Relatively high ad valorem tariffs (60% until 2004 and 30–50% thereafter) seem to have made international trade less active for beef and pigmeat.

Farm gate prices of beef and pigmeat have been on a general upward trend in terms of the local currency, but import prices converted to local currency have fluctuated. The result was large minus %PSE in 1996–98, which recovered to a positive value in the 2000s. The pigmeat %PSEs fluctuates more than beef, most likely due to cyclical production response by producers.

e) Milk

The estimated %PSE for milk shows a different pattern from the other commodities – that is, there was no clear reverse spike in the latter half of the 1990s and there was a clear declining trend in the 2000s (Figure 6). This means that the domestic milk sector was not affected very much by the buoyant exchange rates in the 1990s, and that Thailand continues to import milk products in spite of high import prices. The first point may be explained by the rise in domestic milk prices, which happened to be parallel with the exchange rates. The second point may be derived from the methodology we have used for the PSE measurement. We have assumed that local milk would compete with reconstituted milk produced from imported butter and skimmed milk powder. But in reality, imported milk products are mostly consumed as butter, ghee, or powdered milk because there are specific demands for them. On the other hand, a considerable portion of Thai milk may be consumed locally as liquid milk. There might only be a weak substitutability between them. This must be further examined including a look at the adequacy of quality and weight adjustment factors.

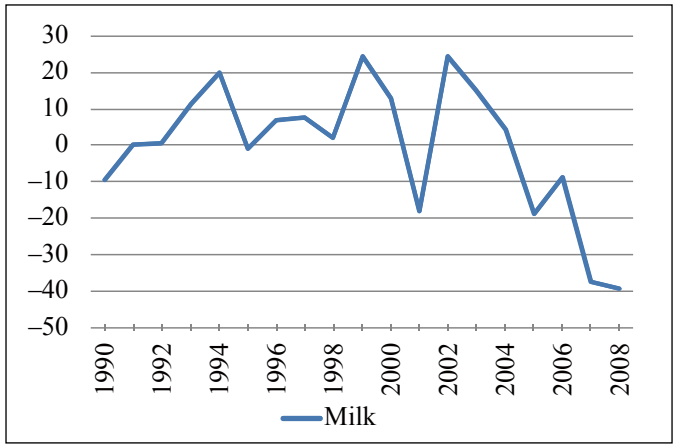

Figure 6. %PSE of Milk

General Services to the Agricultural Sector

Table 9 summarizes the estimated general service support estimates (billion baht and % to total) for Thailand since 1990. As government budgetary tables are structured by ministries or by projects, and the titles of projects can change from time to time, it was extremely difficult for us to identify relevant items and reclassify them under the seven categories. From the project title alone we can hardly tell whether it means the cost of government services, subsidies, or direct investment. There are several cases in which the listed amounts refer only to total loans rather than actual government subsidies. In some cases, budgetary books referred to only the planned amounts, which became much less in the actual implementation. Expenditures from semi-governmental agencies or local governments are excluded. Therefore, the below figures should be taken as very rough estimates.

This table indicates that GSSE has been gradually increasing. Infrastructure is the largest component, whose share rose from 63.5% in 1990–94 to 81% in 2005–08. Research and development accounted for 18% in 1990–94 but for only 3% in 2005–08. Expenditures for agricultural school (training and education) reached 16.6% of the GSSE in 1995–2004 but dropped below 5% in 2005–08. The costs for inspection have been steadily rising in response to the increasing demand for food safety and animal health.

Table 9. Estimated GSSE, 1990–2008 (THB million)

	1990–94	1995–99	2000–04	2005–08	Total
Research and development	39	27	34	9	109
Agricultural school	16	51	64	15	145
Inspection	2	8	18	19	47
Infrastructure	138	209	266	257	869
Marketing/Promotion	22	5	1	13	40
Public stock holdings	1	2	2	0	5
Miscellaneous	0	3	1	5	9
Total	217	307	384	317	1,224
	Percentage				
Research and development	17.9	8.9	8.8	2.8	8.9
Agricultural school	7.2	16.6	16.6	4.6	11.8
Inspection	0.9	2.7	4.7	5.9	3.8
Infrastructure	63.5	68.2	69.1	81.1	71.0
Marketing/Promotion	10.0	1.7	0.1	4.0	3.3
Public stock holdings	0.5	0.8	0.4	0.0	0.4
Miscellaneous	0.0	1.1	0.2	1.7	0.8
Total	100	100	100	100	100

Note: Because of rounding, the total figures do not necessarily match the tally of relevant columns.

Total Support to Agriculture and Policy Implications

The TSE is an indicator used to represent the total annual monetary value of all gross transfers from taxpayers (government) and consumers, arising from policies measures that support agriculture, net of the associated budgetary receipts. In short, the TSE measures the overall cost of agriculture support financed by consumers (transfer from consumers) and taxpayers/government (transfer from taxpayers) net of import receipts. The summary of Total Support Estimate (TSE) table for each NESDP period is shown in Table 10.

The value of annual average TSE increased from THB43 billion from 1990–92, to THB70 billion in 1998–2002, and declined to THB59 billion in 2008. One notable feature is that annual average transfers from consumers have been always negative, in all periods except for 1990–92. The negative transfer from consumers were less than THB10 billion until the 9th NESDP period but shot up in 2008 to THB42 billion, reflecting the widened reverse price gap between local and international markets. In compensation, transfer from tax payers rose sharply to THB94 billion, of which, expenditures for infrastructure made up nearly 70%.

Table 10. TSE Indicators for each NESDP Period

		6th NESDP 1990–92	7th NESDP 1993–97	8th NESDP 1998–02	9th NESDP 2002–07	10th NESDP 2008
I.	Value of production (farm gate)	346.1	438.0	525.4	774.5	1,421.6
II.	Value of consumption (farm gate)	268.3	307.5	362.8	477.7	745.1
III.1	PSE	1.7	–14.2	–0.8	–4.7	–40.6
	Market price support	–0.4	–19.3	–15.8	–9.0	–70.8
	Various payments	2.1	5.1	15.0	4.2	30.2
III.2	Percentage PSE (%)	0.5	–3.1	0.0	–0.4	–2.8
III.3	Producer NAC (ratio)	1.00	0.97	1.00	1.00	0.97
IV.	GSSE	41.3	56.0	70.6	73.5	99.6
	of which Infrastructure	24.3	40.1	46.2	57.9	75.0
V.1	CSE	–3.4	7.1	4.4	3.5	42.1
	Transfers to producers (–)	–3.1	7.1	6.1	–0.3	34.9
	Others (=Import tax) (–)	–0.3	0.0	–1.7	3.9	7.2
V.2	Percentage CSE (%)	–1.3	2.1	1.1	0.4	5.7
V.3	Consumer NAC (ratio)	1.01	0.98	0.99	1.00	0.95
VI.	TSE	43.0	41.8	69.8	68.8	59.0
	Transfers from consumers	3.4	–7.1	–4.4	–3.5	–42.1
	Transfers from taxpayers	39.9	48.9	75.9	68.5	93.9
	Budget revenues (=import tax) (–)	–0.3	0.0	–1.7	3.9	7.2

Although the total transfers from tax payers are increasing, their relative size is not rising. The TSE per GDP declined from 1.7% in 1990–92 to 0.7% in 2008 (Table 11). Transfers from taxpayers (=government) to the agricultural sector also dropped from 1.6% to 1.0% for the same period. The TSE per agricultural GDP went up in 1998–2002 to 15%, due to low prices of agricultural products but fell sharply to 5.6% in 2008 reflecting the booming international markets.

Table 11. TSEs and Transfers from Taxpayers per GDP

	Unit	6th NESDP 1990–92	7th NESDP 1993–97	8th NESDP 1998–02	9th NESDP 2002–07	10th NESDP 2008
GDP	THB billion	2,507	4,065	4,954	7,176	9,075
GDP, Agriculture	THB billion	313	377	472	754	1,057
TSE	THB billion	43	42	70	69	59
from taxpayers (TFT)	THB billion	40	49	76	68	94
TSE/GDP	%	1.7	1.0	1.4	1.0	0.7
TSE/GDPA	%	13.6	11.3	14.9	9.5	5.6
TFT/GDP	%	1.6	1.2	1.5	1.0	1.0
TFT/GDPA	%	12.6	13.2	16.1	9.3	8.9

Trends in Agricultural Support

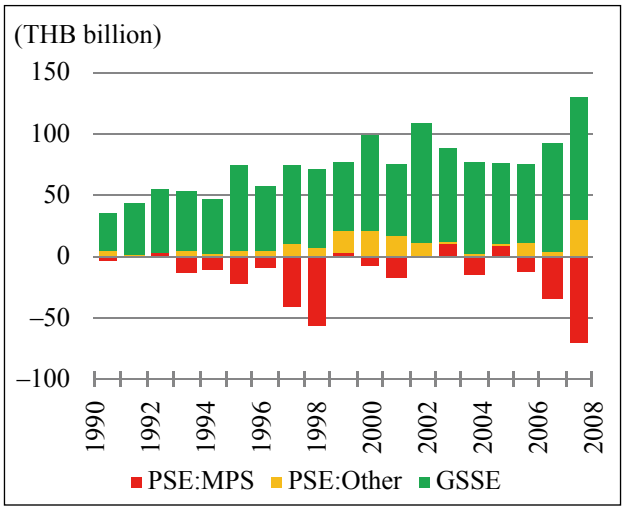

Figure 7. TSE Composition Thailand

The TSE table provides us with another important policy overview through the breakdown by type of support. Figure 7 illustrates the TSE composition by major source of support in Thailand. If we look at PSEs and CSEs only, we may have an impression that Thai agriculture is negatively supported, mainly by trade distortive measures. Indeed, the market price support (MPS) plays a main role in causing transfers to producers (negative), as shown in the red color portion of the bar chart. Transfers from taxpayers to producers (shown in orange) are relatively small. However, this figure makes it clear that the PSE is only a part of the total assistance to the agricultural sector in Thailand. In all years of 1990–2008, the value of GSSE (shown in green) has surpassed the size of the PSE and thus, makes the total TSE always positive.

We may draw several policy implications from our study. First, Thailand applies, as in other countries, various sophisticated policy measures to the agricultural sector. A wide spectrum of production promotion projects have been implemented as exemplified by the pledging program, concessional loans, and input subsidies. Agricultural trade is also subject to many trade restricting measures such as tariff quotas, non ad valorem duties, and licensing. Second, government expenditures to support agriculture have been rising over the years, reaching THB94 billion in 2008. Third, despite this rise, the overall level of agricultural support is very low. The TSE as a percentage of GDP has been around one percent and declining. Forth, agricultural support in Thailand mainly takes a form of expenditures on government services including the construction and maintenance of irrigation facilities, agricultural extensions, inspections, and animal health. Fifth, although Thailand applies various market price support policies associated with trade restricting measures, they are taxing producers rather than protecting them. The estimated PSEs for major commodities often became negative in particular when the baht was depreciated or international commodity prices soared.

Agricultural support policies in Thailand seem to have little market distorting effects. Policies under the GSSE category have no direct impact on agricultural market by nature and price support policies in Thailand are functioning to stabilize market prices close to international prices. Although large negative MPSs were sometimes recorded, they were mostly short-lived, as witnessed in the Asian Financial crisis of 1997 or in the recent international commodity boom.

There is a possibility that agricultural policies are moving in the directions that OECD countries have been taking, which are shifting to income support, environment oriented, and costly. If we disregard the impact of recent high prices in the international markets, overall support to agriculture in Thailand shows a clear upward trend and is becoming more costly. There are good reasons for this: high economic growth is widening income gaps between agriculture and non agriculture sectors; urbanization is making people more concerned about environmental degradations and food safety; and Thai agricultural exports are being challenged by new competitors such as PR China, Vietnam, Myanmar, and India whose labour costs are lower than in Thailand.

SUMMARY AND CONCLUSION

Agriculture has long been and still is a key sector of Thailand's economy. The share of agriculture has declined to about 10% in recent years but still makes up nearly 40% of the total employment of the country. Thailand is a world leading exporter of many agricultural products including rice, cassava, and rubber, although its share in total merchandise exports has declined as exports of industrial products has expanded much faster.

Despite being a major exporter of agricultural products, Thailand has maintained a wide range of trade restricting measures such as ad valorem duties, specific duties, tariff quotas, import surcharges, and export licensing. They have worked as market support measures under which domestic prices have been relatively stable. In recent years, however, tariffs of some products were reduced and quota volumes with low tariffs were raised.

The government of Thailand has provided extensive support to the agricultural sector to encourage domestic production but their support has centered on irrigation and other government services (i.e., GSSE components).

The estimated national average PSEs were relatively low and sometimes negative, being partly affected by volatile exchange rates and international commodity markets. Market price support (often negative) and payment on input use (positive) were major components of PSEs.

The pattern of yearly changes in %PSE varies by commodity. It was relatively stable over the whole period for major export products such as rice, cassava, and rubber although some downward moves were recorded in the middle of the 1990s. The %PSE of soybeans, beef, pigmeat, and milk fluctuated irregularly, reflecting turbulent international prices and exchange rates.

The average TSE measured for 1990–2008 shows that the agricultural sector was positively supported but at an extremely low level of one percent to GDP. The GSSE was the largest contributor to the TSE, whereas the PSE often contributed negatively to the support. This means that agricultural support in Thailand is less trade-distorting.

The transfers from the consumers were often negative in the examined period, meaning that consumers were benefitted by agricultural policies, whereas positive transfers from the taxpayers (government) were observed in many years of the 2000s.

The quality of analysis would be highly dependent on the availability of budgetary data. The transparency and access to this information is crucial for an accurate analysis. Strengthening the human and institutional capacity of agencies involved in policy advocacy is crucial in using this tool. Nevertheless, statistical data information used in the analysis should be systematic.

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A. Agricultural producitivy indicators for APO member countries (1980～)

Annex Table A-1. Agriculture, Gross Value-added (2000 constant USD, million)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Bangladesh	6,615	6,833	6,903	7,174	7,524	7,544	7,794	7,804	7,760	7,740	8,465	8,654	8,867	9,091	9,168
Cambodia	..	..	..	..	..	..	..	..	..	..	..	..	..	1,012	1,110
Fiji	188	213	216	177	223	192	229	214	209	247	236	232	240	242	269
India	53,781	56,256	56,098	61,776	62,755	62,952	62,694	61,699	71,348	72,197	75,095	73,629	78,526	81,135	84,962
Indonesia	14,752	15,461	15,626	15,918	16,653	17,361	17,810	18,192	19,083	20,570	21,153	21,194	22,452	22,929	23,056
IR Iran	6,139	6,252	6,698	7,002	7,516	8,110	8,496	8,707	8,651	9,026	10,021	10,585	11,673	11,786	12,035
Japan	87,587	87,362	92,603	93,777	96,413	95,392	95,134	98,060	95,018	97,553	97,300	86,374	88,737	80,625	82,589
ROK	13,648	16,154	17,006	18,030	17,654	18,451	19,343	18,496	20,006	19,809	18,523	18,900	20,665	19,431	19,508
Lao PDR	..	..	..	..	437	485	510	500	479	530	576	566	613	630	682
Malaysia	4,834	4,286	4,279	4,407	4,801	4,295	3,751	4,231	4,566	4,426	4,136	4,224	5,072	5,334	5,796
Mongolia	..	255	287	293	286	311	325	283	290	312	308	261	285	277	284
Nepal	1,053	1,163	1,216	1,203	1,320	1,350	1,386	1,376	1,467	1,557	1,647	1,682	1,664	1,654	1,780
Pakistan	7,810	8,096	8,479	8,852	8,425	9,345	9,901	10,223	10,503	11,224	11,564	12,138	13,291	12,589	13,247
Philippines	8,910	9,233	9,305	8,991	8,907	8,740	9,062	9,353	9,656	9,947	9,995	10,132	10,171	10,388	10,658
ROC	6,111	5,936	5,983	5,978	5,653	5,209	6,318	8,304	8,388	9,406	8,114	8,391	8,790	9,102	9,533
Singapore	209	216	219	232	239	216	189	174	147	141	130	120	112	107	110
Sri Lanka	1,834	1,961	2,012	2,113	2,105	2,287	2,346	2,210	2,256	2,230	2,420	2,466	2,426	2,544	2,628
Thailand	6,487	6,932	7,104	7,442	7,771	8,122	8,153	8,158	9,016	9,881	9,418	10,102	10,585	9,114	9,500
Vietnam	..	..	..	..	..	4,421	4,553	4,501	4,665	4,992	5,042	5,151	5,506	5,686	5,878

Source: World Bank, World database, accessed July 2010 and the Council of Agriculture, ROC, Statistical Yearbook 2009, 2000.

Note: Data for Malaysia has been recalculated from other sources.

Annex Table A-2. Economically Active Population in Agriculture (thousand)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Bangladesh	27,589	28,276	28,947	29,601	30,241	30,870	31,491	32,102	32,694	33,257	33,784	34,156	34,107	34,022	33,920
Cambodia	2,424	2,455	2,514	2,591	2,677	2,767	2,854	2,941	3,028	3,109	3,190	3,258	3,324	3,390	3,460
Fiji	96	99	102	106	108	110	111	112	113	113	115	114	116	117	119
India	176,653	179,555	182,539	185,545	188,578	191,640	194,732	197,853	201,000	204,173	207,371	210,764	214,177	217,616	221,088
Indonesia	31,913	32,553	33,283	33,839	34,397	34,955	38,140	39,186	40,244	40,656	41,320	41,639	41,927	42,354	42,720
IR Iran	4,315	4,446	4,525	4,613	4,744	4,856	5,001	5,089	5,163	5,219	5,257	5,270	5,282	5,294	5,323
Japan	6,199	6,061	5,939	5,841	5,659	5,462	5,298	5,124	4,951	4,790	4,648	4,465	4,272	4,054	3,844
ROK	5,378	5,183	5,096	4,865	4,565	4,455	4,308	4,166	3,932	3,736	3,470	3,349	3,214	3,069	2,967
Lao PDR	1,167	1,182	1,205	1,235	1,268	1,302	1,337	1,378	1,421	1,454	1,491	1,531	1,568	1,607	1,644
Malaysia	2,038	2,026	2,009	1,989	1,969	1,959	1,949	1,938	1,922	1,927	1,921	1,914	1,903	1,889	1,877
Mongolia	228	230	232	235	238	242	244	247	250	249	248	247	247	245	244
Nepal	5,453	5,576	5,688	5,800	5,915	6,033	6,154	6,278	6,404	6,534	6,665	6,797	6,965	7,141	7,327
Pakistan	13,791	14,802	15,030	14,931	15,138	15,048	15,044	15,313	15,565	15,633	15,659	16,276	16,411	16,442	16,754
Philippines	9,197	9,368	9,534	9,721	9,878	10,028	10,368	10,673	10,786	10,815	10,973	11,146	11,367	11,466	11,621
ROC	1,270	1,251	1,275	1,306	1,280	1,296	1,317	1,226	1,113	1,066	1,064	1,093	1,065	1,005	976
Singapore	17	17	16	15	14	12	11	10	9	7	6	5	5	5	4
Sri Lanka	3,105	3,122	3,131	3,137	3,150	3,173	3,162	3,263	3,366	3,469	3,567	3,500	3,422	3,449	3,508
Thailand	16,804	17,392	18,008	18,489	18,943	19,423	19,854	20,237	20,616	21,054	21,126	20,948	20,702	20,391	20,019
Vietnam	17,651	18,099	18,593	19,092	19,601	20,144	20,628	21,081	21,514	21,921	22,388	22,809	23,235	23,666	24,103

Source: FAOSTAT, accessed July 2010.

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
9,141	9,424	9,989	10,308	10,797	11,594	11,958	11,959	12,327	12,831	13,114	13,762	14,389	14,850	Bangladesh
1,147	1,162	1,225	1,289	1,317	1,312	1,359	1,325	1,465	1,452	1,680	1,772	1,861	1,968	Cambodia
260	272	244	224	255	252	237	248	238	250	252	251	236	257	Fiji
84,371	92,741	90,372	96,084	98,652	98,407	104,559	96,984	106,642	106,591	112,925	117,388	123,090	143,712	India
24,065	24,821	25,070	24,736	25,271	25,747	26,585	27,502	28,544	29,348	30,146	31,158	32,226	33,762	Indonesia
12,481	12,891	13,018	14,393	13,342	13,806	13,493	15,025	16,094	16,444	17,976	18,816	19,977	..	IR Iran
77,649	79,495	78,533	80,097	80,873	82,548	80,548	85,377	80,366	74,621	77,274	75,691	79,432	..	Japan
20,535	21,008	21,978	20,576	21,787	22,051	22,399	21,903	20,725	22,608	22,911	23,254	24,188	25,511	ROK
703	722	773	801	862	905	939	976	994	1,023	1,040	1,066	1,155	1,198	Lao PDR
6,468	6,551	6,129	5,282	4,700	4,376	3,986	4,844	5,449	6,067	5,986	6,947	9,392	11,027	Malaysia
311	322	335	358	374	314	255	223	234	277	308	331	383	403	Mongolia
1,774	1,852	1,929	1,949	2,002	2,101	2,192	2,259	2,334	2,447	2,532	2,577	2,602	2,725	Nepal
14,117	15,772	15,791	16,505	16,826	17,852	17,463	17,481	18,206	18,649	19,858	21,108	21,977	22,213	Pakistan
10,748	11,159	11,504	10,770	11,470	11,968	12,411	12,902	13,386	14,079	14,361	14,910	15,627	16,131	Philippines
9,695	9,390	6,766	7,050	7,703	6,227	5,262	5,204	5,077	5,458	5,273	5,195	4,929	5,021	ROC
106	110	109	100	100	94	89	82	84	94	93	108	104	100	Singapore
2,714	2,589	2,666	2,733	2,857	2,908	2,809	2,880	2,928	2,928	2,981	3,170	3,277	3,524	Sri Lanka
9,882	10,320	10,248	10,097	10,332	11,074	11,433	11,511	12,970	12,663	12,429	13,106	13,220	13,686	Thailand
6,160	6,431	6,705	6,946	7,309	7,648	7,876	8,204	8,501	8,872	9,229	9,569	9,929	10,333	Vietnam

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
33,815	33,709	33,935	34,148	34,330	34,464	34,791	35,059	35,272	35,439	35,566	35,652	35,536	35,562	Bangladesh
3,543	3,638	3,751	3,874	4,002	4,130	4,339	4,440	4,535	4,629	4,727	4,814	4,959	5,074	Cambodia
120	122	122	123	123	124	124	124	124	124	124	124	124	125	Fiji
223,810	226,537	229,263	231,982	234,685	237,360	240,432	243,470	246,461	249,389	252,901	256,519	258,642	261,632	India
43,594	44,411	44,701	44,477	46,445	46,602	46,687	46,716	47,026	47,304	47,555	47,023	47,783	47,894	Indonesia
5,378	5,463	5,563	5,678	5,797	5,910	6,017	6,118	6,213	6,301	6,382	6,454	6,526	6,581	IR Iran
3,641	3,458	3,288	3,098	2,909	2,734	2,571	2,404	2,259	2,118	1,997	1,880	1,745	1,631	Japan
2,853	2,740	2,639	2,439	2,322	2,225	2,116	2,022	1,896	1,814	1,717	1,624	1,527	1,441	ROK
1,683	1,724	1,763	1,809	1,853	1,896	1,942	1,988	2,034	2,086	2,134	2,189	2,256	2,323	Lao PDR
1,866	1,857	1,850	1,842	1,828	1,838	1,821	1,797	1,771	1,742	1,715	1,687	1,663	1,638	Malaysia
241	240	238	237	236	235	234	233	232	231	228	226	223	221	Mongolia
7,526	7,737	7,960	8,194	8,438	8,690	8,951	9,266	9,601	9,956	10,330	10,722	11,000	11,340	Nepal
16,450	17,011	17,664	18,072	18,635	19,255	19,656	20,145	20,902	21,680	22,726	23,796	24,210	24,902	Pakistan
11,949	12,102	12,233	12,488	12,555	12,468	12,825	12,914	13,037	13,079	12,918	12,940	13,228	13,317	Philippines
954	918	878	822	774	738	706	709	696	642	590	554	543	535	ROC
4	4	4	4	3	3	3	3	3	2	2	2	2	2	Singapore
3,410	3,464	3,491	3,728	3,642	3,619	3,654	3,696	3,739	3,772	3,755	3,812	3,879	3,904	Sri Lanka
20,199	20,324	20,311	20,066	19,737	19,830	19,909	19,915	19,923	19,965	19,964	19,759	19,594	19,420	Thailand
24,544	24,990	25,048	25,402	25,884	25,919	26,720	27,049	27,479	27,763	28,183	28,601	28,954	29,334	Vietnam

Annex Table A-3. Labor productivity in agriculture (2000 constant USD)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Bangladesh	240	242	238	242	249	244	247	243	237	233	251	253	260	267	270
Cambodia	..	..	..	..	..	..	..	..	..	..	..	..	..	298	321
Fiji	1,960	2,147	2,120	1,670	2,062	1,747	2,063	1,911	1,852	2,186	2,050	2,034	2,071	2,070	2,258
India	304	313	307	333	333	328	322	312	355	354	362	349	367	373	384
Indonesia	462	475	469	470	484	497	467	464	474	506	512	509	535	541	540
IR Iran	1,423	1,406	1,480	1,518	1,584	1,670	1,699	1,711	1,676	1,729	1,906	2,008	2,210	2,226	2,261
Japan	14,129	14,414	15,592	16,055	17,037	17,465	17,957	19,137	19,192	20,366	20,934	19,345	20,772	19,888	21,485
ROK	2,538	3,117	3,337	3,706	3,867	4,142	4,490	4,440	5,088	5,302	5,338	5,643	6,430	6,331	6,575
Lao PDR	..	..	..	..	344	372	381	363	337	365	387	370	391	392	415
Malaysia	4,834	4,286	4,279	4,407	4,801	4,295	3,751	4,231	4,566	4,426	4,136	4,224	5,072	5,334	5,796
Mongolia	..	1,107	1,237	1,248	1,200	1,284	1,331	1,146	1,158	1,253	1,241	1,055	1,155	1,130	1,165
Nepal	193	209	214	207	223	224	225	219	229	238	247	247	239	232	243
Pakistan	566	547	564	593	557	621	658	668	675	718	739	746	810	766	791
Philippines	969	986	976	925	902	872	874	876	895	920	911	909	895	906	917
ROC	4,812	4,745	4,693	4,578	4,417	4,019	4,797	6,773	7,536	8,824	7,626	7,677	8,253	9,057	9,768
Singapore	12,310	12,717	13,692	15,450	17,048	18,016	17,138	17,353	16,334	20,095	21,619	23,982	22,484	21,446	27,528
Sri Lanka	591	628	643	674	668	721	742	677	670	643	678	705	709	738	749
Thailand	386	399	394	403	410	418	411	403	437	469	446	482	511	447	475
Vietnam	..	..	..	..	..	219	221	214	217	228	225	226	237	240	244

Note: Agriculture value-added per economically active population in agriculture.

Annex Table A-4. Arable land and permanent crop areas (thousand hectare)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Bangladesh	9,158	9,168	9,130	9,131	9,132	9,135	9,164	9,248	9,463	9,482	9,437	9,137	8,328	8,234	8,124
Cambodia	2,070	2,070	2,100	2,110	2,110	2,390	2,690	3,100	3,550	3,785	3,805	3,810	3,815	3,831	3,820
Fiji	170	175	180	185	190	200	200	210	220	230	240	251	260	260	260
India	168,255	168,391	168,675	168,520	169,078	169,015	169,250	169,770	169,310	169,485	169,438	169,340	169,270	169,737	169,790
Indonesia	26,000	26,000	26,000	26,000	25,934	27,829	29,070	30,644	31,418	31,142	31,973	29,797	29,551	30,216	30,171
IR Iran	13,713	14,280	14,867	15,210	15,540	15,870	16,200	16,530	16,871	16,700	16,500	17,997	18,287	18,652	18,657
Japan	5,461	5,442	5,426	5,411	5,396	5,379	5,358	5,340	5,317	5,279	5,243	5,204	5,165	5,124	5,083
ROK	2,196	2,188	2,180	2,167	2,153	2,144	2,141	2,143	2,138	2,127	2,109	2,091	2,070	2,055	2,033
Lao PDR	806	809	817	820	830	835	838	840	850	852	860	862	864	865	890
Malaysia	4,800	4,860	5,065	5,270	5,470	5,695	5,915	6,120	6,450	6,700	6,948	7,197	7,395	7,604	7,604
Mongolia	1,182	1,212	1,251	1,314	1,336	1,355	1,308	1,336	1,366	1,375	1,371	1,369	1,363	1,353	1,322
Nepal	2,299	2,316	2,322	2,327	2,337	2,342	2,344	2,346	2,348	2,350	2,353	2,393	2,399	2,399	2,399
Pakistan	20,300	20,340	20,430	20,340	20,330	20,610	20,680	20,920	21,820	21,020	20,940	20,960	21,060	21,400	21,510
Philippines	9,628	9,620	9,640	9,660	9,680	9,750	9,800	9,820	9,840	9,860	9,880	9,887	9,835	9,785	9,735
ROC	907	900	891	894	892	888	887	886	895	895	890	884	876	875	872
Singapore	8	7	6	6	6	5	4	3	3	2	2	1.2	1.2	1.2	1.2
Sri Lanka	1,910	1,910	1,857	1,869	1,872	1,876	1,887	1,895	1,898	1,901	1,900	1,903	1,905	1,880	1,883
Thailand	18,298	18,681	19,099	19,198	19,331	19,847	20,036	20,490	20,568	20,567	20,603	20,726	20,574	20,445	20,320
Vietnam	6,570	6,580	6,580	6,590	6,590	6,421	6,400	6,387	6,380	6,380	6,384	6,425	6,697	6,759	6,812

Source: FAOSTAT accessed August 2010 and Council of Agriculture, ROC, Yearly Statistics on line accessed October 2010.

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
270	280	294	302	315	336	344	341	349	362	369	386	405	418	Bangladesh
324	319	327	333	329	318	313	299	323	314	355	368	375	388	Cambodia
2,167	2,227	1,997	1,823	2,071	2,028	1,913	2,003	1,917	2,016	2,033	2,022	1,907	..	Fiji
377	409	394	414	420	415	435	398	433	427	447	458	476	478	India
552	559	561	556	544	552	569	589	607	620	634	663	674	705	Indonesia
2,321	2,360	2,340	2,535	2,302	2,336	2,243	2,456	2,590	2,610	2,817	2,915	3,061	..	IR Iran
21,326	22,989	23,885	25,854	27,801	30,193	31,329	35,515	35,576	35,232	38,695	40,261	45,520	..	Japan
7,198	7,667	8,328	8,436	9,383	9,911	10,586	10,832	10,931	12,463	13,343	14,319	15,840	17,704	ROK
418	419	439	443	465	477	483	491	489	491	487	487	512	516	Lao PDR
6,468	6,551	6,129	5,282	4,700	4,376	3,986	4,844	5,449	6,067	5,986	5,890	6,110	..	Malaysia
1,291	1,340	1,409	1,511	1,584	1,338	1,092	959	1,008	1,200	1,350	1,465	1,719	1,821	Mongolia
236	239	242	238	237	242	245	244	243	246	245	240	237	240	Nepal
858	927	894	913	903	927	888	868	871	860	874	887	908	892	Pakistan
900	922	940	862	914	960	968	999	1,027	1,076	1,112	1,152	1,181	1,211	Philippines
10,162	10,229	7,706	8,576	9,952	8,438	7,453	7,339	7,295	8,502	8,938	9,377	9,077	9,385	ROC
26,519	27,384	27,240	24,934	33,245	31,323	29,786	27,288	27,864	46,985	46,408	53,903	52,173	49,867	Singapore
796	747	764	733	784	803	769	779	783	776	794	832	845	903	Sri Lanka
489	508	505	503	523	558	574	578	651	634	623	663	675	705	Thailand
251	257	268	273	282	295	295	303	309	320	327	335	343	352	Vietnam

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
8,148	8,195	8,241	8,332	8,440	8,484	8,485	8,429	8,419	8,425	8,443	8,421	8,408	8,700	Bangladesh
3,820	3,830	3,830	3,830	3,840	3,840	3,840	3,850	3,850	3,850	3,856	3,955	3,955	4,055	Cambodia
265	265	265	255	253	253	253	253	253	253	253	253	253	253	Fiji
169,750	170,001	170,018	170,154	170,152	171,917	169,788	169,534	169,865	169,660	169,443	169,520	169,284	169,320	India
30,387	30,986	31,245	31,745	32,746	33,600	33,300	33,281	36,106	38,866	37,446	36,500	37,000	37,100	Indonesia
18,708	18,427	17,832	18,187	17,687	16,284	17,223	17,444	17,665	17,886	18,107	18,328	18,549	18,770	IR Iran
5,038	4,994	4,949	4,905	4,866	4,830	4,793	4,763	4,736	4,714	4,692	4,671	4,650	4,628	Japan
1,985	1,945	1,924	1,910	1,899	1,918	1,889	1,863	1,846	1,836	1,824	1,800	1,782	1,747	ROK
900	900	930	940	955	958	961	1,031	1,061	1,081	1,081	1,182	1,215	1,345	Lao PDR
7,604	7,604	7,605	7,605	7,605	7,605	7,585	7,585	7,585	7,585	7,585	7,585	7,585	7,585	Malaysia
1,322	1,322	1,200	1,150	1,191	1,176	1,000	903	860	850	848	820	853	852	Mongolia
2,399	2,399	2,404	2,409	2,416	2,459	2,475	2,475	2,475	2,475	2,475	2,475	2,475	2,475	Nepal
21,550	21,680	21,980	21,970	21,880	21,950	22,160	22,270	22,230	22,030	22,060	22,290	21,880	21,200	Pakistan
9,685	9,735	9,885	10,135	10,085	9,684	9,634	9,635	9,670	9,850	9,850	10,000	10,000	10,300	Philippines
873	872	865	859	855	851	849	847	844	836	833	830	826	822	ROC
1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	0.8	0.8	0.8	0.8	0.8	0.7	Singapore
1,886	1,887	1,888	1,889	1,905	1,910	1,911	1,916	1,930	1,870	2,070	2,000	1,950	2,200	Sri Lanka
20,410	20,063	19,642	19,252	19,217	19,034	19,028	18,889	18,754	18,755	18,800	18,800	18,850	18,850	Thailand
6,751	7,004	7,202	7,413	7,771	8,138	8,841	8,813	8,895	9,153.6	9,412.1	9,436	9,421	9,415	Vietnam

Annex Table A-5. Land productivity of agriculture (2000 constant USD per ha)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Bangladesh	722	745	756	786	824	826	850	844	820	816	897	947	1,065	1,104	1,129
Cambodia	..	..	..	..	..	..	..	..	..	..	..	..	..	264	291
Fiji	1,107	1,214	1,201	957	1,172	961	1,145	1,019	951	1074	982	924	924	931	1,033
India	320	334	333	367	371	372	370	363	421	426	443	435	464	478	500
Indonesia	567	595	601	612	642	624	613	594	607	661	662	711	760	759	764
IR Iran	448	438	450	460	484	511	524	527	513	540	607	588	638	632	645
Japan	16,039	16,053	17,066	17,331	17,868	17,734	17,755	18,363	17,871	18,479	18,558	16,598	17,180	15,735	16,248
ROK	6,215	7,383	7,801	8,320	8,200	8,606	9,035	8,631	9,357	9,313	8,783	9,039	9,983	9,455	9,596
Lao PDR	..	..	..	..	526	581	608	595	563	623	670	657	710	728	766
Malaysia	1,007	882	845	836	878	754	634	691	708	661	595	587	686	701	762
Mongolia	..	210	229	223	214	229	248	212	212	227	225	190	209	205	215
Nepal	458	502	524	517	565	576	591	587	625	663	700	703	694	689	742
Pakistan	385	398	415	435	414	453	479	489	481	534	552	579	631	588	616
Philippines	925	960	965	931	920	896	925	952	981	1,009	1,012	1,025	1,034	1,062	1,095
ROC	6,735	6,595	6,717	6,685	6,340	5,868	7,119	9,369	9,372	10,515	9,116	9,487	10,034	10,408	10,929
Singapore	26,159	30,884	36,512	38,626	39,779	43,238	47,129	57,842	49,003	70,333	64,856	99,927	93,682	89,358	91,760
Sri Lanka	960	1,027	1,084	1,131	1,125	1,219	1,243	1,166	1,189	1,173	1,274	1,296	1,274	1,353	1,396
Thailand	355	371	372	388	402	409	407	398	438	480	457	487	514	446	468
Vietnam	..	..	..	..	..	689	711	705	731	782	790	802	822	841	863

Note: Agriculture value is added per arable land and permanent crop.

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
1,122	1,150	1,212	1,237	1,279	1,367	1,409	1,419	1,464	1,523	1,553	1,634	1,711	1,707	Bangladesh
300	303	320	336	343	342	354	344	380	377	436	448	471	485	Cambodia
981	1,025	919	879	1,007	994	938	982	939	988	996	991	935	1,016	Fiji
497	546	532	565	580	572	616	572	628	628	666	692	727	849	India
792	801	802	779	772	766	798	826	791	755	805	854	871	910	Indonesia
667	700	730	791	754	848	783	861	911	919	993	1,027	1,077	..	IR Iran
15,413	15,918	15,868	16,330	16,620	17,091	16,805	17,925	16,969	15,830	16,469	16,204	17,082	..	Japan
10,345	10,801	11,423	10,773	11,473	11,497	11,858	11,757	11,227	12,314	12,561	12,919	13,573	14,603	ROK
782	802	831	853	903	944	977	947	937	947	962	902	951	891	Lao PDR
851	862	806	695	618	575	526	639	718	800	789	916	1,238	1,454	Malaysia
235	243	279	311	314	267	255	247	272	326	363	404	449	472	Mongolia
739	772	802	809	829	855	885	913	943	989	1,023	1,041	1,051	1,101	Nepal
655	727	718	751	769	813	788	785	819	847	900	947	1,004	1,048	Pakistan
1,110	1,146	1,164	1,063	1,137	1,236	1,288	1,339	1,384	1,429	1,458	1,491	1,563	1,566	Philippines
11,100	10,767	7,824	8,209	9,009	7,313	6,199	6,141	6,015	6,533	6,329	6,262	5,968	6,106	ROC
88,397	91,279	90,799	83,112	83,112	78,308	74,465	68,219	104,491	117,462	116,021	134,757	130,434	142,478	Singapore
1,439	1,372	1,412	1,447	1,500	1,522	1,470	1,503	1,517	1,566	1,440	1,585	1,681	1,602	Sri Lanka
484	514	522	524	538	582	601	609	692	675	661	697	701	726	Thailand
912	918	931	937	941	940	891	931	956	969	981	1,014	1,054	1,097	Vietnam

Annex Table A-6. Production Index, agriculture, crops, and livestock (1999–2001=100)

Agriculture	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Bangladesh	59	59	61	63	63	66	67	66	66	72	73	75	76	76	73
Cambodia	38	36	46	49	38	49	55	51	64	67	65	64	65	67	65
Fiji	86	93	96	73	104	89	107	88	91	106	110	99	101	100	105
India	51	55	54	61	62	64	64	63	70	75	76	76	80	82	85
Indonesia	51	54	53	58	63	65	68	69	73	77	80	81	89	90	91
IR Iran	39	44	49	49	51	54	60	60	58	57	69	70	79	84	86
Japan	102	104	107	108	110	112	113	112	110	110	110	106	110	101	108
ROK	60	64	67	67	69	71	74	73	77	79	80	76	85	85	85
Lao PDR	41	45	45	44	50	50	51	49	46	57	64	56	64	63	71
Malaysia	46	47	51	49	52	56	59	61	66	72	73	75	77	84	84
Mongolia	89	90	93	98	94	97	103	98	97	103	101	108	95	83	79
Nepal	49	51	48	57	57	59	57	64	69	72	76	77	74	82	80
Pakistan	44	46	48	47	51	54	59	61	62	67	70	76	74	78	80
Philippines	66	68	70	65	65	66	71	69	69	73	80	78	81	84	85
ROC	87	85	87	88	89	92	89	94	95	97	96	101	99	105	105
Singapore	1,031	1,034	939	933	953	767	711	712	558	535	335	421	334	222	188
Sri Lanka	95	91	86	94	91	94	93	83	88	83	90	87	85	92	98
Thailand	64	66	66	69	71	75	70	71	78	82	77	85	88	88	90
Viet Nam	36	38	42	43	46	46	48	49	51	55	56	58	62	66	69
Crops	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Bangladesh	60	60	62	64	64	68	68	67	67	73	74	75	76	75	72
Cambodia	43	40	49	53	38	50	57	51	66	68	66	65	63	64	62
Fiji	93	103	108	74	119	95	117	89	93	113	117	98	103	104	108
India	53	58	56	63	64	66	65	63	72	77	78	79	83	85	87
Indonesia	51	55	54	58	63	65	68	69	73	76	80	80	87	88	88
IR Iran	36	44	49	49	51	55	61	61	59	57	71	73	82	85	87
Japan	117	118	122	120	123	124	125	122	116	116	115	108	113	98	113
ROK	71	78	81	81	81	82	85	83	88	91	88	86	90	89	87
Lao PDR	43	47	46	45	52	52	53	49	46	57	65	56	64	60	71
Malaysia	50	51	55	52	56	59	62	63	68	74	74	73	74	80	79
Mongolia	119	143	235	346	268	379	380	291	327	358	293	250	195	188	134
Nepal	45	47	40	53	53	55	52	61	67	71	75	76	72	82	79
Pakistan	51	54	56	53	60	63	69	70	68	74	77	86	78	81	81
Philippines	72	75	78	70	72	75	81	78	77	80	87	83	86	89	90
ROC	111	108	109	106	106	107	102	106	107	107	102	105	100	107	103
Singapore	1,070	1,099	1,062	894	818	703	547	458	300	197	223	120	127	109	111
Sri Lanka	97	92	86	95	91	94	96	83	89	83	90	86	82	90	96
Thailand	66	67	66	71	73	76	71	71	81	84	76	83	85	84	87
Viet Nam	38	39	43	44	47	47	49	48	52	56	57	59	63	67	70
Livestock	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Bangladesh	50	51	52	54	54	59	61	62	65	66	70	72	75	79	83
Cambodia	17	20	31	34	39	45	47	50	56	61	59	62	73	76	75
Fiji	73	76	73	74	74	79	86	86	87	93	99	101	99	95	101
India	43	47	49	53	56	59	61	62	64	68	70	70	73	76	79
Indonesia	42	44	47	52	57	61	66	68	71	76	81	87	93	101	108
IR Iran	43	44	47	48	50	51	54	55	56	60	64	67	72	76	81
Japan	90	90	93	95	97	101	102	104	105	106	106	106	107	107	105
ROK	32	32	33	37	43	48	52	57	60	59	62	64	76	81	83
Lao PDR	33	35	36	38	41	41	45	50	50	58	57	57	64	72	72
Malaysia	29	30	33	36	38	43	47	53	55	62	71	81	90	99	104
Mongolia	88	90	90	90	90	87	94	93	89	93	94	103	91	81	78
Nepal	59	62	66	69	68	68	70	71	74	75	78	80	80	81	85
Pakistan	38	39	40	41	44	47	51	54	57	61	64	67	71	75	80
Philippines	42	43	42	44	44	37	40	43	47	52	57	63	64	68	71
ROC	49	50	52	60	63	68	70	76	77	81	87	94	97	101	107
Singapore	1,060	1,001	963	974	958	814	741	656	499	495	481	407	335	222	168
Sri Lanka	81	85	81	86	91	92	72	81	79	81	88	92	102	106	114
Thailand	49	52	54	55	56	62	60	63	63	69	74	86	97	98	98
Viet Nam	24	29	32	37	38	40	42	46	46	48	50	49	55	57	61

Source: FAOSTAT accessed Oct. 2010 and Council of Agriculture, ROC, Agriculture Statistics Yearbook 2008, 2000.

Note: Index for the ROC has been estimated based on the original data.

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Agriculture
76	80	82	84	96	102	100	103	106	104	116	119	125	135	131	Bangladesh
83	84	86	87	98	100	101	96	115	109	141	153	161	175	183	Cambodia
108	106	101	85	102	102	94	99	92	98	100	103	94	93	89	Fiji
87	91	92	95	99	98	101	94	104	103	108	114	122	124	121	India
99	100	96	96	97	100	102	108	115	122	126	131	136	141	146	Indonesia
88	92	95	99	101	96	102	112	116	117	125	127	130	114	123	IR Iran
106	104	104	99	100	100	98	99	95	97	98	95	97	97	95	Japan
86	92	95	94	99	100	100	94	93	95	94	95	96	100	100	ROK
65	65	73	75	88	105	105	115	111	117	121	123	134	147	149	Lao PDR
86	89	91	87	96	99	104	106	113	119	126	132	133	142	140	Malaysia
84	93	90	100	108	106	84	78	67	78	72	72	78	89	109	Mongolia
87	88	90	92	95	100	104	106	110	115	118	119	118	126	130	Nepal
88	89	91	94	99	101	99	100	103	111	115	117	122	126	130	Pakistan
87	94	96	88	96	99	103	107	109	116	118	122	126	132	132	Philippines
108	110	107	99	101	101	98	100	98	95	89	94	90	88		ROC
177	132	170	166	166	60	73	95	113	132	100	123	127	114	132	Singapore
101	92	95	96	99	101	98	100	103	99	108	108	107	118	117	Sri Lanka
92	94	96	93	96	100	103	105	111	112	110	115	125	125	126	Thailand
73	77	82	85	94	100	104	112	114	120	124	129	134	138	140	Viet Nam
1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Crops
74	78	79	82	96	103	100	102	105	102	115	118	124	134	130	Bangladesh
85	85	86	87	99	99	101	95	118	110	148	162	174	192	202	Cambodia
111	108	101	77	104	103	91	96	86	94	96	100	85	83	79	Fiji
89	93	94	96	100	98	100	89	103	100	105	111	122	122	116	India
97	97	93	96	97	100	101	107	114	121	126	130	135	140	145	Indonesia
90	95	97	101	103	94	102	115	119	117	126	126	130	105	117	IR Iran
108	105	106	98	100	100	99	98	92	94	96	91	92	93	89	Japan
93	95	95	91	96	101	102	93	88	96	94	92	91	96	96	ROK
62	62	71	73	86	106	106	117	111	117	123	124	138	153	157	Lao PDR
82	85	88	82	95	99	105	105	115	120	126	133	133	144	141	Malaysia
115	95	123	118	105	92	102	87	122	123	95	133	134	182	270	Mongolia
87	88	89	90	94	100	104	107	112	117	120	121	119	129	135	Nepal
92	90	90	95	101	103	95	94	98	111	115	111	117	121	125	Pakistan
91	98	98	87	96	99	103	106	109	117	119	123	127	132	131	Philippines
105	105	107	98	105	100	95	101	98	93	84	92	86	86		ROC
111	109	99	100	100	99	99	99	190	198	209	453	428	426	440	Singapore
98	89	92	96	100	102	97	99	101	96	106	108	106	119	115	Sri Lanka
89	92	94	91	95	101	102	102	110	114	112	116	128	128	129	Thailand
74	78	84	87	95	100	103	111	115	121	124	127	131	136	137	Viet Nam
1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Livestock
87	91	97	95	97	100	102	107	112	116	124	128	133	139	137	Bangladesh
78	81	87	88	92	102	104	101	104	107	113	116	111	109	109	Cambodia
102	104	103	102	99	99	100	104	106	105	108	111	114	115	111	Fiji
83	87	89	93	97	99	103	105	107	112	116	121	125	132	133	India
105	111	109	94	91	100	108	121	126	135	128	142	142	153	157	Indonesia
83	88	90	93	95	100	103	105	110	119	125	132	135	138	142	IR Iran
103	102	102	101	101	100	97	100	100	99	99	100	101	101	101	Japan
85	91	96	99	103	99	97	100	101	93	96	101	104	106	106	ROK
85	79	84	87	101	98	99	104	112	118	118	122	124	136	126	Lao PDR
106	106	107	108	99	98	101	110	113	118	124	131	132	134	133	Malaysia
83	93	89	99	109	107	83	78	64	76	71	69	76	84	101	Mongolia
87	88	93	95	98	99	102	104	107	109	112	115	118	122	120	Nepal
84	88	92	94	97	99	102	105	109	112	115	122	126	131	135	Pakistan
75	83	90	93	95	99	105	110	113	113	114	121	124	130	134	Philippines
112	116	108	100	96	102	102	100	98	98	95	98	95	90		ROC
167	132	177	151	161	66	72	100	108	119	92	95	101	89	105	Singapore
116	114	114	93	91	99	108	109	109	114	116	106	114	118	123	Sri Lanka
98	100	100	99	94	97	107	114	112	96	106	111	113	114	111	Thailand
64	67	73	77	92	100	107	117	111	117	130	141	149	149	157	Viet Nam

Annex Table A-7. Yields of cereals, rice, and milk

Cereals, (rice milled equiv. + total, ton/ha)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Bangladesh	1.36	1.33	1.36	1.51	1.46	1.48	1.47	1.50	1.53	1.70	1.69	1.76	1.79	1.81	1.69
Cambodia	0.81	0.77	0.81	0.84	0.87	0.84	0.93	0.89	0.91	0.96	0.92	0.94	0.89	0.88	1.00
Fiji	1.32	1.44	1.45	1.29	1.49	1.65	1.51	1.31	1.62	1.60	1.51	1.56	1.47	1.54	1.60
India	1.09	1.15	1.11	1.28	1.29	1.29	1.29	1.30	1.43	1.56	1.53	1.55	1.66	1.68	1.71
Indonesia	2.02	2.14	2.32	2.35	2.39	2.46	2.47	2.54	2.54	2.67	2.70	2.73	2.73	2.77	2.74
IR Iran	1.01	0.96	1.13	1.05	1.14	1.16	1.29	1.24	1.24	1.08	1.38	1.43	1.54	1.56	1.73
Japan	3.35	3.60	3.69	3.67	4.12	4.06	4.09	3.95	3.84	3.97	4.08	3.76	4.07	3.08	4.41
ROK	2.98	3.73	3.88	3.97	4.08	4.08	4.09	3.92	4.30	4.25	4.07	3.96	4.19	3.81	4.11
Lao PDR	0.96	1.03	0.99	1.06	1.34	1.40	1.50	1.48	1.28	1.56	1.55	1.50	1.77	1.52	1.73
Malaysia	1.90	1.89	1.83	1.73	1.68	1.77	1.76	1.65	1.69	1.75	1.84	1.88	1.99	2.02	2.04
Mongolia	0.52	0.64	1.04	1.39	0.97	1.40	1.38	1.11	1.27	1.25	1.10	0.97	0.83	0.87	0.74
Nepal	1.32	1.33	1.12	1.37	1.32	1.30	1.22	1.33	1.41	1.51	1.54	1.49	1.42	1.48	1.45
Pakistan	1.47	1.51	1.48	1.53	1.40	1.47	1.68	1.49	1.56	1.64	1.63	1.67	1.75	1.79	1.70
Philippines	1.23	1.26	1.38	1.28	1.34	1.42	1.47	1.44	1.46	1.51	1.60	1.58	1.63	1.72	1.76
ROC	3.37	3.25	3.44	3.52	3.53	3.56	3.45	3.55	3.67	3.79	3.87	4.08	3.89	4.13	4.20
Singapore	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sri Lanka	1.68	1.71	1.85	2.06	1.77	1.99	2.01	2.02	1.96	1.94	1.99	1.97	1.99	2.03	1.95
Thailand	1.37	1.44	1.38	1.48	1.53	1.57	1.53	1.43	1.61	1.56	1.47	1.66	1.63	1.60	1.74
Vietnam	1.37	1.44	1.65	1.72	1.79	1.83	1.84	1.77	1.94	2.10	2.08	2.04	2.18	2.28	2.36
Rice, paddy (ton/ha)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Bangladesh	2.02	1.95	2.01	2.23	2.15	2.17	2.18	2.24	2.28	2.56	2.57	2.66	2.69	2.72	2.53
Cambodia	1.19	1.13	1.21	1.26	1.29	1.25	1.38	1.32	1.37	1.44	1.35	1.40	1.32	1.31	1.49
Fiji	1.98	2.07	2.12	1.81	2.13	2.37	2.12	1.92	2.40	2.42	2.19	2.35	2.15	2.36	2.29
India	2.00	1.96	1.85	2.18	2.13	2.33	2.21	2.20	2.55	2.62	2.61	2.63	2.61	2.83	2.86
Indonesia	3.29	3.49	3.74	3.85	3.91	3.94	3.98	4.04	4.11	4.25	4.30	4.35	4.34	4.38	4.35
IR Iran	2.84	3.54	3.32	2.83	3.36	3.71	3.79	3.42	3.04	3.57	3.78	4.05	3.96	3.88	4.01
Japan	5.13	5.63	5.69	5.70	6.41	6.22	6.32	6.19	5.89	6.17	6.33	5.86	6.28	4.58	6.77
ROK	4.31	5.84	6.15	6.19	6.48	6.35	6.37	6.02	6.56	6.45	6.21	6.03	6.31	5.73	6.24
Lao PDR	1.44	1.55	1.48	1.59	2.02	2.10	2.26	2.23	1.91	2.36	2.29	2.20	2.66	2.27	2.58
Malaysia	2.85	2.84	2.76	2.60	2.52	2.66	2.64	2.47	2.53	2.63	2.77	2.82	2.99	3.03	3.06
Mongolia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nepal	1.93	1.97	1.45	2.07	1.97	2.02	1.78	2.09	2.26	2.37	2.41	2.28	2.05	2.41	2.12
Pakistan	2.42	2.60	2.61	2.51	2.49	2.35	2.53	2.48	2.35	2.29	2.32	2.32	2.37	2.74	2.43
Philippines	2.21	2.30	2.63	2.32	2.43	2.59	2.72	2.62	2.64	2.70	2.98	2.82	2.94	2.87	2.89
ROC	4.68	4.50	4.76	4.87	4.84	4.88	4.69	4.79	4.95	4.97	5.03	5.36	5.19	5.49	5.63
Singapore	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sri Lanka	2.59	2.65	2.89	3.20	2.73	3.08	3.09	3.13	3.04	2.99	3.06	3.02	3.05	3.14	2.99
Thailand	1.89	1.95	1.89	2.04	2.07	2.06	2.05	2.01	2.15	2.09	1.96	2.25	2.17	2.17	2.35
Vietnam	2.08	2.20	2.52	2.63	2.73	2.78	2.81	2.70	2.96	3.21	3.18	3.11	3.33	3.48	3.57
Milk (kg/cow)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Bangladesh	210	210	210	210	210	210	210	210	210	210	210	210	210	210	210
Cambodia	170	170	170	170	170	170	170	170	170	170	170	170	170	170	170
Fiji	1,700	1,700	1,700	1,710	1,700	1,690	1,700	1,700	1,700	1,710	1,710	1,700	1,680	1,690	1,680
India	520	560	590	580	590	630	650	650	680	710	730	750	770	800	810
Indonesia	760	760	840	880	880	920	990	1,010	1,010	1,180	1,180	1,180	1,180	1,180	1,280
IR Iran	850	810	930	940	890	850	800	890	950	950	960	1,130	1,150	1,130	1,130
Japan	4,570	4,540	4,620	4,790	4,840	5,040	5,110	5,180	5,480	5,760	5,870	5,840	6,050	6,090	6,060
ROK	3,960	4,590	4,290	4,460	4,280	4,360	4,640	5,300	5,910	5,900	6,010	5,920	6,020	5,810	6,070
Lao PDR	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Malaysia	550	530	530	540	530	530	540	510	500	500	480	480	480	480	480
Mongolia	360	350	340	330	330	330	360	360	360	360	350	330	350	330	310
Nepal	320	330	330	330	330	330	330	320	340	350	370	370	370	370	380
Pakistan	860	850	890	890	920	960	750	770	790	820	840	870	890	920	950
Philippines	2,170	2,150	2,230	2,140	2,140	2,140	2,140	2,140	2,140	2,210	2,310	2,380	2,570	2,600	2,690
ROC	..	..	..	..	..	..	..	..	..	..	..	4,560	4,620	4,830	4,920
Singapore	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sri Lanka	700	730	630	650	730	740	380	480	470	550	560	580	590	600	600
Thailand	2,000	2,190	1,970	1,980	2,000	2,190	2070	2460	4,290	2,840	2,930	2,980	3,050	2,820	2,830
Vietnam	800	800	800	800	800	800	800	800	800	800	800	800	800	800	800

Source: FAOSTAT and USDA PSD online accessed Oct. 2010 and Council of Agriculture, ROC, Agriculture Statistical Yearbook 2008, 2000.

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Cereals, (rice milled equiv. + total, ton/ha)
1.77	1.84	1.83	1.97	2.13	2.31	2.26	2.31	2.37	2.34	2.50	2.55	2.69	2.71	Bangladesh
1.20	1.21	1.18	1.19	1.30	1.45	1.43	1.31	1.49	1.39	1.71	1.74	1.85	1.94	Cambodia
1.85	1.48	1.57	0.56	1.84	1.72	1.58	1.45	1.66	1.53	1.59	1.58	1.69	1.37	Fiji
1.73	1.77	1.82	1.82	1.87	1.88	1.96	1.81	1.95	1.93	1.95	1.98	2.11	2.16	India
2.75	2.83	2.88	2.76	2.80	2.90	2.91	3.00	3.08	3.10	3.15	3.17	3.26	3.46	Indonesia
1.81	1.74	1.77	2.05	1.93	1.74	1.85	2.16	2.27	2.32	2.20	2.48	2.36	1.80	IR Iran
4.10	4.22	4.16	3.99	4.13	4.33	4.23	4.24	3.82	4.14	4.28	4.08	4.23	4.37	Japan
4.04	4.47	4.54	4.16	4.37	4.38	4.50	4.17	3.92	4.45	4.37	4.35	4.16	4.81	ROK
1.69	1.73	1.85	1.85	1.98	2.06	2.11	2.22	2.14	2.26	2.54	2.45	2.66	2.85	Lao PDR
2.10	2.16	2.04	1.92	1.97	2.06	2.11	2.19	2.27	2.25	2.31	2.30	2.38	2.42	Malaysia
0.74	0.66	0.76	0.63	0.61	0.77	0.71	0.59	0.80	0.80	0.48	1.10	0.94	1.38	Mongolia
1.52	1.58	1.57	1.58	1.61	1.71	1.75	1.76	1.79	1.87	1.89	1.86	1.85	1.94	Nepal
1.88	1.87	1.87	2.01	2.01	2.22	2.07	2.08	2.13	2.23	2.40	2.34	2.53	2.39	Pakistan
1.72	1.78	1.80	1.72	1.87	1.95	2.01	2.04	2.12	2.27	2.30	2.42	2.54	2.55	Philippines
4.27	4.16	4.06	3.72	3.85	3.96	3.74	4.17	4.31	4.30	3.88	4.21	3.72	4.10	ROC
..	..	..	..	..	..	..	..	..	..	..	..	..	..	Singapore
2.05	2.02	2.11	2.28	2.14	2.24	2.30	2.28	2.20	2.39	2.33	2.43	2.57	2.48	Sri Lanka
1.81	1.83	1.76	1.86	1.82	1.95	1.95	1.93	1.95	2.08	2.12	2.09	2.15	2.14	Thailand
2.43	2.51	2.58	2.63	2.72	2.82	2.87	3.06	3.13	3.26	3.30	3.32	3.40	3.55	Vietnam
1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Rice, paddy (ton/ha)
2.65	2.76	2.74	2.94	3.21	3.48	3.40	3.49	3.58	3.54	3.78	3.85	4.01	3.99	Bangladesh
1.79	1.81	1.77	1.79	1.94	2.12	2.07	1.92	2.10	1.98	2.48	2.49	2.62	2.75	Cambodia
2.66	2.07	2.17	0.64	2.76	2.50	2.44	2.14	2.39	2.21	2.34	2.31	2.67	2.28	Fiji
2.70	2.82	2.85	2.88	2.98	2.85	3.12	2.62	3.12	2.98	3.15	3.18	3.30	3.37	India
4.35	4.42	4.43	4.20	4.25	4.40	4.39	4.47	4.54	4.54	4.57	4.62	4.71	4.89	Indonesia
4.07	4.47	4.17	4.51	4.00	3.69	3.87	4.73	4.76	4.16	4.36	4.14	4.33	4.14	IR Iran
6.34	6.54	6.42	6.22	6.41	6.70	6.64	6.58	5.85	6.42	6.65	6.34	6.51	6.78	Japan
6.05	6.79	6.95	6.42	6.60	6.71	6.84	6.35	5.92	6.73	6.57	6.71	6.35	7.39	ROK
2.53	2.55	2.76	2.71	2.93	3.06	3.13	3.27	3.14	3.28	3.49	3.35	3.47	3.55	Lao PDR
3.16	3.25	3.07	2.88	2.94	3.06	3.11	3.24	3.36	3.33	3.42	3.39	3.53	3.59	Malaysia
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Mongolia
2.39	2.46	2.42	2.44	2.47	2.70	2.75	2.68	2.68	2.86	2.78	2.72	2.56	2.78	Nepal
2.75	2.87	2.80	2.89	3.07	3.03	2.75	3.02	2.96	2.99	3.17	3.16	3.32	3.52	Pakistan
2.80	2.86	2.93	2.70	2.95	3.07	3.19	3.28	3.37	3.51	3.59	3.68	3.80	3.77	Philippines
5.71	5.55	5.61	5.19	5.43	5.61	5.18	5.87	6.06	6.05	5.45	6.01	5.25	5.78	ROC
..	..	..	..	..	..	..	..	..	..	..	..	..	..	Singapore
3.16	3.12	3.25	3.51	3.28	3.44	3.52	3.49	3.37	3.65	3.55	3.71	3.93	3.75	Sri Lanka
2.42	2.41	2.38	2.47	2.42	2.61	2.62	2.61	2.65	2.86	2.96	2.92	3.01	2.96	Thailand
3.69	3.77	3.88	3.96	4.10	4.24	4.29	4.59	4.64	4.86	4.89	4.89	4.99	5.22	Vietnam
1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Milk (kg/cow)
210	210	210	210	210	210	210	210	210	210	210	210	210	210	Bangladesh
170	170	170	170	170	170	170	170	170	170	170	170	170	170	Cambodia
1,690	1,720	1,750	1,800	1,990	1,990	1,990	2,000	2,000	1,790	2,040	2,050	1,970	1,970	Fiji
810	840	870	910	980	1,000	1,010	1,000	980	1,040	1,090	1,130	1,160	1,150	India
1,270	1,270	1,270	1,170	1,310	1,410	1,380	1,380	1,480	1,510	1,480	1,670	1,500	1,410	Indonesia
1,170	1,180	1,190	1,200	1,240	1,310	1,300	1,440	1,400	1,670	1,620	1,750	1,810	1,840	IR Iran
6,250	6,490	6,550	6,590	6,610	6,790	6,800	6,880	6,940	7,060	7,240	7,200	7,330	7,430	Japan
6,280	6,440	7,060	7,210	7,330	8,830	9,060	10,060	9,820	9,530	9,810	9,920	9,230	9,910	ROK
200	200	200	200	200	200	200	200	200	200	200	200	200	200	Lao PDR
480	480	430	390	340	390	330	430	430	430	430	430	430	430	Malaysia
310	320	340	360	420	410	340	430	380	460	350	370	370	480	Mongolia
380	380	380	390	400	400	400	410	420	410	420	430	430	440	Nepal
990	1,180	1,180	1,180	1,150	1,180	1,180	1,180	1,180	1,180	1,180	1,230	1,230	1,230	Pakistan
2,820	2,880	2,990	2,410	2,380	2,260	2,280	2,290	2,250	2,220	2,280	2,170	2,230	2,300	Philippines
4,790	5,030	5,060	5,090	5,110	5,410	5,310	5,550	5,960	5,910	5,710	6,180	6,070	6,000	ROC
..	..	..	..	..	..	..	..	..	..	..	..	..	..	Singapore
600	620	640	570	570	600	600	620	620	620	610	610	600	580	Sri Lanka
3,090	2,630	3,060	3,450	2,380	2,590	2,730	2,870	2,760	2,960	2,960	3,010	3,000	3,000	Thailand
800	800	800	800	800	800	860	1,400	1,600	1,580	1,900	1,700	1,610	1,900	Vietnam

Annex Table A-8. Producer prices in current USD: rice, chicken, and milk

Rice, paddy	1991	1992	1993	1994	1995	1996	1997	1998	1999
Bangladesh	173	162	141	153	176	131	122	136	132
Cambodia	144	87	130	149	212	179	173	158	110
Fiji	..	..	..	..	..	..	..	174	175
India	160	153	141	141	151	155	119	120	145
Indonesia	162	162	147	181	208	206	186	94	155
IR Iran	591	724	357	377	900	608	626	1,244	1,777
Japan	2,566	2,786	3,360	3,338	3,349	2,845	2,299	2,214	2,303
ROK	1,158	1,144	1,159	1,191	1,390	2,085	1,858	1,351	1,686
Lao PDR	164	168	175	181	177	190	310	178	116
Malaysia	149	159	155	152	191	196	186	157	146
Mongolia	..	..	..	..	..	..	..	..	..
Nepal	138	127	126	126	107	121	130	126	108
Pakistan	163	174	165	172	175	177	189	168	163
Philippines	174	189	199	223	282	310	269	203	201
ROC	638	652	664	637	690	724	550	581	626
Singapore	..	..	..	..	..	..	..	..	..
Sri Lanka	175	184	170	162	152	182	184	161	178
Thailand	160	151	127	153	166	205	212	139	128
Vietnam	123	120	149	148	184	385	265	278	236
Chicken live weight	1991	1992	1993	1994	1995	1996	1997	1998	1999
Bangladesh	1,448	1,361	1,390	1,368	1,415	1,364	1,367	1,279	1,146
Cambodia	607	1,093	1,241	1,079	1,302	1,243	1,571	974	1,220
Fiji	..	..	..	..	..	..	..	1,501	1,514
India	1,045	962	955	940	1,513	2,269	1,911	1,137	1,004
Indonesia	1,233	1,237	1,107	1,564	1,453	1,531	1,193	559	1,170
IR Iran	1,688	2,477	1,575	1,286	2,127	2,439	2,431	3,359	4,088
Japan	1,393	1,488	1,671	1,803	1,864	1,607	1,436	1,334	1,530
ROK	1,313	1,138	1,398	1,672	1,584	1,632	1,193	926	999
Lao PDR	1,584	1,620	1,664	1,717	1,516	1,793	1,966	894	950
Malaysia	937	1,013	1,018	1,136	1,114	1,081	988	823	842
Mongolia	1,112	564	499	403	411	408	402	273	252
Nepal	724	940	928	1,030	992	810	982	954	940
Pakistan	599	562	576	576	668	625	600	594	569
Philippines	1,673	2,068	1,865	2,110	1,818	1,813	1,632	1,339	1,360
ROC	1,258	1,330	1,395	1,380	1,203	1,330	1,083	1,116	1,215
Singapore	1,005	1,087	1,133	1,231	1,354	1,376	1,212	1,016	1,015
Sri Lanka	951	970	920	969	997	1,016	1,039	1,035	973
Thailand	954	867	895	1,000	1,105	1,056	882	774	759
Vietnam	817	826	887	773	719	812	625	646	525
Cow milk, whole, fresh	1991	1992	1993	1994	1995	1996	1997	1998	1999
Bangladesh	235	226	233	370	402	359	372	354	288
Cambodia	..	..	..	..	..	..	..	..	..
Fiji	..	..	182	198	213	214	205	176	178
India	190	199	186	198	210	208	217	204	205
Indonesia	296	297	257	269	265	269	223	113	285
IR Iran	284	343	237	209	286	377	452	500	520
Japan	659	703	783	840	901	758	680	631	721
ROK	283	273	294	299	316	314	266	214	252
Lao PDR	966	988	1,029	1,068	1,047	1,121	1,825	819	534
Malaysia	324	355	350	343	359	417	423	344	416
Mongolia	336	188	152	184	236	303	192	184	201
Nepal	204	265	262	291	280	263	292	267	283
Pakistan	308	317	321	336	357	345	331	332	316
Philippines	210	249	239	254	291	385	353	291	361
ROC	..	..	..	..	..	..	..	..	..
Singapore	1,274	1,412	1,424	1,506	1,623	858	795	663	590
Sri Lanka	197	214	207	223	234	253	271	248	227
Thailand	279	296	315	317	320	358	299	262	298
Vietnam	147	143	143	132	143	194	239	162	239

Source: FAOSTAT accessed Oct. 2010 and Council of Agriculture, ROC, Agriculture Statistical Yearbook 2008, 2000.

2000	2001	2002	2003	2004	2005	2006	2007	2008	Rice, paddy
119	108	114	103	143	144	139	153	174	Bangladesh
96	105	120	105	134	147	137	178	199	Cambodia
162	152	158	182	306	314	329	355	403	Fiji
133	125	124	134	208	204	259	154	386	India
127	112	134	141	176	210	232	278	280	Indonesia
1,101	1,360	438	383	477	387	985	1,145	2,014	IR Iran
2,276	2,010	1,927	2,447	2,338	2,055	1,920	1,848	2,087	Japan
1,834	1,561	1,593	1,714	1,798	1,838	1,889	1,998	1,631	ROK
108	101	99	106	116	122	133	153	177	Lao PDR
142	174	182	190	158	164	183	224	236	Malaysia
..	..	..	..	..	..	..	..	..	Mongolia
129	106	120	124	141	151	150	168	166	Nepal
161	133	165	181	210	213	230	251	224	Pakistan
191	160	171	163	169	189	204	244	319	Philippines
550	522	541	473	586	593	581	567	666	ROC
..	..	..	..	..	..	..	..	..	Singapore
160	140	144	129	156	159	134	163	295	Sri Lanka
112	107	118	126	162	166	170	236	267	Thailand
205	152	141	208	314	321	331	227	278	Vietnam
2000	2001	2002	2003	2004	2005	2006	2007	2008	Chicken live weight
935	806	777	782	772	722	708	744	820	Bangladesh
996	1,670	1,770	1,642	1,942	2,220	2,847	3,279	3,939	Cambodia
1,401	1,403	1,461	1,873	2,050	2,100	2,256	2,432	2,450	Fiji
1,013	1,038	995	1,073	1,145	1,198	1,241	1,446	1,497	India
961	850	1,030	1,128	1,148	1,557	1,768	1,877	2,255	Indonesia
4,619	5,024	1,195	1,117	1,130	1,088	1,245	1,372	1,727	IR Iran
1,604	1,424	1,381	1,469	1,528	1,409	1,315	1,369	1,674	Japan
1,041	1,083	918	772	1,226	1,414	1,249	1,203	1,042	ROK
881	822	813	864	949	995	1,090	1,273	1,477	Lao PDR
816	808	758	824	850	993	862	1,051	1,112	Malaysia
228	325	313	198	196	279	287	357	439	Mongolia
952	928	855	887	922	1,000	1,010	1,182	1,166	Nepal
525	569	613	683	689	707	715	790	852	Pakistan
1,297	1,176	1,113	1,084	1,185	1,274	1,410	1,751	1,718	Philippines
976	904	994	911	1,056	1,121	1,034	1,127	1,324	ROC
940	871	838	895	1,053	1,364	1,322	1,427	1,647	Singapore
909	801	821	839	907	1,081	1,181	1,133	1,249	Sri Lanka
655	662	610	649	705	893	834	976	1,115	Thailand
478	500	524	768	878	920	986	1,205	1,361	Vietnam
2000	2001	2002	2003	2004	2005	2006	2007	2008	Cow milk, whole, fresh
257	222	195	197	194	182	178	187	206	Bangladesh
..	..	..	..	..	..	..	..	..	Cambodia
188	176	183	211	231	266	260	280	314	Fiji
213	206	203	219	233	245	254	296	306	India
316	246	300	354	338	316	358	417	446	Indonesia
649	692	192	194	219	230	267	308	377	IR Iran
756	676	656	718	765	737	682	671	803	Japan
265	232	240	249	272	326	350	359	311	ROK
496	462	457	486	534	560	613	699	810	Lao PDR
355	350	350	355	350	351	363	440	464	Malaysia
149	272	240	240	238	245	168	256	605	Mongolia
286	295	279	285	305	323	346	375	370	Nepal
297	259	277	286	288	286	308	328	293	Pakistan
307	281	286	285	309	308	354	404	443	Philippines
..	..	..	..	..	..	..	..	..	ROC
598	530	570	723	1,118	1,196	1,278	1,394	1,701	Singapore
221	201	199	218	228	259	279	235	306	Sri Lanka
282	252	257	279	291	284	297	350	413	Thailand
294	230	291	307	541	566	559	705	895	Vietnam

Annex Table A-9. Fertilizer use per hectare (nutrient weight, kg/ha)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Bangladesh	45	44	51	60	64	59	67	76	82	96	99	110	120	115	129
Cambodia	4	9	5	2	1	0	0	0	0	0	1	1	3	4	3
Fiji	96	107	77	59	83	68	109	102	115	100	96	56	50	57	69
India	33	36	35	39	47	51	57	49	64	67	71	75	72	73	80
Indonesia	45	56	61	59	72	70	70	73	79	75	78	81	87	77	82
IR Iran	45	48	60	68	60	57	56	57	61	76	70	64	74	48	54
Japan	333	345	366	388	389	376	383	381	365	367	351	337	345	355	347
ROK	366	351	282	331	361	390	403	422	431	460	454	444	466	474	472
Lao PDR	5	5	0	1	0	2	0	1	0	0	2	3	4	3	2
Malaysia	94	82	87	93	118	109	111	122	138	133	131	131	130	136	152
Mongolia	7	11	11	12	13	14	15	18	14	12	11	12	11	1	0
Nepal	10	10	13	16	19	19	19	23	24	29	31	34	34	31	39
Pakistan	53	53	61	59	62	73	86	82	80	90	90	90	102	100	102
Philippines	35	33	36	38	27	29	40	49	51	54	59	45	51	58	62
ROC	..	..	..	..	..	..	..	..	..	..	671	697	679	689	684
Singapore	550	671	783	783	833	1,040	1,300	1,833	1,867	2,800	2,800	4,250	4,667	4,583	3,918
Sri Lanka	87	77	84	90	102	104	102	107	109	111	90	93	96	112	116
Thailand	15	17	17	25	23	23	28	31	37	40	51	46	54	71	67
Vietnam	24	33	42	57	57	73	82	66	90	88	88	122	114	112	174

Source: FAOSTAT resources, accessed Oct. 2010 and Agriculture Statistics Yearbook 2008, Council of Agriculture, ROC.

Annex Table A-10. Number of tractors per 1000 agricultural workers

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Bangladesh	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Cambodia	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3
Fiji	44.3	45.5	46.6	47.2	46.3	50.0	52.3	53.6	56.2	57.5	58.3	61.0	59.9	58.5	56.6
India	2.2	2.4	2.6	2.8	3.0	3.3	3.4	3.6	4.0	4.9	5.2	5.6	6.0	6.3	6.6
Indonesia	0.5	0.5	0.5	0.5	0.6	2.0	2.3	2.7	2.7	3.2	3.2	4.3	6.3	5.8	6.5
IR Iran	18.8	19.8	21.2	24.5	28.1	31.6	34.8	37.2	38.8	40.2	41.8	42.7	44.2	44.2	44.1
Japan	380	384	421	444	476	542	563	606	652	690	722	702	740	789	835
ROK	0.7	1.2	1.8	2.7	4.0	5.4	7.4	9.6	12.7	17.2	24.4	32.0	39.0	47.1	53.6
Lao PDR	0.4	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Malaysia	3.6	4.0	4.0	4.5	5.2	6.1	7.4	8.8	10.4	11.9	13.5	15.2	16.4	17.9	20.7
Mongolia	52.8	53.5	55.3	56.8	56.3	57.1	57.0	58.3	58.3	56.1	53.6	49.4	44.9	40.8	40.0
Nepal	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.7	0.8	0.8	1.1	1.4	1.7
Pakistan	7.1	7.6	8.2	9.4	10.4	10.5	11.9	13.1	14.3	15.7	17.1	16.8	17.3	16.4	15.2
Philippines	1.2	1.2	1.1	1.0	1.0	1.4	1.8	2.2	2.6	3.0	3.3	3.7	3.8	4.0	4.1
ROC	..	..	..	..	..	..	..	..	..	..	..	10.3	11.0	13.0	12.9
Singapore	2.6	2.7	3.0	3.3	3.7	4.6	5.1	5.8	6.6	8.6	10.3	12.8	13.0	13.0	16.3
Sri Lanka	5.3	4.9	4.5	4.5	4.6	4.6	4.7	4.6	4.5	4.4	4.4	4.5	4.7	4.7	4.7
Thailand	2.2	2.4	2.9	3.0	3.2	3.1	3.4	3.7	4.0	4.3	4.7	5.2	6.3	7.5	9.1
Vietnam	2.8	2.9	3.0	2.8	2.9	3.6	3.7	2.9	3.0	3.1	3.2	3.7	4.0	4.8	8.1

Source: FAOSTAT resources, accessed Oct. 2010 and Agriculture Statistics Yearbook 2008, Council of Agriculture, ROC.

Note: Tractors include combines and harvesters. Agricultural workers are economically active population in agriculture.

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
147	150	135	140	162	156	171	185	157	165	185	181	171	149	Bangladesh
3	2	6	2	na	na	na	15	19	17	19	21	20	22	Cambodia
68	72	72	72	57	30	40	48	13	30	26	17	16	31	Fiji
82	84	95	99	106	97	102	95	99	108	120	128	133	143	India
83	88	71	86	77	74	79	75	81	83	88	93	100	112	Indonesia
54	59	68	70	75	86	77	72	74	95	86	104	82	83	IR Iran
326	313	305	289	296	301	282	309	311	329	323	309	326	259	Japan
493	467	516	454	432	408	379	370	421	473	580	423	458	426	ROK
7	4	8	5	10	6	13	0	0	0	0	0	0	0	Lao PDR
144	149	165	185	174	156	149	157	175	233	190	213	234	221	Malaysia
2	2	5	4	2	3	3	5	5	7	4	8	7	8	Mongolia
39	43	45	50	39	30	29	22	23	34	18	20	17	7	Nepal
117	111	121	117	129	135	133	137	142	152	169	171	163	157	Pakistan
62	76	82	62	74	76	81	75	89	83	77	69	75	67	Philippines
688	691	604	607	556	575	578	564	508	551	527	529	525	477	ROC
3,781	2,618	1,719	3,356	3,141	2,504	1,961	1,525	..	..	..	..	..	..	Singapore
109	112	111	123	136	129	128	149	128	138	136	145	149	162	Sri Lanka
74	76	75	85	92	82	89	90	121	107	91	96	111	106	Thailand
181	212	204	250	265	279	216	228	253	285	197	199	250	192	Vietnam

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	Bangladesh
0.3	0.3	0.3	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.9	Cambodia
55.2	53.4	52.5	51.2	50.3	49.0	48.2	47.3	45.5	45.5	46.3	46.9	47.5	Fiji
7.0	7.7	8.4	9.0	9.7	10.3	10.9	11.4	12.0	12.4	12.8	13.4	14.0	India
7.0	7.4	7.9	8.4	8.2	8.4	7.4	7.5	7.5	7.5	7.4	7.5	2.4	Indonesia
43.7	43.1	53.4	41.8	40.7	40.0	42.0	43.4	42.9	41.0	46.6	47.8	48.9	IR Iran
914	952	992	1,046	1,114	1,125	1,181	1,247	1,310	1,379	1,444	1,515	1,624	Japan
60.5	68.3	77.9	96.8	112.0	125.2	136.5	145.3	157.4	169.3	183.3	199.0	215.0	ROK
0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	Lao PDR
23.2	23.3	23.4	23.5	23.7	23.6	23.8	24.1	24.4	24.9	25.2	25.7	26.0	Malaysia
38.3	35.8	33.2	30.6	28.0	24.7	24.3	23.6	23.1	21.9	20.4	19.9	18.8	Mongolia
2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.1	3.0	2.9	2.8	2.7	2.6	Nepal
18.6	18.9	18.8	19.0	19.0	17.0	17.3	17.5	17.5	18.6	18.6	18.5	19.5	Pakistan
4.2	4.3	4.4	4.5	4.6	4.8	4.9	5.0	4.9	4.9	5.0	5.0	4.9	Philippines
14.0	14.6	16.0	16.2	18.5	19.8	20.2	20.2	21.3	23.0	25.5	28.5	28.8	ROC
16.3	16.3	16.3	16.3	21.7	21.7	21.7	21.7	21.7	32.5	32.5	32.5	32.5	Singapore
4.9	4.9	4.9	4.6	4.8	4.9	4.9	4.9	5.1	5.3	5.5	5.5	5.5	Sri Lanka
10.8	12.8	14.9	18.8	23.2	28.3	34.8	42.9	45.1	47.1	49.0	51.4	53.1	Thailand
8.4	10.6	12.2	13.9	16.8	16.2	14.5	14.3	14.1	13.9	13.7	13.5	13.3	Vietnam

Annex Table A-11. Irrigated area as a % of total arable land and permanent crop areas

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Bangladesh	17	17	17	20	21	23	23	24	25	29	30	33	39	39	40
Cambodia	6	6	6	7	8	8	7	7	6	6	6	7	7	7	7
Fiji	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1
India	23	23	24	24	25	25	25	25	25	27	28	28	29	30	30
Indonesia	16	16	16	16	16	15	14	13	14	14	14	15	15	15	15
IR Iran	36	37	38	39	41	43	43	42	41	42	42	39	38	39	39
Japan	56	56	55	55	55	55	55	54	54	54	54	54	54	54	54
ROK	41	41	42	43	43	44	45	46	46	46	47	47	47	47	46
Lao PDR	14	14	14	14	14	14	14	14	15	15	16	16	17	17	17
Malaysia	7	7	6	6	6	6	6	6	5	5	5	5	5	5	5
Mongolia	3	3	4	4	4	4	5	5	6	6	6	6	6	6	6
Nepal	23	25	27	29	31	32	35	36	38	40	42	43	44	46	47
Pakistan	72	75	75	77	77	76	76	78	72	75	75	80	80	80	80
Philippines	13	13	13	14	15	15	15	14	15	16	16	16	16	16	16
ROC	..	..	..	..	..	..	..	..	..	..	..	42	43	42	43
Singapore	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sri Lanka	24	26	27	27	27	27	26	27	27	27	27	28	29	29	29
Thailand	16	17	17	18	19	19	20	20	20	20	21	21	22	22	23
Vietnam	26	27	30	32	35	39	41	42	42	44	45	45	43	44	44

Source: FAOSTAT resources, accessed Oct. 2010 and Agriculture Statistics Yearbook 2008, Council of Agriculture, ROC.

B. Estimated PSE indicators for selected countries

Annex Table B-1. PSEs for the selected countries (value and %)

PSE Values (local currency)		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	INR mill.	133,617	14,348	–39,878	–157,835	47,256	–382,093	–343,406	–14,162	123,067	507,683
Indonesia	IDR bill.	2,381	2,448	5,499	6,953	7,662	6,245	6,556	12,311	–32,265	16,411
Malaysia	MYR mill.	-181	–436	610	452	607	–610	185	–4,223	–1,363	–756
Pakistan	PKR mill.	–69,995	–64,427	–33,524	–14,263	48,345	–130,167	–163,739	–89,447	42,340	92,215
ROC	TWD mill.	33,731	44,208	80,057	87,315	87,398	102,965	85,197	45,962	92,712	116,166
Thailand	THB mill.	926	555	3,619	–9,783	–7,945	–17,594	–4,494	–31,403	–49,962	21,802
% PSE		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	%	7.4	0.7	–1.7	–5.9	1.5	–11.4	–8.6	–0.3	2.5	9.9
Indonesia	%	5.8	5.4	10.6	11.9	11.5	8.2	7.5	12.4	–19.4	7.8
Malaysia	%	–1.3	–2.8	3.6	2.5	2.7	–2.4	0.8	–16.5	–4.1	–2.6
Pakistan	%	–19.6	–14.8	–6.7	–2.2	7.7	–15.9	–16.7	–7.8	3.8	7.4
ROC	%	14.8	18.0	31.6	31.3	30.0	32.4	25.3	16.0	31.0	37.3
Thailand	%	0.3	0.2	1.0	–2.8	–2.0	–3.9	–0.9	–5.9	–8.5	4.2

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
46	46	46	46	47	49	52	55	56	57	58	59	60	58	Bangladesh
7	7	7	7	7	7	7	7	7	7	7	7	7	7	Cambodia
1	1	1	1	1	1	1	1	1	1	1	1	1	1	Fiji
31	31	32	32	34	36	36	37	36	36	37	37	37	37	India
15	14	15	16	16	16	17	18	17	17	18	18	18	18	Indonesia
39	40	41	42	44	48	47	47	47	47	47	48	48	48	IR Iran
54	55	55	55	55	55	55	55	55	55	54	54	54	54	Japan
46	46	46	46	46	46	47	47	48	47	48	48	48	48	ROK
17	17	18	20	26	31	31	30	28	28	28	25	25	22	Lao PDR
5	5	5	5	5	5	5	5	5	5	5	5	5	5	Malaysia
6	6	7	7	7	7	8	9	10	10	10	10	10	10	Mongolia
47	47	47	47	47	46	47	47	47	47	47	47	47	47	Nepal
80	81	81	82	82	82	80	81	82	85	85	86	89	94	Pakistan
15	15	15	14	13	14	14	14	14	14	14	14	14	15	Philippines
43	42	43	43	44	44	44	44	44	45	45	45	45	45	ROC
..	..	..	..	..	..	..	..	..	..	..	..	..	..	Singapore
30	30	30	30	30	30	30	30	30	30	28	29	29	26	Sri Lanka
25	26	27	28	28	29	30	31	32	32	33	34	34	34	Thailand
44	45	44	45	45	45	44	44	45	46	49	49	49	49	Vietnam

2000	2001	2002	2003	2004	2005	2006	2007	2008	PSE Values (local currency)	
725,839	615,232	873,701	896,263	622,654	465,907	197,583	–227,395	–784,037	India	INR mill.
1,372	8,579	11,493	14,464	25,607	23,143	29,464	1,854	–17,221	Indonesia	IDR bill.
406	–589	–129	855	323	884	68	1706	100	Malaysia	MYR mill.
4,997	12,081	141,269	53,843	55,374	–36,830	85,894	–325,460	–468,471	Pakistan	PKR mill.
79,416	57,915	77,352	73,585	105,807	85,641	78,389	75,742	85,770	ROC	TWD mill.
13,367	–343	11,131	12,009	–13,587	9,986	–783	–31,238	–40,635	Thailand	THB mill.
2000	2001	2002	2003	2004	2005	2006	2007	2008	% PSE	
14.1	11.0	15.8	13.8	9.9	6.6	2.5	–2.6	–7.7	India	%
0.6	3.3	4.0	4.8	8.0	6.7	7.3	0.4	–3.0	Indonesia	%
1.6	–2.6	–0.4	2.2	0.8	2.1	0.1	2.5	0.1	Malaysia	%
0.8	1.2	10.5	3.6	3.5	–0.8	5.2	–12.3	–15.4	Pakistan	%
27.2	20.6	29.1	27.2	35.2	28.0	25.8	24.4	25.0	ROC	%
2.6	–0.1	2.0	2.0	–2.2	1.3	–0.1	–3.2	–2.8	Thailand	%

Annex Table B-2. CSEs for the selected countries (value and %)

PSE Values (local currency)		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	INR mill.	–52,073	101,859	174,306	304,130	124,141	541,364	518,294	253,876	155,240	–200,242
Indonesia	IDR bill.	–2,250	–2,579	–5,418	–6,655	–7,617	–7,165	–6,837	–12,260	33,633	–21,659
Malaysia	MYR mill.	–332	182	–505	–607	–395	283	107	2,990	902	568
Pakistan	PKR mill.	66,900	58,548	29,611	12,175	–48,235	130,912	154,215	91,078	–45,102	–90,791
ROC	TWD mill.	–40,147	–43,242	–72,741	–81,020	–77,688	–89,743	–70,428	–40,226	–73,426	–105,370
Thailand	THB mill.	–3,757	–2,899	–3,541	3,937	1,911	10,003	–1,450	21,098	34,673	–9,653
% PSE		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	%	–3.1	5.4	8.6	12.6	4.4	17.3	14.8	7.7	4.1	–2.7
Indonesia	%	–6.0	–6.1	–11.0	–12.2	–12.1	–9.4	–7.9	–13.0	20.6	–9.9
Malaysia	%	–3.5	–1.5	–7.9	–7.9	–5.4	–1.5	–4.4	11.8	0.8	–1.2
Pakistan	%	19.2	13.7	7.3	2.5	–7.4	17.0	17.4	8.9	–3.7	–7.1
ROC	%	–14.6	–18.0	–27.5	–27.6	–26.1	–26.8	–19.7	–13.4	–22.6	–30.5
Thailand	%	–1.5	–1.1	–1.2	1.6	0.7	3.3	–0.4	5.5	8.7	–2.6

Annex Table B-3. GSSEs for the selected countries

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	INR mill.	28,032	33,346	26,438	63,357	63,364	68,438	61,289	63,122	85,867	73,159
Indonesia	IDR bill.	958	964	998	1,003	994	861	857	720	579	720
Malaysia	MYR mill.	995	967	1,272	1,200	1,196	1,118	859	681	704	853
Pakistan	PKR mill.	14,346	13,477	11,849	16,976	17,909	17,188	17,635	17,010	17,907	16,526
ROC	TWD mill.	9,278	11,997	12,579	13,979	12,792	12,781	13,684	14,292	14,619	16,030
Thailand	THB mill.	30,675	42,549	50,661	48,750	44,030	69,129	53,466	64,666	64,422	54,994

Annex Table B-4. TSE for the selected countries (Values and % of GDP)

TSE values (local currency)		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	INR mill.	162,201	47,694	–2,032	–87,874	110,620	–313,656	–259,190	102,459	243,779	655,758
Indonesia	IDR bill.	3,339	3,411	6,498	7,956	8,656	7,105	7,415	13,031	–31,686	17,131
Malaysia	MYR mill.	815	531	1,882	1,652	1,802	508	1,044	–3,541	–659	96
Pakistan	PKR mill.	–55,648	–50,140	–17,981	5,345	69,687	–108,776	–141,191	–66,722	65,456	114,599
ROC	TWD mill.	43,550	56,767	93,184	101,843	100,741	116,314	99,447	60,880	107,941	132,809
Thailand	THB mill.	31,601	43,105	54,280	38,967	36,085	51,534	48,972	33,263	14,460	76,795
TSE as % of GDP		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	%	2.8	0.7	0.0	–1.0	1.1	–2.6	–1.9	0.7	1.4	3.4
Indonesia	%	1.6	1.4	2.3	2.4	2.3	1.6	1.4	2.1	–3.3	1.6
Malaysia	%	0.7	0.4	1.2	1.0	0.9	0.2	0.4	–1.3	–0.2	0.0
Pakistan	%	–6.5	–4.9	–1.5	0.4	4.5	–5.8	–6.7	–2.7	2.4	3.9
ROC	%	1.0	1.1	1.7	1.7	1.5	1.6	1.3	0.7	1.2	1.4
Thailand	%	1.4	1.7	1.9	1.2	1.0	1.2	1.1	0.7	0.3	1.7

2000	2001	2002	2003	2004	2005	2006	2007	2008	PSE Values (local currency)	
–416,602	–286,752	–583,793	–584,154	–274,624	6,191	356,783	810,834	1,807,285	India	INR mill.
–3,239	–11,982	–19,035	–20,061	–26,418	–29,809	–34,460	–32,420	–4,397	Indonesia	IDR bill.
–408	–39	–158	–385	–153	–547	55	–557	1,066	Malaysia	MYR mill.
–9,882	–18,593	–144,349	–55,081	–65,186	18,446	–107,464	318,809	398,629	Pakistan	PKR mill.
–60,082	–39,009	–68,538	–62,598	–92,096	–69,490	–65,152	–58,248	–68,117	ROC	TWD mill.
–2	7,748	–10,563	–14,049	5,820	–139	671	25,430	42,144	Thailand	THB mill.
2000	2001	2002	2003	2004	2005	2006	2007	2008	% PSE	
–7.6	–3.6	–9.1	–7.7	–2.9	1.9	7.4	15.5	27.0	India	%
–1.5	–4.7	–6.7	–6.8	–8.9	–9.2	–9.3	–6.4	–0.8	Indonesia	%
–7.7	–4.6	–5.8	–6.1	–4.4	–3.7	–1.7	–0.2	7.7	Malaysia	%
–1.0	–1.5	–10.6	–3.7	–3.8	0.9	–5.6	12.7	13.6	Pakistan	%
–20.3	–13.2	–21.2	–18.2	–23.7	–18.1	–17.0	–14.5	–14.6	ROC	%
0.0	2.2	–2.9	–3.7	1.6	0.0	0.1	4.2	5.7	Thailand	%

2000	2001	2002	2003	2004	2005	2006	2007	2008		
108,731	140,276	204,497	213,544	246,741	216,387	211,192	202,203	303,005	India	INR mill.
873	914	1,481	1,589	1,911	2,128	2,544	2,754	3,081	Indonesia	IDR bill.
998	1,113	1,349	1,689	1,868	2,038	2,229	2,228	2,228	Malaysia	MYR mill.
38,018	40,790	15,813	6,958	8,727	29,944	31,352	29,960	29,960	Pakistan	PKR mill.
28,727	36,528	19,452	17,827	19,436	20,874	18,716	18,322	18,089	ROC	TWD mill.
77,417	58,822	97,283	76,586	74,231	65,431	63,528	87,908	99,646	Thailand	THB mill.

2000	2001	2002	2003	2004	2005	2006	2007	2008	TSE values (local currency)	
891,023	857,422	1,205,238	1,238,989	977,759	797,069	553,895	301,164	–44,497	India	INR mill.
2,245	9,492	12,975	16,053	27,518	25,272	32,008	4,608	–14,139	Indonesia	IDR bill.
1,404	525	1,220	2,544	2,191	2,922	2,517	4,153	2,759	Malaysia	MYR mill.
48,367	57,671	161,982	61,724	69,102	13,624	146,462	–280,143	–423,154	Pakistan	PKR mill.
108,787	95,110	97,467	92,078	125,935	107,221	97,838	94,802	104,571	ROC	TWD mill.
90,785	58,479	108,414	88,595	60,644	75,417	62,745	56,669	59,011	Thailand	THB mill.
2000	2001	2002	2003	2004	2005	2006	2007	2008	TSE as % of GDP	
4.2	3.8	4.9	4.5	3.0	2.2	1.3	0.6	–0.1	India	%
0.2	0.6	0.7	0.8	1.2	0.9	1.0	0.1	–0.3	Indonesia	%
0.4	0.1	0.3	0.6	0.5	0.6	0.4	0.6	0.4	Malaysia	%
1.3	1.4	3.6	1.3	1.2	0.2	1.9	–3.2	–4.1	Pakistan	%
1.1	1.0	0.9	0.9	1.1	0.9	0.8	0.7	0.8	ROC	%
1.8	1.1	2.0	1.5	0.9	1.1	0.8	0.7	0.7	Thailand	%

Annex Table B-5. Percentage PSEs: rice, poultry meats, and milk

Rice	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	–2.7	–10.0	–5.0	–13.4	–7.3	–42.1	–33.3	–13.9	–16.6	1.0
Indonesia	8.9	8.2	15.3	26.9	25.4	18.1	14.3	28.8	–38.8	25.0
Malaysia	41.8	38.0	45.1	49.5	38.3	45.3	37.8	3.6	26.4	37.1
Pakistan	–47.4	–29.9	–17.7	–13.9	4.2	–16.5	–24.8	3.8	–12.5	5.7
ROC	41.1	47.3	42.6	44.2	38.0	47.1	39.6	25.0	37.2	34.3
Thailand	–0.7	–3.8	–0.7	–2.2	0.9	–9.8	7.6	6.3	–7.4	7.3
Poultry meat	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
India	25.1	2.1	4.2	5.8	–11.3	18.3	42.1	38.4	9.0	11.3
Indonesia	0.3	0.3	10.5	0.4	0.4	0.4	0.5	0.5	0.5	5.4
Malaysia	–2.8	–7.0	12.7	15.9	10.0	–2.2	–14.7	–52.9	–14.2	–2.5
Pakistan	0.8	0.2	0.8	0.5	0.5	0.5	0.5	0.5	0.4	0.5
ROC	21.3	18.2	32.7	36.3	16.6	–4.7	16.0	14.8	18.0	32.4
Thailand	9.2	–3.7	–9.4	–4.3	–7.6	7.3	3.9	–7.0	2.5	9.5
Milk	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
India	17.5	–1.6	–1.6	–8.1	8.1	–9.7	–19.7	4.1	8.7	16.6
Indonesia	12.5	39.9	29.4	13.4	25.9	–0.8	–11.6	15.3	1.7	5.8
Malaysia	13.9	23.3	21.0	18.2	24.6	23.4	30.6	15.6	35.7	31.9
Pakistan	8.8	17.0	10.2	10.3	29.3	6.8	–6.3	8.6	12.9	23.8
ROC	75.4	72.5	69.9	75.0	74.2	69.9	64.7	67.6	68.4	67.5
Thailand	–9.7	0.4	0.7	11.3	19.9	–0.9	6.8	7.6	2.0	24.2
Sugar cane	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
India	–40.7	–4.1	–2.2	–25.9	–39.8	–51.0	–31.3	–20.1	7.0	30.4
Indonesia	–14.2	1.4	8.7	9.2	5.4	3.3	8.4	13.3	–86.9	15.8
Malaysia	24.1	25.3	14.8	29.9	22.0	22.0	13.4	50.6	13.6	17.6
Pakistan	0.7	0.2	3.8	0.5	0.5	–4.9	0.5	8.3	0.3	0.3
ROC	55.3	48.3	62.0	59.2	49.3	39.1	50.8	48.0	44.5	58.3
Thailand	–10.6	2.9	4.7	–8.3	–11.3	–4.8	–4.3	–14.9	–60.0	4.7

Annex Table B-6. Producer Nominal Assistance Coefficients by country

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	1.08	1.01	0.98	0.94	1.02	0.90	0.92	1.00	1.03	1.11
Indonesia	1.06	1.06	1.12	1.13	1.13	1.09	1.08	1.14	0.84	1.08
Malaysia	0.99	0.97	1.04	1.03	1.03	0.98	1.01	0.86	0.96	0.97
Pakistan	0.84	0.87	0.94	0.98	1.08	0.86	0.86	0.93	1.04	1.08
ROC	1.17	1.22	1.46	1.46	1.43	1.48	1.34	1.19	1.45	1.60
Thailand	1.00	1.00	1.01	0.97	0.98	0.96	0.99	0.94	0.92	1.04

Annex Table B-5. Percentage PSEs: rice, poultry meats, and milk

2000	2001	2002	2003	2004	2005	2006	2007	2008	Rice
15.9	19.3	10.2	9.5	–5.7	–11.2	–16.3	–2.7	–71.4	India
5.6	18.7	24.3	26.2	27.7	27.9	30.9	37.9	8.9	Indonesia
39.0	46.2	41.0	38.7	43.3	36.7	37.6	33.2	–12.2	Malaysia
–12.8	–38.4	–20.7	–11.2	–18.0	–25.7	–37.7	–19.7	–80.9	Pakistan
31.4	49.0	62.2	57.9	63.9	62.9	53.1	52.8	51.7	ROC
9.1	6.4	6.1	9.6	0.7	0.8	0.7	–5.1	–4.0	Thailand
2000	2001	2002	2003	2004	2005	2006	2007	2008	Poultry meat
21.0	19.1	19.6	23.3	15.0	11.8	29.5	38.0	39.0	India
0.3	0.3	0.3	0.3	0.3	5.4	5.3	5.4	5.3	Indonesia
7.7	2.5	4.1	12.5	–1.9	7.8	–1.2	2.3	–9.2	Malaysia
0.4	0.4	9.1	16.5	1.8	1.1	6.0	0.7	0.6	Pakistan
24.2	19.8	20.8	13.2	15.2	21.7	20.9	12.7	21.4	ROC
1.1	4.3	–3.6	–2.8	–2.4	6.9	4.5	–13.3	–15.1	Thailand
2000	2001	2002	2003	2004	2005	2006	2007	2008	Milk
17.0	1.8	32.2	25.1	17.5	9.0	16.0	–19.7	–12.0	India
5.7	5.1	5.8	5.7	5.7	5.8	5.7	5.7	5.6	Indonesia
28.1	13.1	30.9	28.3	19.4	6.8	18.3	–14.0	–12.0	Malaysia
11.0	0.0	37.5	25.7	9.4	–5.7	7.4	–36.9	–35.6	Pakistan
67.3	51.9	74.4	54.5	44.6	51.1	51.2	47.6	47.1	ROC
12.9	–18.2	24.3	15.1	4.2	–19.0	–8.9	–37.3	–39.4	Thailand
2000	2001	2002	2003	2004	2005	2006	2007	2008	Sugar cane
8.0	13.8	44.5	48.6	52.4	16.1	–38.3	28.8	–6.6	India
8.5	10.3	17.1	23.3	19.1	–9.4	–31.2	6.8	15.3	Indonesia
21.7	25.7	15.1	17.4	18.0	15.3	13.5	–24.0	–24.9	Malaysia
17.6	11.9	22.0	33.3	32.6	27.6	35.3	31.1	7.2	Pakistan
61.3	44.5	37.2	19.5	32.6	23.0	19.1	21.0	15.0	ROC
2.3	–9.6	–6.0	–7.6	–11.8	–12.5	–17.1	–1.2	17.2	Thailand

Annex Table B-6. Producer Nominal Assistance Coefficients by country

2000	2001	2002	2003	2004	2005	2006	2007	2008	
1.16	1.12	1.19	1.16	1.11	1.07	1.03	0.97	0.93	India
1.01	1.03	1.04	1.05	1.09	1.07	1.08	1.00	0.97	Indonesia
1.02	0.97	1.00	1.02	1.01	1.02	1.00	1.03	1.00	Malaysia
1.01	1.01	1.12	1.04	1.04	0.99	1.05	0.89	0.87	Pakistan
1.37	1.26	1.41	1.37	1.54	1.39	1.35	1.32	1.33	ROC
1.03	1.00	1.02	1.02	0.98	1.01	1.00	0.97	0.97	Thailand

Annex Table B-7. Producer Nominal Protection Coefficients: rice, poultry meats, milk, and sugar cane

Rice	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	0.94	0.87	0.90	0.84	0.89	0.67	0.70	0.83	0.81	0.95
Indonesia	1.09	1.08	1.17	1.36	1.33	1.22	1.16	1.40	0.72	1.33
Malaysia	1.72	1.61	1.82	1.98	1.62	1.72	1.51	0.96	1.24	1.46
Pakistan	0.67	0.77	0.84	0.87	1.04	0.85	0.80	1.03	0.88	1.06
ROC	1.61	1.80	1.67	1.73	1.53	1.80	1.55	1.26	1.45	1.34
Thailand	0.96	0.94	0.98	0.94	1.00	0.90	1.07	1.04	0.92	1.06
Poultry meat	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	1.22	0.90	0.94	0.96	0.79	1.14	1.66	1.52	1.01	1.03
Indonesia	1.00	1.00	1.11	1.00	1.00	1.00	1.00	1.00	1.00	1.05
Malaysia	0.97	0.93	1.15	1.19	1.11	0.98	0.87	0.65	0.87	0.98
Pakistan	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ROC	1.27	1.21	1.47	1.56	1.19	0.95	1.17	1.16	1.20	1.45
Thailand	1.13	0.95	0.89	0.93	0.92	1.07	1.03	0.92	1.01	0.99
Milk	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	1.15	0.92	0.92	0.87	1.02	0.86	0.79	0.98	1.02	1.12
Indonesia	1.12	1.64	1.39	1.13	1.32	0.97	0.88	1.15	1.00	1.05
Malaysia	1.16	1.30	1.27	1.22	1.33	1.30	1.44	1.19	1.55	1.47
Pakistan	1.09	1.20	1.10	1.11	1.41	1.07	0.94	1.09	1.14	1.31
ROC	4.04	3.61	3.30	3.98	3.85	3.30	2.79	3.05	3.11	3.02
Thailand	0.90	1.00	1.00	1.11	1.24	0.98	1.06	0.99	0.99	1.26
Sugar cane	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	0.66	0.89	0.90	0.73	0.66	0.62	0.72	0.77	1.00	1.33
Indonesia	0.87	1.01	1.09	1.09	1.05	1.03	1.09	1.15	0.53	1.18
Malaysia	1.32	1.34	1.17	1.43	1.28	1.28	1.15	2.02	1.15	1.21
Pakistan	1.00	1.00	1.03	1.00	1.00	0.95	1.00	1.09	1.00	1.00
ROC	2.04	1.64	2.30	2.11	1.75	1.46	1.80	1.75	1.71	2.26
Thailand	0.70	1.10	1.32	0.81	0.71	0.81	0.80	0.61	0.44	1.09

Annex Table B-8. Gross Value of total agricultural output (GAO) (current local currency unit)

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	INR bill.	1,782.0	2,100.0	2,325.0	2,662.0	3,060.0	3,354.0	3,919.0	4,268.0	4,887.0	5,124.0
Indonesia	IDR trill.	38,637.9	43,080.4	49,792.2	55,661.4	62,371.5	73,534.0	83,819.5	95,353.0	163,149.2	203,608.3
Malaysia	MYR mill.	12.7	13.2	14.0	14.8	17.2	21.0	19.7	21.9	26.7	23.3
Pakistan	PKR mill.	356.3	428.8	454.4	543.1	663.4	785.4	941.2	1,069.2	1,158.9	1,218.5
ROC	TWD bill.	222.9	238.5	248.6	274.3	284.8	309.6	321.8	281.1	280.4	300.5
Thailand	THB bill.	274.4	323.5	327.7	287.4	341.6	422.7	472.2	478.6	546.2	491.2

2000	2001	2002	2003	2004	2005	2006	2007	2008	Rice
1.12	1.17	1.06	1.06	0.89	0.84	0.79	0.90	0.50	India
1.06	1.23	1.32	1.35	1.38	1.38	1.44	1.61	1.10	Indonesia
1.51	1.69	1.53	1.47	1.58	1.42	1.41	1.30	0.78	Malaysia
0.88	0.72	0.83	0.90	0.84	0.78	0.71	0.83	0.55	Pakistan
1.22	1.61	2.16	1.83	1.99	1.98	1.58	1.51	1.49	ROC
1.06	1.03	1.05	1.10	1.01	1.01	0.99	0.91	0.92	Thailand
2000	2001	2002	2003	2004	2005	2006	2007	2008	Poultry meat
1.16	1.14	1.17	1.24	1.12	1.07	1.34	1.54	1.51	India
1.00	1.00	1.00	1.00	1.00	1.05	1.05	1.05	1.05	Indonesia
1.08	1.03	1.04	1.14	0.98	1.08	0.99	1.02	0.91	Malaysia
1.00	1.00	1.10	1.20	1.02	1.00	1.05	1.00	1.00	Pakistan
1.25	1.19	1.25	1.14	1.17	1.25	1.25	1.12	1.25	ROC
0.98	1.01	0.95	0.97	0.95	1.21	1.09	0.82	0.79	Thailand
2000	2001	2002	2003	2004	2005	2006	2007	2008	Milk
1.13	0.95	1.39	1.26	1.13	1.01	1.09	0.75	0.76	India
1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	Indonesia
1.39	1.15	1.45	1.40	1.23	1.07	1.22	0.87	0.89	Malaysia
1.12	1.00	1.59	1.35	1.10	0.94	1.06	0.73	0.73	Pakistan
2.91	1.98	3.88	2.17	1.79	2.00	2.03	1.86	1.86	ROC
1.10	0.81	1.30	1.17	1.04	0.84	0.91	0.73	0.71	Thailand
2000	2001	2002	2003	2004	2005	2006	2007	2008	Sugar cane
1.02	1.09	1.73	1.87	1.99	1.10	0.67	1.31	0.84	India
1.09	1.11	1.20	1.30	1.23	0.91	0.76	1.07	1.18	Indonesia
1.28	1.35	1.18	1.21	1.21	1.18	1.16	0.80	0.80	Malaysia
1.21	1.13	1.28	1.50	1.48	1.37	1.54	1.45	1.07	Pakistan
2.38	1.63	1.47	1.17	1.31	1.14	1.14	1.14	1.11	ROC
0.94	0.71	0.80	0.78	0.68	0.74	0.73	0.96	1.05	Thailand

2000	2001	2002	2003	2004	2005	2006	2007	2008		
5,125.0	5,533.0	5,405.0	6,155.0	6,384.0	7,233.0	8,028.0	9,130.0	10,033.0	India	INR bill.
204,688.9	248,581.5	276,412.1	288,659.6	310,693.6	343,548.8	406,386.2	516,590.4	594,079.0	Indonesia	IDR trill.
19.3	18.9	23.8	31.1	35.3	35.0	40.7	53.6	56.9	Malaysia	MYR mill.
1,236.3	1,260.5	1,294.0	1,415.9	1,559.6	1,778.3	1,954.7	2,252.4	2,702.3	Pakistan	PKR mill.
272.8	262.0	257.1	259.9	287.2	289.3	290.8	293.1	325.2	ROC	TWD bill.
467.7	491.6	541.0	601.0	620.4	765.8	930.4	1,051.2	1,493.9	Thailand	THB bill.

Annex Table B-9. Percentage share of major MPS commodities in total GAOs

Rice	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	14.0	14.9	14.4	15.0	14.6	13.5	13.3	13.0	13.6	14.2
Indonesia	33.1	32.7	31.9	26.6	29.2	31.7	29.3	28.0	28.3	30.3
Malaysia	7.7	7.8	7.2	6.9	6.0	4.9	5.5	4.7	4.3	5.4
Pakistan	4.8	4.4	4.5	5.1	4.1	4.2	4.4	4.7	4.6	5.1
ROC	17.0	16.2	14.2	14.8	13.8	12.9	11.9	13.4	12.5	12.2
Thailand	24.4	24.6	23.6	19.8	23.7	20.6	24.3	26.4	29.0	26.4
Cereals total	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	23.5	25.0	24.1	24.6	24.1	22.5	23.9	22.1	23.2	24.5
Indonesia	37.1	36.6	35.8	29.7	32.9	36.1	34.6	32.6	32.6	35.2
Malaysia	7.8	7.9	7.2	6.9	6.1	5.0	5.6	4.8	4.4	5.5
Pakistan	16.9	17.2	18.3	18.1	15.8	15.5	16.3	17.4	17.4	17.5
ROC	19.0	18.0	15.9	16.4	15.4	14.2	13.2	14.6	13.1	12.7
Thailand	29.1	27.4	26.8	23.3	26.4	23.3	27.9	30.1	32.1	30.2
Meats and Milk	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	17.6	18.3	18.8	18.8	18.9	19.6	18.8	19.0	18.5	19.5
Indonesia	7.6	7.5	6.3	6.9	6.0	5.6	6.3	5.8	4.1	5.0
Malaysia	13.2	11.7	13.6	15.4	13.6	12.3	13.6	14.4	12.0	11.4
Pakistan	42.8	41.1	43.6	42.3	40.0	39.4	41.7	38.9	39.6	40.6
ROC	32.0	32.4	36.2	36.5	37.1	38.2	39.6	30.7	33.3	35.3
Thailand	12.0	12.4	13.2	20.0	19.0	19.4	19.0	14.3	15.1	20.4
PSE commodities total	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	69.2	69.4	67.6	70.2	70.3	68.9	69.0	64.8	65.7	65.2
Indonesia	68.5	67.9	68.1	61.1	62.5	66.8	66.0	61.4	59.0	60.7
Malaysia	83.1	83.1	82.7	82.1	85.1	86.9	85.5	86.4	87.4	86.3
Pakistan	92.4	89.9	87.9	81.6	76.9	76.5	77.2	74.4	75.3	77.6
ROC	64.9	63.3	65.9	66.6	67.2	66.0	67.0	61.4	63.8	64.3
Thailand	67.2	65.0	64.5	69.3	73.0	72.7	74.4	69.5	71.5	73.7

Annex Table B-10. Exchange rates (local currency unit per USD)

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
India	Indian Rupee	17.5	22.7	25.9	30.5	31.4	32.4	35.4	36.3	41.3	43.1
Indonesia	Rupiah	1,842.8	1,950.3	2,029.9	2,087.1	2,160.8	2,248.6	2,342.3	2,909.4	10,013.6	7,855.2
Malaysia	Ringgit	2.7	2.8	2.5	2.6	2.6	2.5	2.5	2.8	3.9	3.8
Pakistan	Pakistan Rupee	21.7	23.8	25.1	28.1	30.6	31.6	36.1	41.1	45	49.5
ROC	New Taiwan Dollar	26.9	26.8	25.2	26.4	26.5	26.5	27.5	28.7	33.4	32.3
Thailand	Baht	25.6	25.5	25.4	25.3	25.1	24.9	25.3	31.4	41.4	37.8

Source: World Bank World database and the Central Bank of ROC accessed Jan. 2010

2000	2001	2002	2003	2004	2005	2006	2007	2008	Rice
13.4	13.3	10.6	11.3	11.3	11.1	11.0	11.8	12.3	India
27.1	23.4	23.2	21.7	27.4	32.1	28.4	28.0	27.5	Indonesia
7.0	6.8	5.5	4.1	3.5	3.9	3.1	2.6	2.8	Malaysia
5.0	3.8	5.1	5.4	5.9	5.9	5.8	5.6	8.5	Pakistan
12.7	12.5	12.5	10.9	9.6	9.7	10.1	8.9	9.6	ROC
25.6	26.0	24.2	24.8	25.9	25.4	20.8	23.2	31.6	Thailand
2000	2001	2002	2003	2004	2005	2006	2007	2008	Cereals total
22.9	22.6	19.0	19.7	19.8	19.7	20.7	21.6	22.0	India
31.5	28.0	27.4	26.5	32.3	37.0	32.7	32.4	34.4	Indonesia
7.1	7.0	5.6	4.2	3.6	4.0	3.2	2.7	2.9	Malaysia
20.2	16.8	18.6	18.8	20.5	21.1	19.2	18.2	22.4	Pakistan
13.1	12.9	12.8	11.2	9.8	9.9	10.3	9.1	9.8	ROC
29.3	29.6	27.4	27.8	29.0	27.8	23.0	25.6	33.6	Thailand
2000	2001	2002	2003	2004	2005	2006	2007	2008	Meats and Milk
21.4	21.1	22.3	20.2	21.8	20.8	20.6	20.1	20.3	India
5.1	4.7	6.1	6.3	6.7	7.0	7.3	6.0	6.3	Indonesia
15.5	17.4	14.7	13.6	14.3	15.8	15.1	12.1	10.2	Malaysia
42.1	43.8	48.5	45.7	43.3	39.5	43.4	41.7	39.0	Pakistan
32.2	31.5	33.5	35.4	35.8	35.1	32.7	33.9	35.7	ROC
19.9	22.5	21.1	18.7	18.7	18.1	15.2	12.7	11.2	Thailand
2000	2001	2002	2003	2004	2005	2006	2007	2008	PSE commodities total
64.2	64.4	60.6	59.9	64.5	64.7	65.6	67.0	66.5	India
57.3	51.2	55.6	55.3	65.6	70.9	67.2	63.1	70.6	Indonesia
84.4	83.7	85.8	88.5	90.0	89.1	91.0	91.5	92.8	Malaysia
82.2	79.9	86.0	82.1	85.1	78.2	79.9	77.0	77.4	Pakistan
62.0	60.5	61.6	62.1	60.3	59.9	58.3	58.5	61.3	ROC
73.8	76.8	76.4	78.6	82.1	79.0	70.9	69.9	69.3	Thailand

2000	2001	2002	2003	2004	2005	2006	2007	2008		
44.9	47.2	48.6	46.6	45.3	44.1	45.3	41.3	43.5	India	Indian Rupee
8,421.8	10,260.8	9,311.2	8,577.1	8,938.8	9,704.7	9,159.3	9,141.0	9,699.0	Indonesia	Rupiah
3.8	3.8	3.8	3.8	3.8	3.8	3.7	3.4	3.3	Malaysia	Ringgit
53.6	61.9	59.7	57.8	58.3	59.5	60.3	60.7	70.4	Pakistan	Pakistan Rupee
31.2	33.8	34.6	34.4	33.4	32.2	32.5	32.8	31.5	ROC	New Taiwan Dollar
40.1	44.4	43	41.5	40.2	40.2	37.9	34.5	33.3	Thailand	Baht

C. TSE tables for selected countries

Annex Table C-1. TSE: India

Item	Sources/Computation	Unit	1990	1991	1992	1993	1994
I. Total value of production (at farm gate)	(I.2)/(I.1)	INR mill.	1,722,350	1,943,267	2,242,108	2,549,646	2,910,867
1. Share of selected PSE commodities (%)	computed from GAO share table	%	69%	69%	68%	70%	70%
2. Selected PSE commodities	sum of item III of all MPS tables	INR mill.	1,192,096	1,349,387	1,514,615	1,789,225	2,045,680
II. Total value of consumption (at farm gate)	(II.1)/(I.1)	INR mill.	1,681,199	1,905,424	2,211,880	2,482,433	2,856,041
1. Selected PSE commodities	sum of item VI of all MPS tables	INR mill.	1,163,613	1,323,109	1,494,195	1,742,058	2,007,150
III.1 Producer Support Estimate	Sum (A~G)	INR mill.	133,617	14,348	–39,878	–157,835	47,256
S. Support on Commodity Output	A+B	INR mill.	58,488	–96,536	–173,959	–303,057	–120,371
A. Market price support	sum of item XI of all MPS tables	INR mill.	58,488	–96,536	–173,959	–303,057	–120,371
A.1 Of which export refund (or tax)	sum of item X.1 of all MPS tables	INR mill.	5,711	5,323	348	1,072	3,769
B. Payments based on output	from Budget tables	INR mill.	0	0	0	0	0
C. Payments based on area planted/animal numbers	ditto	INR mill.	0	0	0	0	0
D. Payments based on input use	ditto	INR mill.	75,033	110,853	134,024	144,584	166,874
E. Payments based on input constraints	ditto	INR mill.	0	0	0	0	0
F. Payments based on overall farming income	ditto	INR mill.	0	0	0	0	0
G. Miscellaneous payments	ditto	INR mill.	95	32	57	639	754
III.2 Percentage PSE	100*(III.1)/((I)+(B)+(C)+(D)+(E)+(F)+(G))	%	7%	1%	–2%	–6%	2%
III.3 Producer NAC	1+(III.2)/(100–(III.2))		1.08	1.01	0.98	0.94	1.02
IV. General Services Support Estimate (GSSE)	(I)+(J)+(K)+(L)+(M)+(N)+(O)	INR mill.	28,032	33,346	26,438	63,357	63,364
I. Research and development	From GSSE table (Table B-3) sum	INR mill.	148	262	281	3,617	4,056
J. Agricultural schools	ditto	INR mill.	3,218	3,545	3,800	5,246	5,417
K. Inspection services	ditto	INR mill.	316	736	330	1,845	352
L. Infrastructure	ditto	INR mill.	11	45	116	419	370
M.Marketing and promotion	ditto	INR mill.	20	19	19	62	118
N. Public stockholding	ditto	INR mill.	24,200	28,505	21,738	52,088	51,250
P. Miscellaneous	ditto	INR mill.	120	235	154	81	1,800
V.1 Consumer Support Estimate (CSE)	(P) + (Q) + (R)	INR mill.	–52,073	102,166	189,105	312,453	125,479
P. Transfers to producers from consumers (–)	sum of item IX.1 of all MPS tables	INR mill.	–52,777	101,859	174,306	304,130	124,141
Q. Other transfers from consumers (=Import tax) (–)	sum of item IX.2 of all MPS tables	INR mill.	152	307	3,391	1,720	1,338
R. Transfers to consumers from taxpayers (=subsidy)	(R.1)/(I.1)	INR mill.	552	0	11,409	6,604	0
1. Selected PSE commodities	sum of item X.2 of all MPS tables	INR mill.	382	0	7,707	4,635	0
V.2 Percentage CSE	100* (V.1) / ((II)–(R))	%	–3%	5%	9%	13%	4%
V.3 Consumer NAC	1–(V.2) / (100+(V.2))		1.03	0.95	0.92	0.89	0.96
VI. Total Support Estimate (TSE)	(III.1)+(IV)+(R)	INR mill.	162,201	47,694	–2,032	–87,874	110,620
T. Transfers from consumers	–((P) + (Q))	INR mill.	52,625	–102,166	–177,697	–305,849	–125,479
U. Transfers from taxpayers	(III.1) + (P) + (IV) + (R)	INR mill.	109,424	149,553	172,274	216,256	234,761
V. Budget revenues (=import tax) (–)	(Q)	INR mill.	152	307	3,391	1,720	1,338

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
3,200,264	3,816,200	4,157,251	4,727,678	4,808,684	4,847,730	5,286,098	5,229,065	6,180,820	5,913,212	6,561,163	7,222,681	8,082,663	9,075,427
69%	69%	65%	66%	65%	64%	64%	61%	60%	65%	65%	66%	67%	67%
2,205,924	2,633,126	2,694,723	3,106,111	3,134,538	3,112,993	3,404,604	3,170,702	3,701,579	3,815,441	4,244,639	4,734,501	5,417,484	6,038,277
3,152,076	3,690,293	4,060,049	4,709,596	4,805,019	4,804,128	5,228,246	5,179,473	6,082,058	5,813,508	6,314,399	7,048,946	7,735,168	8,744,210
2,172,708	2,546,252	2,631,717	3,094,232	3,132,148	3,084,994	3,367,343	3,140,631	3,642,432	3,751,108	4,085,000	4,620,617	5,184,573	5,817,904
–382,093	–343,406	–14,162	123,067	507,683	725,839	615,232	873,701	896,263	622,654	465,907	197,583	-227,395	–784,037
–541,521	–535,755	–252,244	–164,260	194,721	416,492	288,931	589,629	597,573	274,903	–20,476	-368,287	-821,248	–1,927,971
–541,521	–535,755	–254,548	–164,310	194,696	416,492	288,931	589,466	597,409	274,646	–20,873	-368,867	-821,248	–1,927,971
–157	–17,460	–672	–9,070	–5,546	–111	2,179	5,673	13,255	22	–14,682	-12,084	-10,414	–120,686
0	0	2,304	50	25	0	0	163	164	257	397	580	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
159,033	191,218	236,947	286,200	310,845	309,320	326,260	281,480	292,282	342,202	478,840	559,466	585,928	1,135,944
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
396	1,131	1,135	1,127	2,117	27	41	2,593	6,408	5,549	7,543	6,404	7,925	7,990
–11%	–9%	0%	2%	10%	14%	11%	16%	14%	10%	7%	3%	–3%	–8%
0.90	0.92	1.00	1.03	1.11	1.16	1.12	1.19	1.16	1.11	1.07	1.03	0.97	0.93
68,438	61,289	63,122	85,867	73,159	108,731	140,276	204,497	213,544	246,741	216,387	211,192	202,203	303,005
4,548	4,916	4,909	3,738	5,007	2,375	1,777	2,561	3,633	4,886	4,941	4,853	9,266	7,238
5,777	5,866	7,429	10,193	13,897	13,724	14,096	14,785	16,122	20,185	19,734	25,477	26,495	33,715
478	450	519	362	528	354	265	182	235	689	809	913	962	1,336
180	317	120	403	256	197	353	503	564	1,093	1,232	1,687	4,790	8,024
370	558	344	330	337	728	605	1,170	507	1,810	2,079	2,705	2,377	3,367
53,920	48,000	48,606	69,643	52,095	90,335	120,630	178,912	191,446	204,097	171,976	162,407	138,190	205,816
3,165	1,183	1,195	1,198	1,040	1,018	2,551	6,384	1,037	13,982	15,616	13,151	20,124	43,508
545,938	544,152	309,310	192,178	–128,131	–359,929	–186,540	–457,837	–457,780	–167,332	119,618	511,841	1,147,338	2,245,573
541,364	518,294	253,876	155,240	–200,242	–416,602	–286,752	–583,793	–584,154	–274,624	6,191	356,783	810,834	1,807,285
4,574	2,931	1,935	2,093	–2,804	220	–1,702	–1,084	–2,808	–1,072	–1,349	9,937	10,148	1,753
0	22,926	53,499	34,845	74,916	56,454	101,913	127,040	129,182	108,364	114,776	145,120	326,356	436,536
0	15,819	34,678	22,894	48,834	36,252	65,639	77,032	77,365	69,921	74,252	95,127	218,743	290,446
17%	15%	8%	4%	–3%	–8%	–4%	–9%	–8%	–3%	2%	7%	15%	27%
0.85	0.87	0.93	0.96	1.03	1.08	1.04	1.10	1.08	1.03	0.98	0.93	0.87	0.79
–313,656	–259,190	102,459	243,779	655,758	891,023	857,422	1,205,238	1,238,989	977,759	797,069	553,895	301,164	–44,497
–545,938	–521,226	–255,811	–157,333	203,046	416,383	288,453	584,877	586,962	275,696	–4,842	–366,721	–820,982	–1,809,037
227,708	259,104	356,335	399,019	455,516	474,421	570,670	621,445	654,835	703,135	803,261	910,679	1,111,998	1,762,788
4,574	2,931	1,935	2,093	–2,804	220	–1,702	–1,084	–2,808	–1,072	–1,349	9,937	10,148	1,753

Annex Table C-2. TSE: Indonesia

Item	Unit	1990	1991	1992	1993	1994
I. Total value of production (at farm gate)	IDR bill.	40,916	45,093	51,789	58,289	66,108
1. Share of selected PSE commodities (%)	%	75%	73%	74%	66%	69%
2. Selected PSE commodities	IDR bill.	30,681	33,124	38,112	38,640	45,643
II. Total value of consumption (at farm gate)	IDR bill.	37,189	42,061	49,414	54,620	63,134
1. Selected PSE commodities	IDR bill.	27,886	30,897	36,364	36,208	43,590
III.1 Producer Support Estimate	IDR bill.	2,381	2,448	5,499	6,953	7,662
S. Support on Commodity Output	IDR bill.	2,262	2,332	5,298	6,783	7,428
A. Market price support	IDR bill.	2,262	2,332	5,298	6,783	7,428
A.1 Of which export refund (or tax)	IDR bill.	189	175	301	630	631
B. Payments based on output	IDR bill.	0	0	0	0	0
C. Payments based on area planted/animal numbers	IDR bill.	1	1	1	1	1
D. Payments based on input use	IDR bill.	110	104	189	157	221
E. Payments based on input constraints	IDR bill.	4	5	6	6	6
F. Payments based on overall farming income	IDR bill.	0	0	0	0	0
G. Miscellaneous payments	IDR bill.	5	5	6	6	6
III.2 Percentage PSE	%	6%	5%	11%	12%	12%
III.3 Producer NAC		1.06	1.06	1.12	1.13	1.13
IV. General Services Support Estimate (GSSE)	IDR bill.	958	964	998	1,003	994
I. Research and development	IDR bill.	80	82	85	86	89
J. Agricultural schools	IDR bill.	121	128	132	123	134
K. Inspection services	IDR bill.	38	38	39	51	54
L. Infrastructure	IDR bill.	502	517	553	579	583
M.Marketing and promotion	IDR bill.	2	2	2	2	2
N. Public stockholding	IDR bill.	213	192	185	158	129
P. Miscellaneous	IDR bill.	3	3	3	3	3
V.1 Consumer Support Estimate (CSE)	IDR bill.	–2,250	–2,579	–5,418	–6,655	–7,617
P. Transfers to producers from consumers (–)	IDR bill.	–2,072	–2,158	–4,997	–6,153	–6,797
Q. Other transfers from consumers (=Import tax) (–)	IDR bill.	–178	–421	–421	–502	–820
R. Transfers to consumers from taxpayers (=subsidy)	IDR bill.	0	0	0	0	0
1. Selected PSE commodities	IDR bill.	0	0	0	0	0
V.2 Percentage CSE	%	–6%	–6%	–11%	–12%	–12%
V.3 Consumer NAC		1.06	1.07	1.12	1.14	1.14
VI. Total Support Estimate (TSE)	IDR bill.	3,339	3,411	6,498	7,956	8,656
T. Transfers from consumers	IDR bill.	2,250	2,579	5,418	6,655	7,617
U. Transfers from taxpayers	IDR bill.	1,267	1,253	1,500	1,803	1,859
V. Budget revenues (=import tax) (–)	IDR bill.	–178	–421	–421	–502	–820

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
76,157	87,219	99,073	165,841	210,410	213,901	257,511	289,809	302,684	319,952	345,653	404,117	511,555	573,500
75%	72%	68%	64%	67%	64%	58%	61%	61%	71%	75%	72%	68%	77%
57,301	62,954	67,443	106,763	140,052	136,586	148,478	178,081	184,085	228,181	260,340	289,250	346,158	441,853
76,491	86,595	94,326	163,543	218,363	210,190	254,376	283,521	294,518	297,711	325,064	370,554	509,626	561,008
57,552	62,503	64,212	105,284	145,346	134,216	146,671	174,218	179,119	212,320	244,834	265,227	344,852	432,228
6,245	6,558	12,311	–32,265	16,411	1,372	8,579	11,493	14,464	25,607	23,143	29,464	1,854	–17,221
6,055	6,179	12,068	–32,610	16,048	1,001	8,175	10,954	13,915	25,032	22,512	28,793	1,154	–18,005
6,055	6,179	12,068	–32,610	16,048	1,001	8,175	10,954	13,915	25,032	22,512	28,793	1,154	–18,005
18	380	946	–1,604	–872	–1,371	–1,969	–3,899	–2,428	–344	–6,145	–4,490	–26,691	–17,767
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1
175	361	224	317	332	270	296	392	404	426	473	504	540	618
7	8	9	11	11	11	12	13	13	14	15	16	16	17
0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	9	10	17	20	90	95	134	132	134	143	150	144	150
8%	7%	12%	–19%	8%	1%	3%	4%	5%	8%	7%	7%	0%	–3%
1.09	1.08	1.14	0.84	1.08	1.01	1.03	1.04	1.05	1.09	1.07	1.08	1.00	0.97
861	857	720	579	720	873	914	1,481	1,589	1,911	2,128	2,544	2,754	3,081
84	84	92	70	74	108	123	172	196	321	355	492	510	538
136	150	163	177	190	198	214	215	219	230	240	250	268	268
57	62	62	63	70	70	75	136	155	159	177	183	188	346
464	448	333	208	305	364	370	703	758	775	888	955	1,005	1,065
2	2	2	2	2	2	2	2	3	3	3	3	3	3
113	107	62	52	69	121	119	240	243	404	419	583	610	640
4	4	6	8	9	10	11	13	15	20	47	78	170	220
–7,165	–6,837	–12,260	33,633	–21,659	–3,239	–11,982	–19,035	–20,061	–26,418	–29,809	–34,460	–32,420	–4,397
–6,037	–5,799	–11,122	31,006	–16,920	–2,371	–10,145	–14,853	–16,343	–25,376	–28,657	–33,283	–27,844	238
–1,128	–1,038	–1,139	2,627	–4,739	–868	–1,837	–4,182	–3,718	–1,042	–1,153	–1,177	–4,576	–4,635
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
–9%	–8%	–13%	21%	–10%	–2%	–5%	–7%	–7%	–9%	–9%	–9%	–6%	–1%
1.10	1.09	1.15	0.83	1.11	1.02	1.05	1.07	1.07	1.10	1.10	1.10	1.07	1.01
7,105	7,415	13,031	–31,686	17,131	2,245	9,492	12,975	16,053	27,518	25,272	32,008	4,608	–14,139
7,165	6,837	12,260	–33,633	21,659	3,239	11,982	19,035	20,061	26,418	29,809	34,460	32,420	4,397
1,068	1,616	1,910	-680	211	–126	–652	–1,878	–290	2,142	–3,385	–1,276	–23,236	–13,901
–1,128	–1,038	–1,139	2,627	–4,739	–868	–1,837	–4,182	–3,718	–1,042	–1,153	–1,177	–4,576	–4,635

Annex Table C-3. TSE: Malaysia

Item	Unit	1990	1991	1992	1993	1994
I. Total value of production (at farm gate)	MYR mill.	13,942	15,136	16,804	17,435	21,766
1. Share of selected PSE commodities (%)	%	83%	83%	83%	82%	85%
2. Selected PSE commodities	MYR mill.	11,580	12,584	13,901	14,313	18,532
II. Total value of consumption (at farm gate)	MYR mill.	9,372	10,629	11,356	12,938	13,984
1. Selected PSE commodities	MYR mill.	7,784	8,837	9,394	10,621	11,906
III.1 Producer Support Estimate	MYR mill.	–181	–436	610	452	607
S. Support on Commodity Output	MYR mill.	–181	–436	610	452	607
A. Market price support	MYR mill.	–513	–828	251	54	248
A.1 Of which export refund (or tax)	MYR mill.	–559	–647	–254	–553	–147
B. Payments based on output	MYR mill.	332	392	359	398	358
C. Payments based on area planted/animal numbers	MYR mill.	0	0	0	0	0
D. Payments based on input use	MYR mill.	0	0	0	0	0
E. Payments based on input constraints	MYR mill.	0	0	0	0	0
F. Payments based on overall farming income	MYR mill.	0	0	0	0	0
G. Miscellaneous payments	MYR mill.	0	0	0	0	0
III.2 Percentage PSE	%	–1%	–3%	4%	3%	3%
III.3 Producer NAC		0.99	0.97	1.04	1.03	1.03
IV. General Services Support Estimate (GSSE)	MYR mill.	995	967	1,272	1,200	1,196
I. Research and development	MYR mill.	270	281	293	305	317
J. Agricultural schools	MYR mill.	96	29	36	101	100
K. Inspection services	MYR mill.	1	1	1	1	1
L. Infrastructure	MYR mill.	500	514	787	624	582
M.Marketing and promotion	MYR mill.	39	42	45	4	59
N. Public stockholding	MYR mill.	0	0	0	0	0
P. Miscellaneous	MYR mill.	90	100	111	121	136
V.1 Consumer Support Estimate (CSE)	MYR mill.	–332	–154	–893	–1,024	–748
P. Transfers to producers from consumers (–)	MYR mill.	–47	182	–505	–607	–395
Q. Other transfers from consumers (=Import tax) (–)	MYR mill.	–285	–336	–388	–417	–354
R. Transfers to consumers from taxpayers (=subsidy)	MYR mill.	0	0	0	0	0
1. Selected PSE commodities	MYR mill.	0	0	0	0	0
V.2 Percentage CSE	%	–4%	–1%	–8%	–8%	–5%
V.3 Consumer NAC		1.04	1.01	1.09	1.09	1.06
VI. Total Support Estimate (TSE)	MYR mill.	815	531	1,882	1,652	1,802
T. Transfers from consumers	MYR mill.	332	154	893	1,024	748
U. Transfers from taxpayers	MYR mill.	768	713	1,377	1,045	1,407
V. Budget revenues (=import tax) (–)	MYR mill.	–285	–336	–388	–417	–354

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
24,381	23,752	25,055	32,896	28,844	24,668	22,362	29,813	38,304	41,791	42,404	47,308	68,066	74,570
87%	85%	86%	87%	86%	84%	84%	86%	89%	90%	89%	91%	91%	93%
21,179	20,298	21,655	28,755	24,895	20,823	18,708	25,582	33,915	37,598	37,798	43,063	62,270	69,187
14,882	16,653	19,010	16,361	19,028	18,208	19,166	20,152	22,546	24,739	27,148	28,393	35,647	41,525
12,927	14,232	16,430	14,302	16,423	15,370	16,034	17,292	19,962	22,257	24,199	25,845	32,611	38,527
–610	185	–4,223	–1,363	–756	406	–589	-129	855	323	884	68	1,706	100
–782	5	–4,338	–1,637	–903	249	–756	–306	668	–50	672	–169	1,001	–618
–1,170	–406	–4,758	–2,017	–1,309	–183	–1,173	–643	294	–465	211	–654	557	–1,066
–887	–299	–1,768	–1,115	–741	–591	–1,212	–801	–91	–619	–336	–599	0	0
388	411	421	380	406	432	417	337	374	415	461	486	444	448
0	0	0	0	0	0	0	0	0	0	0	0	0	0
172	180	115	274	147	157	167	177	187	373	212	237	705	718
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
–2%	1%	–17%	–4%	–3%	2%	–3%	0%	2%	1%	2%	0%	2%	0%
0.98	1.01	0.86	0.96	0.97	1.02	0.97	1.00	1.02	1.01	1.02	1.00	1.03	1.00
1,118	859	681	704	853	998	1,113	1,349	1,689	1,868	2,038	2,229	2,228	2,228
331	345	375	388	442	500	497	630	794	837	848	850	850	850
100	110	97	107	118	151	164	148	161	175	191	208	208	208
1	1	1	2	2	2	2	2	2	2	2	4	4	4
536	193	56	47	110	156	222	317	452	542	650	780	780	780
55	75	64	57	57	64	75	85	97	110	125	142	142	142
0	0	0	0	0	0	0	0	0	0	0	0	0	0
96	136	88	104	125	126	153	168	184	202	222	244	244	244
–223	–737	2,234	131	–223	–1,410	–876	–1,177	–1,374	–1,094	–1,017	–484	–68	3,150
283	107	2,990	902	568	–408	–39	–158	–385	–153	–547	55	–557	1,066
–506	–844	–756	–770	–791	–1,002	–837	–1,019	–989	–941	–470	–759	270	1,653
0	0	0	0	0	0	0	0	0	0	0	220	219	431
0	0	0	0	0	0	0	0	0	0	0	200	200	400
–1%	–4%	12%	1%	–1%	–8%	–5%	–6%	–6%	–4%	–4%	–2%	0%	8%
1.02	1.05	0.89	0.99	1.01	1.08	1.05	1.06	1.06	1.05	1.04	1.02	1.00	0.93
508	1,044	–3,541	–659	96	1,404	525	1,220	2,544	2,191	2,922	2,517	4,153	2,759
223	737	–2,234	–131	223	1,410	876	1,177	1,374	1,094	1,017	704	287	–2,719
791	1,150	–551	243	664	995	486	1,062	2,159	2,038	2,375	2,572	3,596	3,825
–506	–844	–756	–770	–791	–1,002	–837	–1,019	–989	–941	–470	–759	270	1,653

Annex Table C-4. TSE: Pakistan

Item	Unit	1990	1991	1992	1993	1994
I. Total value of production (at farm gate)	PKR mill.	354,505	430,455	444,416	529,563	667,449
1. Share of selected PSE commodities (%)	%	92%	90%	88%	82%	77%
2. Selected PSE commodities	PKR mill.	327,563	387,045	390,857	432,107	513,353
II. Total value of consumption (at farm gate)	PKR mill.	348,010	426,949	439,239	527,434	670,225
1. Selected PSE commodities	PKR mill.	321,561	383,893	386,303	430,369	515,488
III.1 Producer Support Estimate	PKR mill.	–69,995	–63,617	–29,830	–11,631	51,778
S. Support on Commodity Output	PKR mill.	–72,731	–64,427	–33,524	–14,263	48,345
A. Market price support	PKR mill.	–72,731	–64,427	–33,524	–14,263	48,345
A.1 Of which export refund (or tax)	PKR mill.	–6,696	–5,879	–3,913	–2,088	110
B. Payments based on output	PKR mill.	0	0	0	0	0
C. Payments based on area planted/animal numbers	PKR mill.	0	0	0	0	0
D. Payments based on input use	PKR mill.	2,736	810	3,694	2,632	3,433
E. Payments based on input constraints	PKR mill.	0	0	0	0	0
F. Payments based on overall farming income	PKR mill.	0	0	0	0	0
G. Miscellaneous payments	PKR mill.	0	0	0	0	0
III.2 Percentage PSE	%	–20%	–15%	–7%	–2%	8%
III.3 Producer NAC		0.84	0.87	0.94	0.98	1.08
IV. General Services Support Estimate (GSSE)	PKR mill.	14,346	13,477	11,849	16,976	17,909
I. Research and development	PKR mill.	467	551	620	487	514
J. Agricultural schools	PKR mill.	111	104	147	92	122
K. Inspection services	PKR mill.	295	348	391	308	325
L. Infrastructure	PKR mill.	9,013	9,103	8,750	11,802	13,570
M.Marketing and promotion	PKR mill.	158	177	194	176	186
N. Public stockholding	PKR mill.	4,222	3,100	1,641	4,028	3,104
P. Miscellaneous	PKR mill.	80	94	106	83	88
V.1 Consumer Support Estimate (CSE)	PKR mill.	66,900	58,412	32,050	13,228	–49,762
P. Transfers to producers from consumers (–)	PKR mill.	66,035	58,548	29,611	12,175	–48,235
Q. Other transfers from consumers (=Import tax) (–)	PKR mill.	865	–136	2,439	1,053	–1,526
R. Transfers to consumers from taxpayers (=subsidy)	PKR mill.	0	0	0	0	0
1. Selected PSE commodities	PKR mill.	0	0	0	0	0
V.2 Percentage CSE	%	19%	14%	7%	3%	–7%
V.3 Consumer NAC		0.84	0.88	0.93	0.98	1.08
VI. Total Support Estimate (TSE)	PKR mill.	–55,648	–50,140	–17,981	5,345	69,687
T. Transfers from consumers	PKR mill.	–66,900	–58,412	–32,050	–13,228	49,762
U. Transfers from taxpayers	PKR mill.	10,387	8,408	11,630	17,520	21,452
V. Budget revenues (=import tax) (–)	PKR mill.	865	–136	2,439	1,053	–1,526

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
786,247	946,123	1,064,536	1,260,890	1,325,467	1,288,799	1,350,435	1,386,556	1,529,588	1,738,741	1,975,473	2,179,868	2,512,826	2,919,105
76%	77%	74%	75%	78%	82%	80%	86%	82%	85%	78%	80%	77%	77%
601,205	730,211	792,316	949,332	1,029,029	1,059,105	1,078,821	1,192,281	1,256,131	1,478,946	1,545,736	1,742,481	1,935,524	2,259,079
781,942	937,537	1,067,901	1,250,206	1,302,366	1,270,633	1,348,750	1,364,970	1,508,836	1,710,670	1,937,735	2,192,846	2,492,615	2,966,421
597,913	723,584	794,821	941,289	1,011,094	1,044,177	1,077,474	1,173,720	1,239,089	1,455,069	1,516,207	1,752,855	1,919,957	2,295,697
–125,964	–158,826	–83,732	47,549	98,073	10,350	16,881	146,169	54,765	60,375	–16,320	115,111	–310,103	–453,115
–130,167	–163,739	–89,447	42,340	92,215	4,997	12,081	141,269	53,843	55,374	–36,830	85,894	–325,460	–468,471
–130,167	–163,739	–89,447	42,340	92,215	4,997	12,081	141,269	53,843	55,374	–36,830	85,894	–325,460	–468,471
744	–9,524	1,631	–2,763	1,424	–4,885	–6,512	–3,080	–1,238	–9,812	–18,384	–21,570	–6,650	–69,842
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
4,203	4,913	5,715	5,209	5,857	5,352	4,800	4,900	922	5,001	20,510	29,217	15,357	15,357
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
–16%	–17%	–8%	4%	7%	1	1%	11%	4%	3%	–1%	5%	–12%	–15%
0.86	0.86	0.93	1.04	1.08	1.01	1.01	1.12	1.04	1.04	0.99	1.05	0.89	0.87
17,188	17,635	17,010	17,907	16,526	38,018	40,790	15,813	6,958	8,727	29,944	31,352	29,960	29,960
537	373	396	228	229	199	339	276	363	484	896	365	688	688
73	23	13	23	67	79	91	70	121	125	121	20	100	100
238	166	156	43	146	168	349	178	12	132	89	263	108	108
14,484	14,179	10,893	11,494	10,607	10,687	11,975	7,607	5,054	4,260	6,452	24,453	23,292	23,292
98	90	70	119	106	123	226	193	0	232	18	733	255	255
1,665	2,718	5,412	5,886	5,265	26,640	27,728	7,440	1,396	3,424	22,211	5,409	5,409	5,409
93	86	70	114	106	122	82	49	14	70	157	109	109	109
132,548	162,828	95,130	–46,211	–92,729	–12,191	–19,893	–144,770	–55,606	–65,568	16,874	–123,440	315,761	403,398
130,912	154,215	91,078	–45,102	–90,791	–9,882	–18,593	–144,349	–55,081	–65,186	18,446	–107,464	318,809	398,629
1,636	8,614	4,052	–1,109	–1,938	–2,309	–1,300	–421	–525	–383	–1,573	–15,977	–3,048	4,769
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
17%	17%	9%	–4%	–7%	–1%	–1%	–11%	–4%	–4%	1%	–6%	13%	14%
0.86	0.85	0.92	1.04	1.08	1.01	1.01	1.12	1.04	1.04	0.99	1.06	0.89	0.88
–108,776	–141,191	–66,722	65,456	114,599	48,367	57,671	161,982	61,724	69,102	13,624	146,462	–280,143	–423,154
–132,548	–162,828	–95,130	46,211	92,729	12,191	19,893	144,770	55,606	65,568	–16,874	123,440	–315,761	–403,398
22,135	13,024	24,356	20,353	23,808	38,485	39,078	17,633	6,642	3,916	32,071	38,999	38,667	–24,525
1,636	8,614	4,052	–1,109	–1,938	–2,309	–1,300	–421	–525	–383	–1,573	–15,977	–3,048	4,769

Annex Table C-5. TSE: ROC

Item	Unit	1990	1991	1992	1993	1994
I. Total value of production (at farm gate)	TWD mill.	224,028	240,610	248,851	274,935	285,807
1. Share of selected PSE commodities (%)	%	65%	63%	66%	67%	67%
2. Selected PSE commodities	TWD mill.	145,443	152,375	163,917	183,101	191,924
II. Total value of consumption (at farm gate)	TWD mill.	276,360	285,271	298,668	331,625	338,088
1. Selected PSE commodities	TWD mill.	179,417	180,658	196,731	220,856	227,031
III.1 Producer Support Estimate	TWD mill.	33,731	44,208	80,057	87,315	87,398
S. Support on Commodity Output	TWD mill.	29,925	39,544	75,729	83,116	82,342
A. Market price support	TWD mill.	29,925	39,544	75,729	83,116	82,342
A.1 Of which export refund (or tax)	TWD mill.	–3,894	–3,699	2,988	2,095	4,654
B. Payments based on output	TWD mill.	0	0	0	0	0
C. Payments based on area planted/animal numbers	TWD mill.	666	684	665	547	498
D. Payments based on input use	TWD mill.	998	1,359	1,356	1,269	1,210
E. Payments based on input constraints	TWD mill.	1,831	1,811	1,623	1,693	2,066
F. Payments based on overall farming income	TWD mill.	0	0	0	0	0
G. Miscellaneous payments	TWD mill.	311	810	684	690	1,283
III.2 Percentage PSE	%	15%	18%	32%	31%	30%
III.3 Producer NAC		1.17	1.22	1.46	1.46	1.43
IV. General Services Support Estimate (GSSE)	TWD mill.	9,278	11,997	12,579	13,979	12,792
I. Research and development	TWD mill.	1,387	1,366	1,161	1,696	1,376
J. Agricultural schools	TWD mill.	2,068	1,679	1,861	2,339	2,160
K. Inspection services	TWD mill.	715	925	871	913	805
L. Infrastructure	TWD mill.	3,398	5,277	5,655	5,792	5,944
M.Marketing and promotion	TWD mill.	1,022	1,067	1,063	1,388	1,287
N. Public stockholding	TWD mill.	42	44	45	47	49
P. Miscellaneous	TWD mill.	646	1,638	1,924	1,803	1,171
V.1 Consumer Support Estimate (CSE)	TWD mill.	–40,147	–51,133	–81,908	–91,480	–87,950
P. Transfers to producers from consumers (–)	TWD mill.	–33,820	–43,242	–72,741	–81,020	–77,688
Q. Other transfers from consumers (=Import tax) (–)	TWD mill.	–6,869	–8,453	–9,715	–11,008	–10,813
R. Transfers to consumers from taxpayers (=subsidy)	TWD mill.	541	562	548	549	551
1. Selected PSE commodities	TWD mill.	351	356	361	365	370
V.2 Percentage CSE	%	–15%	–18%	–27%	–28%	–26%
V.3 Consumer NAC		1.17	1.22	1.38	1.38	1.35
VI. Total Support Estimate (TSE)	TWD mill.	43,550	56,767	93,184	101,843	100,741
T. Transfers from consumers	TWD mill.	40,688	51,695	82,456	92,029	88,501
U. Transfers from taxpayers	TWD mill.	9,730	13,524	20,443	20,822	23,053
V. Budget revenues (=import tax) (–)	TWD mill.	–6,869	–8,453	–9,715	–11,008	–10,813

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
313,171	324,238	281,057	279,626	300,453	272,794	261,964	257,053	259,867	287,219	289,300	290,817	293,058	325,213
66%	67%	61%	64%	64%	62%	60%	62%	62%	60%	60%	58%	59%	61%
206,738	217,250	172,484	178,507	193,086	169,094	158,482	158,275	161,316	173,320	173,165	169,536	171,512	199,351
372,295	404,460	391,255	376,380	397,839	370,337	359,251	368,858	401,748	447,549	449,868	458,404	487,843	550,859
245,768	271,002	240,112	240,273	255,671	229,557	217,339	227,118	249,391	270,069	269,274	267,233	285,509	337,669
102,965	85,197	45,962	92,712	116,166	79,416	57,915	77,352	73,585	105,807	85,641	78,389	75,742	85,770
98,319	73,107	39,506	73,626	105,327	60,103	39,087	68,560	62,459	92,272	69,499	65,157	58,252	68,123
98,319	73,107	39,506	73,626	105,327	60,103	39,087	68,560	62,459	92,272	69,499	65,157	58,252	68,123
8,576	2,678	–721	200	–43	21	78	22	–139	176	9	5	4	6
0	0	0	0	0	0	0	0	0	0	0	0	0	0
462	530	197	34	33	30	36	55	22	40	41	34	34	37
1,422	1,474	1,227	1,142	1,799	1,721	1,327	1,028	855	589	774	936	978	957
1,889	3,461	3,112	3,977	5,498	13,422	14,310	7,160	8,561	10,945	9,935	10,232	10,235	12,078
0	0	0	0	0	0	0	0	0	0	0	0	0	0
873	6,625	1,920	13,933	3,510	4,139	3,155	550	1,688	1,961	5,393	2,030	6,242	4,575
32%	25%	16%	31%	37%	27%	21%	29%	27%	35%	28%	26%	24%	25%
1.48	1.34	1.19	1.45	1.60	1.37	1.26	1.41	1.37	1.54	1.39	1.35	1.32	1.33
12,781	13,684	14,292	14,619	16,030	28,727	36,528	19,452	17,827	19,436	20,874	18,716	18,322	18,089
1,123	1,139	1,312	1,414	1,844	2,513	3,111	2,475	2,431	2,724	2,709	2,979	3,466	3,177
1,930	2,102	2,478	2,701	4,089	4,340	3,583	3,023	2,637	2,805	2,343	2,575	2,289	1,809
869	899	1,222	1,338	1,622	1,504	1,423	1,205	1,143	1,560	1,417	1,417	1,419	1,409
6,134	6,490	6,114	6,462	6,170	8,046	16,744	10,750	9,136	8,855	11,509	9,619	9,386	9,207
1,700	920	1,236	870	1,053	923	733	1,114	1,585	2,638	1,945	1,494	1,165	1,870
50	51	52	52	52	52	52	52	53	54	55	56	57	57
976	2,084	1,878	1,782	1,200	11,348	10,882	833	840	800	895	576	541	560
–99,484	–79,642	–52,516	–85,065	–121,275	–75,054	–47,285	–77,918	–72,994	–106,012	–81,463	–77,814	–70,450	–80,071
–89,743	–70,428	–40,226	–73,426	–105,370	–60,082	–39,009	–68,538	–62,598	–92,096	–69,490	–65,152	–58,248	–68,117
–10,310	–9,780	–12,917	–12,249	–16,519	–15,615	–8,943	–10,043	–11,061	–14,608	–12,679	–13,396	–12,940	–12,667
568	567	627	610	613	643	667	663	665	692	706	733	738	713
375	380	385	389	394	399	404	408	413	418	423	427	432	437
–27%	–20%	–13%	–23%	–31%	–20%	–13%	–21%	–18%	–24%	–18%	–17%	–14%	–15%
1.37	1.25	1.16	1.29	1.44	1.25	1.15	1.27	1.22	1.31	1.22	1.20	1.17	1.17
116,314	99,447	60,880	107,941	132,809	108,787	95,110	97,467	92,078	125,935	107,221	97,838	94,802	104,571
100,052	80,208	53,143	85,675	121,888	75,697	47,952	78,581	73,659	106,704	82,169	78,547	71,188	80,783
26,571	29,019	20,654	34,515	27,439	48,705	56,101	28,930	29,479	33,839	37,730	32,687	36,554	36,454
–10,310	–9,780	–12,917	–12,249	–16,519	–15,615	–8,943	–10,043	–11,061	–14,608	–12,679	–13,396	–12,940	–12,667

Annex Table C-6. TSE: Thailand

Item	Unit	1990	1991	1992	1993	1994
I. Total value of production (at farm gate)	THB mill.	311,892	348,019	378,330	345,005	386,808
1. Share of selected PSE commodities (%)	%	67%	65%	64%	69%	73%
2. Selected PSE commodities	THB mill.	209,568	226,322	243,899	238,976	282,473
II. Total value of consumption (at farm gate)	THB mill.	242,636	271,975	290,225	253,680	266,414
1. Selected PSE commodities	THB mill.	163,034	176,869	187,100	175,717	194,553
III.1 Producer Support Estimate	THB mill.	926	555	3,619	–9,783	–7,945
S. Support on Commodity Output	THB mill.	–2,713	–661	2,888	–14,104	–10,239
A. Market price support	THB mill.	–3,513	–661	2,888	–14,104	–10,239
A.1 Of which export refund (or tax)	THB mill.	–7,525	–3,354	319	–9,275	–6,144
B. Payments based on output	THB mill.	800	0	0	0	0
C. Payments based on area planted/animal numbers	THB mill.	0	0	0	0	0
D. Payments based on input use	THB mill.	3,639	1,217	731	4,320	2,294
E. Payments based on input constraints	THB mill.	0	0	0	0	0
F. Payments based on overall farming income	THB mill.	0	0	0	0	0
G. Miscellaneous payments	THB mill.	0	0	0	0	0
III.2 Percentage PSE	%	0%	0%	1%	–3%	–2%
III.3 Producer NAC		1.00	1.00	1.01	0.97	0.98
IV. General Services Support Estimate (GSSE)	THB mill.	30,675	42,549	50,661	48,750	44,030
I. Research and development	THB mill.	8,129	11,713	12,708	2,871	3,289
J. Agricultural schools	THB mill.	1,581	2,050	2,354	3,664	5,907
K. Inspection services	THB mill.	151	132	344	474	748
L. Infrastructure	THB mill.	18,867	23,743	30,151	36,505	28,421
M.Marketing and promotion	THB mill.	827	4,912	5,106	5,237	5,646
N. Public stockholding	THB mill.	1,120	0	0	0	0
P. Miscellaneous	THB mill.	0	0	0	0	19
V.1 Consumer Support Estimate (CSE)	THB mill.	–3,757	–2,899	–3,541	3,937	1,911
P. Transfers to producers from consumers (–)	THB mill.	–4,012	–2,692	–2,569	4,829	4,095
Q. Other transfers from consumers (=Import tax) (–)	THB mill.	254	–207	–973	–892	–2,184
R. Transfers to consumers from taxpayers (=subsidy)	THB mill.	0	0	0	0	0
1. Selected PSE commodities	THB mill.	0	0	0	0	0
V.2 Percentage CSE	%	–2%	–1%	–1%	2%	1%
V.3 Consumer NAC		1.02	1.01	1.01	0.98	0.99
VI. Total Support Estimate (TSE)	THB mill.	31,601	43,105	54,280	38,967	36,085
T. Transfers from consumers	THB mill.	3,757	2,899	3,541	–3,937	–1,911
U. Transfers from taxpayers	THB mill.	27,589	40,412	51,711	43,796	40,180
V. Budget revenues (=import tax) (–)	THB mill.	254	–207	–973	–892	–2,184

1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
452,236	485,464	520,508	577,943	500,479	486,392	511,877	550,470	605,353	616,927	756,771	913,760	979,558	1,421,605
73%	74%	69%	72%	74%	74%	77%	76%	79%	82%	79%	71%	70%	69%
328,691	361,199	361,623	413,467	369,039	359,118	393,220	420,706	475,748	506,633	597,783	648,100	684,873	985,443
299,265	334,222	384,012	398,293	367,404	337,725	345,552	365,044	380,484	365,728	470,776	564,134	607,167	745,105
217,510	248,671	266,792	284,943	270,913	249,353	265,450	278,991	299,023	300,344	371,872	400,122	424,510	516,500
–17,594	–4,494	–31,403	–49,962	21,802	13,367	–343	11,131	12,009	–13,587	9,986	–783	–31,238	–40,635
–22,069	–8,912	–40,543	–57,165	5,475	–6,399	–17,242	1,912	9,493	–15,684	9,255	–12,886	–34,972	–48,810
–22,069	–8,912	–41,418	–57,165	3,207	–8,099	–17,242	264	9,493	–15,684	9,255	–12,886	–34,972	–70,810
–11,957	–9,335	–24,578	–24,479	–2,229	–6,039	–11,272	–4,294	–3,392	–16,068	1,482	–12,095	–16,321	–35,898
0	0	875	0	2,268	1,700	0	1,648	0	0	0	0	0	22,000
0	0	0	0	0	0	0	0	0	0	0	0	0	0
4,475	4,419	9,083	7,203	16,327	9,398	6,240	7,867	2,516	1,405	731	598	2,379	5,005
0	0	56	0	0	9,365	9,688	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1,004	972	1,352	0	691	0	11,505	1,355	3,170
–4%	–1%	–6%	–9%	4%	3%	0%	2%	2%	–2%	1%	0%	–3%	–3%
0.96	0.99	0.94	0.92	1.04	1.03	1.00	1.02	1.02	0.98	1.01	1.00	0.97	0.97
69,129	53,466	64,666	64,422	54,994	77,417	58,822	97,283	76,586	74,231	65,431	63,528	87,908	99,646
3,596	4,012	4,109	9,089	6,614	13,762	7,637	4,927	4,261	3,294	1,410	1,608	2,908	2,893
17,956	6,797	8,568	10,269	7,311	7,630	3,519	24,662	14,662	13,474	6,619	1,363	3,271	3,331
938	1,072	1,118	1,100	4,100	4,031	3,426	3,448	3,592	3,606	3,706	3,808	4,092	6,967
45,737	40,274	49,567	40,400	33,075	51,586	41,945	64,190	54,064	53,856	53,697	54,183	73,672	75,037
839	1,254	1,301	1,128	643	408	70	56	6	0	0	160	2,579	9,980
53	0	0	2,436	0	0	1,500	0	0	0	0	0	0	0
10	57	3	0	3,250	0	725	0	0	0	0	2,406	1,386	1,437
10,003	–1,450	21,098	34,673	–9,653	–2	7,748	–10,563	–14,049	5,820	–139	671	25,430	42,144
10,113	–423	16,840	32,686	–5,435	2,060	5,970	–4,558	–12,885	–384	–7,772	791	18,651	34,912
–110	–1,027	4,259	1,987	–4,217	–2,062	1,778	–6,005	–1,164	6,204	7,633	–119	6,779	7,232
0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0
3%	0%	5%	9%	–3%	0%	2%	–3%	–4%	2%	0%	0%	4%	6%
0.97	1.00	0.95	0.92	1.03	1.00	0.98	1.03	1.04	0.98	1.00	1.00	0.96	0.95
51,534	48,972	33,263	14,460	76,795	90,785	58,479	108,414	88,595	60,644	75,417	62,745	56,669	59,011
–10,003	1,450	–21,098	–34,673	9,653	2	–7,748	10,563	14,049	-5,820	139	–671	–25,430	–42,144
61,647	48,549	50,103	47,146	71,360	92,845	64,449	103,856	75,710	60,260	67,645	63,535	75,320	93,923
–110	–1,027	4,259	1,987	–4,217	–2,062	1,778	–6,005	–1,164	6,204	7,633	–119	6,779	7,232

D. Transfer Matrix for selected countries

Annex Table D-1. Transfer matrix and TSE

Transfer Matrix and TSE (annual average, 2000 price)										
	1990–94					1995–99				
India (INR bill.)		PRD	CSM	TXP	Total		PRD	CSM	TXP	Total
	PRD	0	252	–268	–15	PRD	0	388	–318	70
	CSM	–252	0	–10	–263	CSM	–388	0	–52	–440
	TXP	268	10	87	366	TXP	318	52	98	468
	Total	15	263	0	(111)	Total	–70	440	0	(78)
Indonesia (IDR trill.)		PRD	CSM	TXP	Total		PRD	CSM	TXP	Total
	PRD	0	–16.0	–2.0	–18.0	PRD	0	–7.6	–0.6	–8.3
	CSM	16.0	0	1.7	17.7	CSM	7.6	0	2.2	9.8
	TXP	2.0	–1.7	3.7	4.0	TXP	0.6	–2.2	1.7	0.1
	Total	18.0	–17.7	0.0	(21.7)	Total	8.3	–9.8	0.0	(9.9)
Malaysia (MYR bill.)		PRD	CSM	TXP	Total		PRD	CSM	TXP	Total
	PRD	0	–0.4	0.1	–0.3	PRD	0	1.1	0.4	1.6
	CSM	0.4	0	0.5	0.9	CSM	–1.1	0	0.9	–0.3
	TXP	–0.1	–0.5	1.6	1.0	TXP	–0.4	–0.9	1.0	–0.3
	Total	0.3	–0.9	0.0	(1.9)	Total	–1.6	0.3	0.0	(–0.6)
Pakistan (PKR bill.)		PRD	CSM	TXP	Total		PRD	CSM	TXP	Total
	PRD	0	72.3	3.6	75.9	PRD	0	86.7	–4.8	81.9
	CSM	–72.3	0	–1.5	–73.8	CSM	–86.7	0	–3.7	–90.5
	TXP	–3.6	1.5	36.5	34.4	TXP	4.8	3.7	25.4	33.9
	Total	-75.9	73.8	0.0	(-39.4)	Total	–81.9	90.5	0.0	(–56.6)
ROC (TWD bill.)		PRD	CSM	TXP	Total		PRD	CSM	TXP	Total
	PRD	0	–68.3	–5.2	–73.5	PRD	0	–74.6	–12.5	–87.1
	CSM	68.3	0	9.8	78.1	CSM	74.6	0	11.5	86.1
	TXP	5.2	–9.8	13.5	9.0	TXP	12.5	–11.5	14.0	15.0
	Total	73.5	–78.1	0.0	(87.7)	Total	87.1	–86.1	0.0	(101.7)
Thailand (THB bill.)		PRD	CSM	TXP	Total		PRD	CSM	TXP	Total
	PRD	0	–0.2	2.1	1.9	PRD	0	6.8	3.6	10.4
	CSM	0.2	0	0.6	0.8	CSM	–6.8	0	–0.1	–6.9
	TXP	–2.1	–0.6	35.0	32.3	TXP	–3.6	0.1	39.8	36.3
	Total	–1.9	–0.8	0.0	(33.1)	Total	–10.4	6.9	0.0	(29.4)

Note 1: PRD=producers; CSM=consumers; TXP=taxpayers.

Note 2: Figures in bracket are TSE.

Transfer Matrix and TSE (annual average, 2000 price)										
2000–04					2005–08					
	PRD	CSM	TXP	Total		PRD	CSM	TXP	Total	India (INR bill.)
PRD	0	–480	–354	–834	PRD	0	618	–568	50	
CSM	480	0	–114	366	CSM	–618	0	–222	–840	
TXP	354	114	201	669	TXP	568	222	204	994	
Total	834	–366	0	(1,150)	Total	–50	840	0	(371)	
	PRD	CSM	TXP	Total		PRD	CSM	TXP	Total	Indonesia (IDR trill.)
PRD	0	–10.9	1.3	–9.6	PRD	0	–12.6	6.4	–6.1	
CSM	10.9	0	1.9	12.8	CSM	12.6	0	1.4	14.0	
TXP	–1.3	–1.9	1.1	–2.1	TXP	–6.4	–1.4	1.4	–6.5	
Total	9.6	–12.8	0.0	(10.7)	Total	6.1	–14.0	0.0	(7.5)	
	PRD	CSM	TXP	Total		PRD	CSM	TXP	Total	Malaysia (MYR bill.)
PRD	0	–0.2	0.1	–0.2	PRD	0	–0.03	–0.53	–0.6	
CSM	0.2	0	0.9	1.2	CSM	0.03	0	–0.26	–0.2	
TXP	–0.1	–0.9	1.3	0.4	TXP	0.53	0.26	1.74	2.5	
Total	0.2	–1.2	0.0	(1.5)	Total	0.56	0.23	0.00	(2.5)	
	PRD	CSM	TXP	Total		PRD	CSM	TXP	Total	Pakistan (PKR bill.)
PRD	0	–51.6	0.7	–50.8	PRD	0	89.7	4.3	94.0	
CSM	51.6	0	0.9	52.5	CSM	–89.7	0	2.8	–86.8	
TXP	–0.7	–0.9	20.6	19.0	TXP	–4.3	–2.8	19.8	12.6	
Total	50.8	–52.5	0.0	(71.5)	Total	–94.0	86.8	0.0	(–74.3)	
	PRD	CSM	TXP	Total		PRD	CSM	TXP	Total	ROC (TWD bill.)
PRD	0	–62.5	–13.9	–76.3	PRD	0	–65.6	–16.2	–81.9	
CSM	62.5	0	11.0	73.5	CSM	65.6	0	12.3	77.9	
TXP	13.9	–11.0	23.6	26.4	TXP	16.2	–12.3	19.1	23.1	
Total	76.3	–73.5	0.0	(100.5)	Total	81.9	–77.9	0.0	(101.7)	
	PRD	CSM	TXP	Total		PRD	CSM	TXP	Total	Thailand (THB bill.)
PRD	0	–1.1	–1.6	–2.8	PRD	0	5.6	2.0	7.5	
CSM	1.1	0	0.2	1.3	CSM	–5.6	0	–2.7	–8.3	
TXP	1.6	–0.2	45.5	46.9	TXP	–2.0	2.7	40.0	40.8	
Total	2.8	–1.3	0.0	(48.3)	Total	–7.5	8.3	0.0	(32.5)	

E. The Computation Template

The Computation Template is a set of Excel Book spreadsheets consisting of a preparatory part and three major modules for PSE computation. To minimize the workload and mistyping, the tables are interlinked by the reference formula or function formula as much as possible. Although they appear very complicated and cumbersome to complete, the actual task required for national experts is rather simple – insert appropriate data, codes, or information in the colored cells only. Other parts of the tables are automatically adjusted or computed with the figures and codes, not including the fixed headings or foot notes.

One exception is the computation of Market Price Differentials (MPD) in the module C-MPS. National experts are often required to do some extra computations by themselves to derive more accurate MPDs. The computation may differ by commodity to reflect the specific natures of the product, market, or the manner of which prices are supported. The current standard computation sheet for Market Price Support (MPS) is not large enough to accommodate such a complicated computation process. For instance, the MPD for milk may have to be computed by comparing the prices of local milk and hypothetical reconstituted milk produced from imported butter and skim milk powder.

Parameters and Commodities

The Template contains two preparatory spreadsheets. The first is the policy checklist and the other is the parameter sheet. The policy checklist asks national experts to tick-mark the relevant cells when they or their colleagues consider specific policies apply to the commodity in question. The parameter sheet asks for the insertion of country name, currency symbol, and names of additional commodities for which PSEs are to be computed beyond nine standard commodities.

Module A

In this module, country experts are requested to provide three kinds of information: Gross Agricultural Output (GAO), exchange rates, and tariffs. The first spreadsheet includes a set of tables to compute the share of PSE commodities in the national GAO. The GAO tables are important because these figures are often linked to Module C and used as parameters to compute national PSEs, CSEs, and TSEs. Production volumes and producer prices of selected commodities can be copied to the relevant columns in the MPS tables of Module C. The percentage share of each commodity's GAO may be used for allocating non-commodity specific government transfers to producers of individual commodities. The GAO share, aggregated for the selected commodities, is used for the extrapolation of commodity specific transfers to estimate national PSEs, CSEs and TSEs. The tariff rate table is prepared to cross check the difference with %PSEs. In the Template for Indonesia and Malaysia, tariff rates are directly linked through 'IF function' formula to MPS tables of Module C.

Module B

Module B is the section used to identify, classify, and reorganize budgetary transfers for agriculture. For the identification of national/provincial policies to be included, the checklist stated above can offer good guidance on what types of policies/programs are being applied to specific commodities or which types are being applied without commodity specifications. It should be noted that not all of the policies are handled by the ministry of agriculture and that the values of tax reduction or redemption are not derived from budget tables.

National governments offer various forms of budgetary assistance to individual farmers or collectively to the sector, in the form of grants, subsidies, interest rate reductions, capital investment, researches, etc. The first step of action in this module is therefore to classify these as direct or indirect monetary transfers in terms of policy types. There are three criteria that are applied for this purpose: whether the transfer in question is paid to individual farmers or to the sector as a whole, whether it is commodity specific or not, and how the payment is made. If the transfer is made for a given commodity or for several commodities that are clearly spelled out, the relevant budgetary expenditure or its allocation to each designated commodity, should be inserted in the relevant rows of the table "Budgetary Transfers: Commodity Specific." If farmers receive a payment regardless of any commodities they produced, e.g., fertilizer subsidies or provision of planting materials, then it should be listed in the table "Budgetary Transfers: Non-commodity Specific." Government expenditures on general services should be listed under the General Service Support (GSSE). They include expenditures for agricultural research, plant/animal quarantine, wholesale market development, export promotion, etc.

Policy classification is also completed by asking how the transfer is implemented, i.e., whether the payment is made in proportion to output/area planted, on condition of the use of inputs (e.g., fertilizer, or water service), or on condition of environmentally friendly practices. This policy implementation criterion plays a key role in the analysis and evaluation because it will enable us to know which directions national policies are moving as a whole. If the share of output-related transfers declines without increasing the total size of PSEs, we can reasonably conclude that policy reform or decoupling is occurring.

Module C

This module is the central part of the Template. At its core is a spread sheet to compute the transfers arising from the Market Price Support (MPS) for the selected commodities. The MPS sheet includes 20 standardized tables for selected commodities all of which have the same structure, sequence, and computation formulas. National experts are requested to fill in several colored rows with the figures on domestic production, farm gate prices, exports and imports, CIF/FOB prices, world market prices, etc. The sample table below illustrates the process. Once relevant data is inserted into the colored cells, the table automatically returns other figures including the MPD, the value of market transfer, and CSEs.

Annex Table E-1. MPS/CSE

			1990	1991
Country: X	MPS (Y or N)		Y	Y
Commodity= rice	Trade (EX or IM)		IM	IM
	Formula or remarks	Units	1990	1991
I. Level of production	Paddy	000t	45,179	44,688
II. Producer price (farm gate)	Source: FAOSTAT	000Rp/t	0.282	0.315
III. Value of production	(I)*(II)	bill Rp.	12,768	14,078
IV. Net Trade volume	(IV.2)–(IV.1)	000t	46	170
1. Export	Milled rice	000t	2	1
2. Import	Milled rice	000t	48	171
3. Weight adjustment (traded /farm gate)	Conversion factor, paddy/milled		0.68	0.68
V. Level of Consumption (farm gate P)	(I)+(IV)/(IV.3)	000t	45,246	44,938
VI. Value of consumption (farm gate P)	(V)*(II)	bill Rp.	12,787	14,156

(continue to next page)

(...continued)

VII. Reference price (farm gate P)	IF formula depending on code EX or IM	Rp/kg	279	0.345
1. Border price, CIF/FOB (at trade form)	Milled rice, 15% broken, FOB Bangkok	Rp/kg	.457	561
2. Port/ transport cost to market	5% of CIF	Rp/kg	23	28
3. Processing & transp. costs	5% of producer price	Rp/kg	14	16
4. Quality adjustment coefficient	Assumed import rice quality is 10% better		0.90	0.90
VIII. Market price differential	IF MPS=Y, (II)–(VII), others= 0	Rp/kg	3	(30)
IX. Market transfers (farm gate P)	(IX.1)+(IX.2)	bill Rp.	145	–1,333
1. Transfers to producers from consumers	IF trade= "IM", (VIII)*(I). otherwise (VIII)*(V)	bill Rp.	145	–1,326
2. Other transfers from consumers	IF trade="EX",0, IF= "IM"&IF(IV)<0,0, otherwise, (V)–(I))*(VIII))	bill Rp.	0.217	–7.421
X. Budgetary transfers	(X.1)+(X.2)	bill Rp.	0	0
1. Transfers to producers from taxpayers	IF"EX",((I)–(V))*(VIII), otherwise 0	bill Rp.	0	0
2. Transfers to consumers from taxpayers	budget data	bill Rp.	–	–
XI. Market Price Support (MPS)	(IX)+(X..1)	bill Rp.	145	–1,333
XII. Producer NPC	1/(100–((IX.1)+(X.1)+(XII.1))/((III)+(XII.1))*100)*100	ratio	1.01	0.91
1. Payment based on output	From "budget (CS) table"	bill Rp.	0	0
2. Payment based on output per kg	(XII.1)/(I)	Rp/kg	0	0
XIII. Consumer Support Estimate (CSE)	(X.2)–(IX)	bill Rp.	–145	1,333
1. Unit CSE	(XIII)/(IV)	Rp/kg	–3.21	29.66
2. Percentage CSE	(XIII)/{(VI)–(IX.2)}*100	%CSE	–1.14	9.42
XIV. Consumer NPC	1/(100–((IX.1)+(IX.2))/(VI)*100)*100	ratio	1.01	0.91
XV. Consumer NAC	1–(XIII.2)/{100+(XIII.2)}	ratio	1.01	0.91

The most difficult part of the task is the estimation of Market Price Differentials (MPD) generated by market support policies. Prices of locally produced commodities may stay higher or lower than international prices as a result of market support policies (e.g., licensing, state trading, and import/export duties). The template asks national experts to insert either world reference prices (e.g., representative prices often quoted by international agencies, see VII.1 in the above table) or actual border prices (e.g., CIF/FOB prices of their own or a neighboring country). Many factors have to be taken into account to find the most appropriate set of price data.

In a simple case where a farm product is fairly homogeneous and traded without processing, national experts can compare the average farm gate price with the average CIF/FOB price of the product by subtracting marketing costs. If ad valorem tax is the only measure applied, the price differential is simply derived by inflating or deflating with that rate. In many cases, however, national experts are asked to adjust physical and/or quality differences because products are traded as processed commodities and as specific segments of local production. Rice is normally traded as polished rice, not as paddy rice. Meats are traded as block meat and chilled/frozen meat rather than fresh carcass meat. Aromatic rice, not ordinary rice, is sometimes the main target of exports or imports. A key principle of MPD measurement is to compare “like with like.” For this purpose, national experts are asked to insert two kinds of adjustment coefficients in the MPS table. One is for weight and the other is for quality. Standard physical conversion factors may be quoted for weight adjustments while traders may suggest a rough percentage of quality difference between local and international products.

A serious problem arises if the traded form of a commodity is different from that of farm gate. A typical example is milk. Except for ultra heat treatment milk, milk is normally traded in the form of various milk products: butter, cheese, powdered milk, whey, etc. Thus, how can we estimate price differentials for milk?

The Template has adopted the method that the OECD's PSE manual suggests and has incorporated it in the Template as a standard formula, to compute a hypothetical price of reconstituted milk made from imported butter and skim milk powder and compare it with local milk. Fat content and non-fat-solid content are used as weights. No other specific standard formulas are inserted for other products although the OECD manual also refers to the methods to compute price differentials for other commodities such as sugar, beef, and wheat. Country experts were asked to study the OECD methods and apply them separately if necessary.

The rest of module C including PSE tables and the TSE table can be automatically computed. All national experts have to do is to check abnormal outputs especially on %PSEs, CSEs, NPC, and TSC. If they find extremely high %PSEs or CSEs, sudden jumps, or sharp ups and downs in these figures for particular years, they have to detect the reasons behind these discrepancies. In many cases, the best yardstick for checking bugs and errors is the expert's own common sense.

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