

VISIONING THE FUTURE OF GROWTH

MAKING APO
MEMBER COUNTRIES
FUTURE-READY
FOR SUSTAINABLE
PRODUCTIVITY



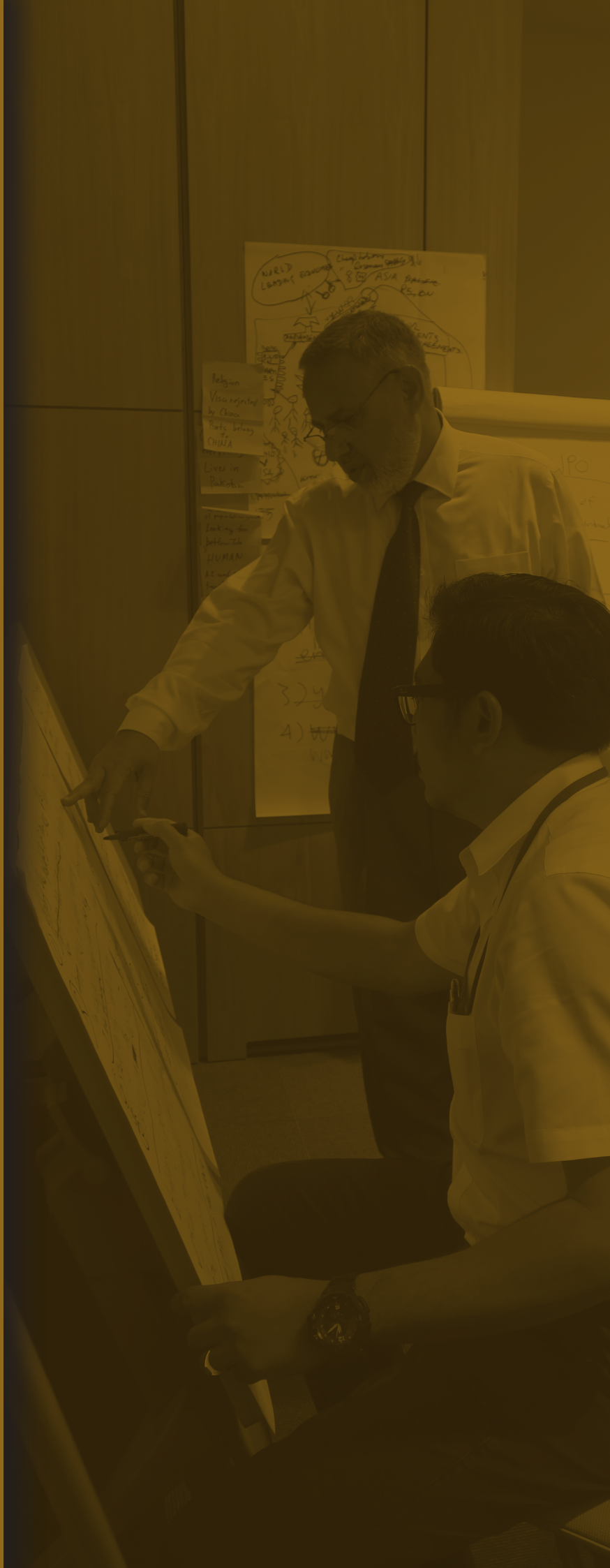
In collaboration with



The Asian Productivity Organization (APO) is an intergovernmental organization committed to improving productivity in the Asia-Pacific region. Established in 1961, the APO contributes to the sustainable socioeconomic development of the region through policy advisory services, acting as a think tank, and undertaking smart initiatives in the industry, agriculture, service, and public sectors. The APO is shaping the future of the region by assisting member economies in formulating national strategies for enhanced productivity and through a range of institutional capacity building efforts, including research and centers of excellence in member countries.

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Visioning the Future of Growth

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Designed by Convert to Curves

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FOREWORD

The Asian Productivity Organization (APO) acknowledges that 2018 is a challenging but promising year. In the face of a possible trade war between PR China and the USA, we also hope for denuclearization of the Korean peninsula, although political uncertainties remain in the Asia-Pacific region.

These are truly uncertain, rapidly changing times. Corporations and individuals have no choice but to prepare for an increasingly turbulent world. The 2018 Sustainable Productivity Summit and Strategic Planning Workshop (SPW) come at an opportune time to redefine sustainable productivity. The Futures-Moves Group, a leading foresight-driven consultancy firm, was commissioned by the APO to moderate discussions among NPO Heads during the SPW.

In a break from the previous year, an APO-commissioned research think piece will be published online to guide the discussions during the SPW. It will help NPO Heads and officers understand the background of economic and productivity growth, envision the future of development through circumventing the curse of unbridled consumption, grasp the productivity paradox, and adopt long-term strategies to utilize the broad-based impact of digitization and related technologies to address the challenges ahead. Coupled with the emerging trends report and the APO Tokyo Scenarios prepared by the APO Futures Team, which are being released together with this research think piece, we hope to frame SPW discussions and strategize first-round initiatives that will guide future projects under the Specific National Program and multicountry projects for the benefit of the entire membership.

Future and scenario thinking as a way of approaching the unknown is increasingly being used as a tool for strategizing by public- and private-sector organizations. The original Mont Fleur scenario exercise, undertaken in South Africa in the early 1990s, was the forebear of scenario thinking. The Mont Fleur exercise was innovative and important because, in the midst of deep-seated prejudices and ongoing conflict, it brought people from diverse organizations together to think collectively about the future. We hope that the APO-commissioned think piece, the Tokyo Scenarios, and the ensuing discussions during the SPW will provide equally useful outcomes of initiatives to address the challenging future faced by member countries, reflecting our equivalent of the Mont Fleur “ostrich, lame duck, Icarus, and flight of the flamingos,” together with the broader insights they will provide.

Guided by the seminal quote from Robert Kennedy, “Few will have the greatness to bend history itself; but each of us can work to change a small portion of events, and in the total of all those acts will be written the history of this generation,” it is our hope that this research think piece will get our collective creative juices flowing in preparation for the July Sustainable Productivity Summit and SPW. Enjoy reading.

Dr. Santhi Kanoktanaporn
Secretary-General
Tokyo
June 2018

VISIONING THE FUTURE OF GROWTH

Synopsis

The future of economic growth is a critical concern for all economies and governments. Growth has enabled the modernity we experience today, which features tremendous technological progress, lengthening life spans, and lifts to general welfare compared with the greater sweep of human history. This paper takes a mixed approach of conventional macroeconomic analysis coupled with foresight methods to shape the discussion on growth and to challenge the Asian Productivity Organization (APO) to play a constructive and appropriate role in sustaining productivity and, by extension, economic growth.

Economic Growth

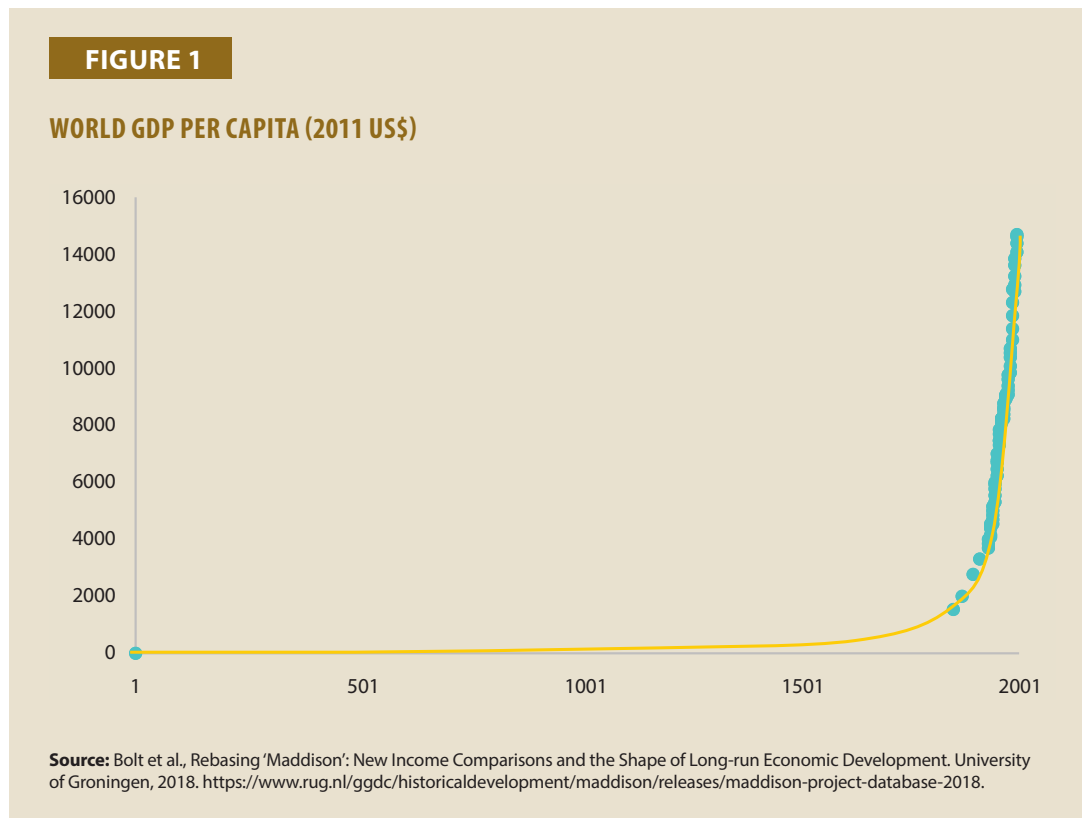
A topic as ambitious as the future of growth is impossible to tackle in the brief space of a paper without some abstraction and simplification. This paper's approach is to deal conceptually with the idea of economic growth through the lens of macroeconomics and to apply foresight to illustrate the possible divergence in future worlds that we may experience. The purpose of macroeconomic analysis is to give "hard surfaces" to the proposition that governance is paramount in dealing with the challenge of future growth. Foresight is used to activate the imagination to look ahead to the prospects for the future, drawn admittedly in terms of strawman scenarios, and to stretch the thinking about present-day choices.

This paper identifies three central imperatives to sustain economic growth: the need for strong institutions; the need to contain consumption; and urgency of comprehending the behavior of productivity under changing economic conditions. It argues that good governance is required to address all three imperatives and asserts that governance should be understood as a broad constituency extending beyond governments to include leadership contributions from academia, the corporate sector, and the community. The paper concludes with prescriptions on strategic actions for the APO.

The Story of Growth

Growth is essential to the story of modernity. The world as we know it today is a function of extreme and compressed growth that commenced in the mid-18th century with the dawn of the Industrial Revolution. Andrew Haldane pithily observed that if the history of growth were a 24-hour clock, 99% would have come in the last 20 seconds [1].

Without growth on such a scale and at such a rate, we would not have a middle class, and without a middle class, we would not have a premise for liberal democracies that typify the politics of advanced economies of the West. The politics of the 19th and 20th centuries were thus derivative of the growth function.



It was growth, under conditions of industrialization and the expansion of the formal economy, that laid the basis for urbanization, organized labor, and a service economy to meet the needs of both a broad working class as well as the voluminous increase in the number and complexity of firms.

Governments on both sides of the Atlantic responded to the social transformation that was generated by the economic transformation from an agricultural, rural, artisan, and domestic-centered economy to an urban, organized workforce and increasingly export-oriented economy. Social policies and labor policies were progressively installed to discipline as well as to safeguard the workforce, alongside which intellectual property, private property, and tort rights were developed to protect the interests of innovators, entrepreneurs, and shareholders.

There is the common misconception that growth comes from the actions of innovation, entrepreneurs, and the production function. While these are not unimportant, they are not the sources of growth. Growth is driven by the interplay of three powerful forces, comprising institutions, consumption, and productivity, which intersect through the prism of governance. It is important that in looking at the future of growth we contend with these forces and the change that each is undergoing. All three are subject to tremendous stress and will require fundamental rethinking.

The Imperative for Strong Institutions

The first of these forces is the imperative for strong institutions. Institutions refer to the broad sweep of mechanisms of governance. This infrastructure of governance ranges from the “hard” fixtures such as bureaucracies and militaries to “soft” notions of the rule of law and political and constitutional models. Institutions are also local, national, and international. As Ricardo Hausmann succinctly observed, “The truth is that markets cannot exist without governments [2].”

The growth of institutions parallels the modern story of growth. Institutions outline the rules of economic action through the provision of policies and structures. Institutions also intervene to redistribute the gains from the economy and make public investments in health, education, and security which underpin the preparation of future generations of entrepreneurs and labor.

Without institutions, we would not be able to conduct economic activity in a predictable, organized manner. We would also not be able to plan and invest in the future. Furthermore, the uneven distribution of benefits from economic functions would lead to highly skewed societies. Institutions are critical, but too often neglected, imperatives for sustained economic success.

The Curse of Consumption

Consumption is the curse of modernity. David Pilling commented that, “The basis of modern economics is that our desire for stuff is limitless. Yet in our hearts we know that way lies madness [3].”

Consumption is the engine that powers growth. Our infinite need for more stuff competes with the finite availability of resources to produce it. Consumption is not only a question of endless wants within extant markets, it also drives the search for new markets to incorporate into the global economy. This extends to a drive to create not only new products and services but also entire new economies.

Consumption creates aggregate demand. Aggregate demand is the source of market opportunity. Opportunity incentivizes entrepreneurship, innovation, and investment, which together form the production function.

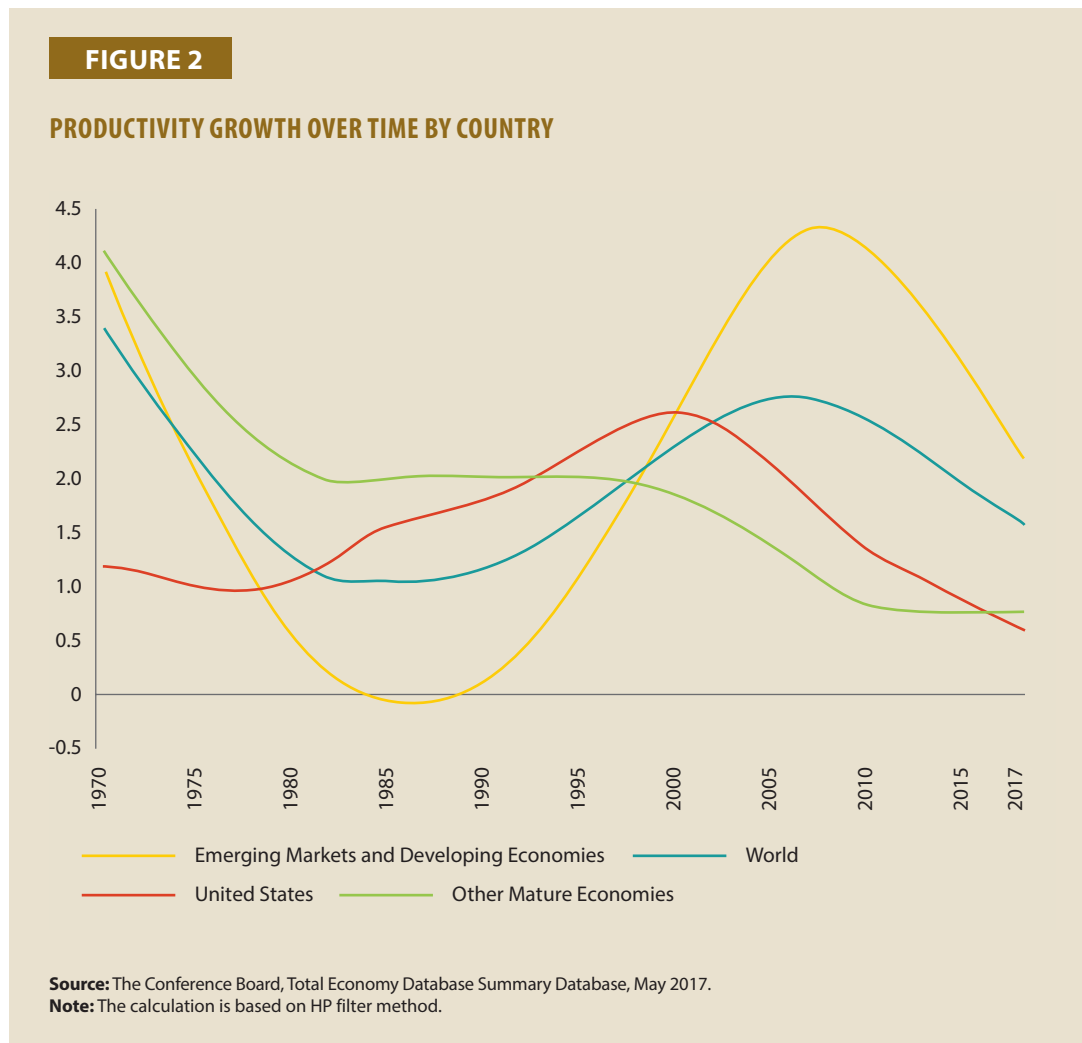
If and how we can manage the curse of consumption is the challenge of postmodernity. Unless we can get to grips with it, we run the danger of exhausting planetary resources and further contributing to climate change and industrial pollution of the air, the sea, and the land.

The Productivity Mystery

The third force is that of productivity. Productivity measures the efficiency in which production inputs are being used in an economy to produce a given level of output and is calculated as the ratio between output volume and the volume of inputs, which are principally capital and labor. Paul Krugman noted that, “Productivity isn’t everything, but in the long run, it is almost everything. A country’s ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker [4].”

Productivity growth generates “operating revenue” which forms the basis for operating margins. These margins then generate both profits for capital owners and income lifts for labor. These are then sources for public revenue through various forms of taxation. Public revenue supports institutions, while reinvestment by firms and consumption by labor stoke the aggregate demand that stimulates the production function.

Historically, productivity growth and technological innovation have fed into each other. This relationship held firm during the previous industrial revolutions, that is, the machine age from the mid-18th century to the end of the 19th century, followed by a second wave of assembly line manufacturing lasting until the mid-20th century. Together, the First and Second Industrial



Revolutions ushered in an era of abundance, when consumer necessities were made widely and cheaply available, helping to fulfill what Maslow termed “deficiency needs” of the masses.

This was succeeded by the IT Revolution commencing in the second half and intensifying in the final quarter of the 20th century. It was in the middle of this phase that the productivity mystery first revealed itself. After decades of relentless upward movement, productivity numbers crumbled in the 1970s and 1980s. Robert Solow famously quipped in 1987, “You can see the computer age everywhere but in productivity statistics [5].”

The mystery seemed to have resolved itself when, in the 1990s, productivity resumed its upward movement. However, over the first two decades of the new century it has reemerged with a vengeance. Despite the wealth of technological innovations in the 21st century such as the Internet of Things, big data, cryptocurrencies, and smartphones, productivity growth has been dismal. Improvements are once again to be seen everywhere but in the productivity statistics.

Explaining the Productivity Mystery

The incongruence between the expected benefits of technological breakthroughs and the apparent lack of productivity improvement has confounded economists and challenged policymakers.

Measurement Issues

It is worth taking a step back to review the big trends of economic progress over the course of history. Progress has scarcely followed a linear trajectory. Certain periods of progression started off slowly but increased exponentially once conditions became ripe. For example, the productivity growth of the First Industrial Revolution remained largely local. It was not until the widespread diffusion of the network infrastructure enabled by the Second Industrial Revolution that the productivity gains of the First Industrial Revolution became widespread.

Following major economic shifts, there are typically also periods of adjustments by both market forces and government intervention before the benefits of progress can be fully reaped. Poor understanding of the situation by market players or the government at times even pulled the economy backward.

For instance, the massive increases in production yielded by the First and Second Industrial Revolutions were for some decades not met by a similar rise in demand levels. The period of adjustment was also known as the Long Depression, during which prices and profits were depressed for two decades from 1873 to 1896 [6].

It was in fact not until the Great Depression of the 1930s that governments recognized that their understanding of the economy was severely inadequate. Prior to the Great Depression, information about the economy was patchy and there was no nationwide account of economic indicators.

A task force led by Simon Kuznets was set up in the USA to develop a new set of national economic accounts, most prominently the gross domestic product (GDP). While the formula for GDP is complex, the explanation for GDP change is not. It is an arithmetic function of changes in productivity and labor force numbers.

While the standard model of GDP and productivity estimation has been in use for over 50 years, we may need to rethink whether these measurements are still adequate in understanding the forces we are experiencing now. The GDP measure assumes that prices paid for goods and services are an adequate proxy of output. This assumption is clearly problematic when we consider the nature of the production and consumption of digital services. Digital services are costly to design but once they are produced, the marginal cost of serving every additional consumer becomes negligible.

This means that the total cost of serving consumers, which translates into the total prices paid for the services, remains relatively constant even as the consumption of these services increases. Hence, the current GDP measure does not seem to measure the output of digital services convincingly.

This has been put forth as one of the reasons why GDP and productivity growth, which measures output by the prices that were paid for them, has been slow in recent decades. It was estimated that the increase in consumer surplus created by free Internet services in the USA alone is over \$100 billion per year [7]. These gains are not captured by traditional measures of economic value, which focus on direct expenditure. Clearly, there needs to be a reworking of how we measure value, output, and productivity in the new digital age.

Novel Phenomenon

More generally, a rethinking of how the new economy is conceptualized may be needed. The traditional economy was centered on physical goods and services, but in the new age of intangible

products, information and data are becoming increasingly important. Broadly speaking, they serve two important functions.

First, information serves as input that produces yet more output throughout the supply chain. To name a couple, route information has helped to improve resource allocation in logistics and analyzing data about employees can help employers to make better hires and make targeted efforts to improve their productivity.

Second, at the end of the supply chain, information adds value for consumers. For example, consumers are able to leverage readily available information to aid them in their purchases and other daily activities. Yet, information is classified neither as an input nor an output in the traditional conception of economic production.

Furthermore, with the advent of artificial intelligence (AI) and machine learning, information is no longer passive. Big data used to simply sit around pointlessly because humans did not have the capacity to go through all of it manually. Now, that data can be turned into useful insights and used to improve algorithms to mine or generate even more data.

The relationship between factor inputs and outputs no longer runs in a single direction; with machine learning, the relationship could well become cyclical. In other words, once initiated, the cycle of production could continue without human supervision or any other additional factor inputs for that matter. Given the massive potential value-add that data and information can bring, they are arguably not given sufficient attention. More thought needs to be given to how to harness the power of information and data virtuously.

Long Cycle

While measurement and conceptual issues have masked the actual level of productivity gains, this does not mean that productivity growth is all robust and we should consider the productivity mystery as case closed. In all likelihood, we are still not operating at the maximum of the production possibility frontier that new technologies have afforded. Just as the inventions in the First Industrial Revolution required the development of physical network infrastructure to spread, a comprehensive digital network infrastructure is required for technological advances to proliferate and boost productivity.

The digital network is still developing and thus, while technological advances have progressed in leaps and bounds, adoption is still far from widespread, especially in the supply chain. For example, for all the time and space efficiency that e-commerce has brought, it only accounted for 12% of overall retail trade value in the USA in 2015. Digital production technologies such as 3D printing and edge cloud systems are even less utilized.

The diffusion of these networks then depends largely on the level of investment. Unfortunately, the shocks of the Global Financial Crisis left long-lasting impacts; economic growth has yet to return to precrisis levels even after a decade. This explains some of the reluctance to make big investments in long-term productivity.

Bell Labs estimated that a major productivity jump will only arrive around 2028 to 2033 when digital energy, digital health and sanitation, digital transportation, digital communication, and digital production networks reach an average 51% penetration rate [8].

It is quite possible that the truth is a complex cocktail of all three of these explanations. It will require patience, observation, and fresh thinking to develop a better lens to view the productivity mystery and see what needs to be done to reignite the flame of value-addedness before the hot-air balloon of growth deflates.

Is the Miracle Over?

There is a fourth possible explanation put forth by Robert Gordon in his classic study, *The Rise and Fall of American Growth* [9]. Simply put, it is that after a century of what he called “miracles,” the underlying drivers of growth have waned; worse, headwinds are now taking the lead. He pointed to headwinds in demography, inequality, education, and debt levels.

Gordon took the view that the way we live and work changed dramatically during a century-long period from the 1870s to about the 1950s. We then had momentum from the accelerated growth-driven changes for another generation. But from the end of the 20th century, just when we thought we had entered a so-called Fourth Industrial Revolution, the productivity numbers went south because fundamentally, while we experienced slow growth, we did not experience changes to economic or social norms.

He also argued that the technological advances of the contemporary period do not represent genuine innovation in economic activity. Thus, they do not represent dramatic leaps in efficiency. He pointed out that much of the innovation, like smartphones, the Internet, and the explosion in the number and range of apps, results in a reduction in productivity instead, as they distract attention away from work.

My own view is that while Gordon’s work is to be read and admired, it falls into the trap of forecasting. His argument is based on a straight-line extrapolation of past occurrences, which does not always yield accurate conclusions about the long term.

Foresighting the Future: Looking Ahead to the Mid-Century

Foresighting is a provocative way to reframe how we look at present phenomena to challenge assumptions and to bring into relief novel features that demand attention in the present day. This paper posits three strawman scenarios to vision the plausible landscape of future growth and outcomes of the crisis facing the fundamental forces of institutions, consumption, and productivity. This is discussed in relation to the degree of digitization, intensity of urbanization, and quality of governance.

Digitization

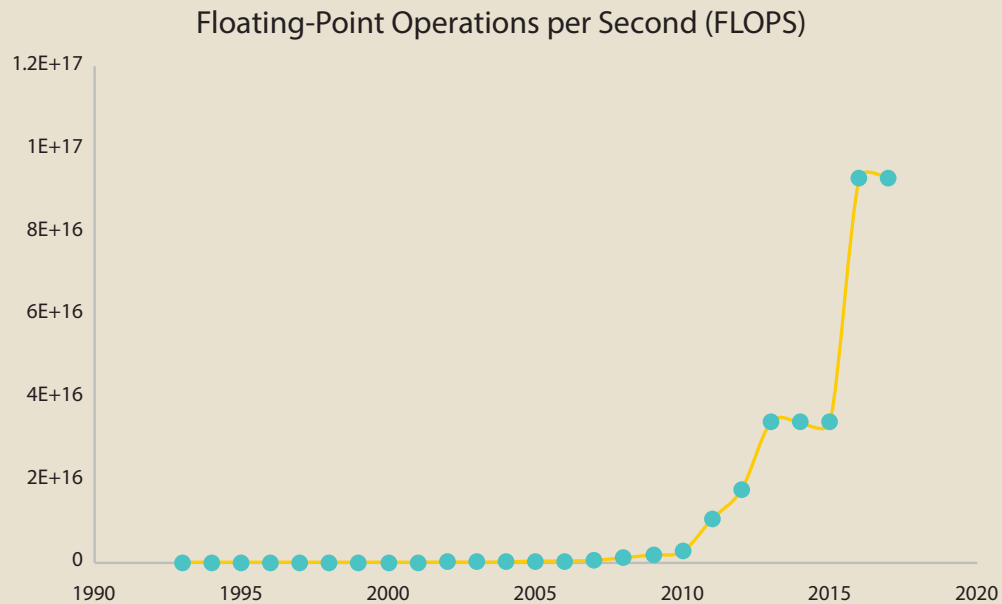
Digitization is already driving changes globally in the ways that goods and services are produced. The Fourth Industrial Revolution is on track to becoming the main driving force in the 21st century. There is profound transformation in the way individuals, organizations, consumers, and suppliers operate, interact, and transact with one another.

The cost of computing power has fallen over the years to a level that has made machine learning economically feasible, which in turn has allowed computing capabilities to rise exponentially.

Technological dispersion continues to accelerate. There were 101.6 mobile cellular subscriptions per 100 people across the world in 2015, a nearly 10-fold increase from 12.1 mobile cellular subscriptions per 100 people in 2000. A similar trend is observed in Internet penetration: in 2016, 45.9% of the world’s population used the Internet as compared with just 8.1% at the turn of the 21st century.

FIGURE 3

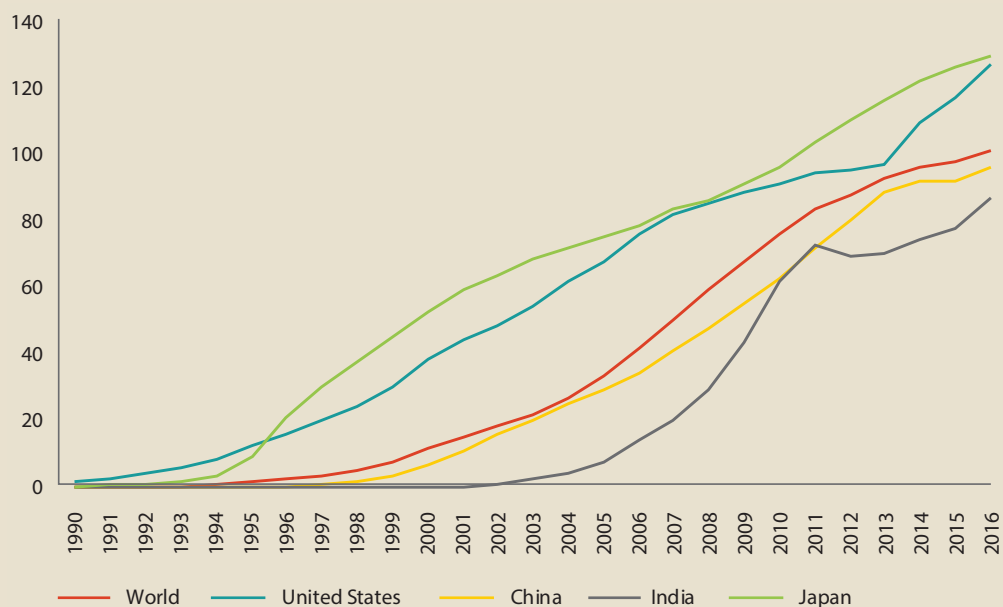
SUPERCOMPUTER POWER (FLOATING-POINT OPERATIONS PER SECOND) OF THE TOP 500 COMPUTERS IN THE WORLD



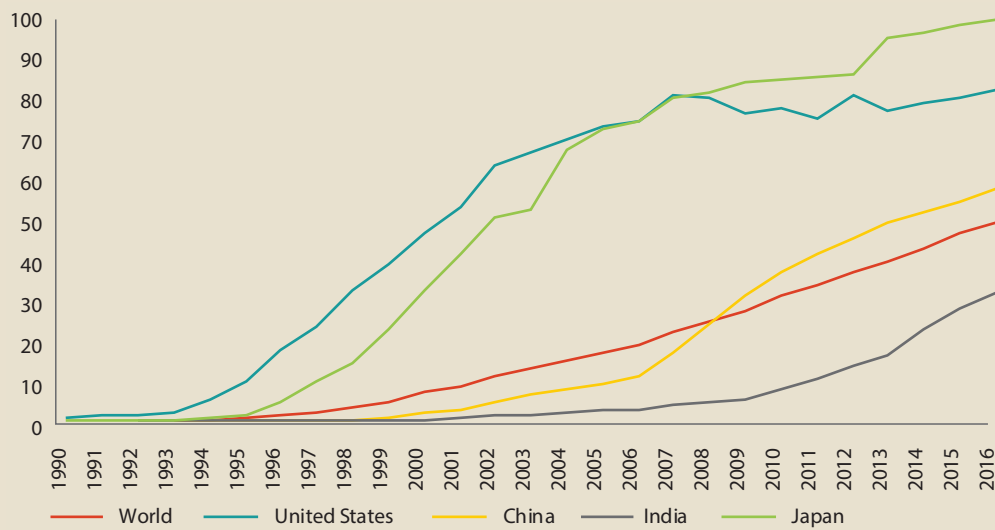
Source: Top500 Supercomputer Database. <https://ourworldindata.org/technological-progress>.

FIGURE 4

MOBILE CELLULAR SUBSCRIPTIONS PER 100 PERSONS OVER TIME BY COUNTRY

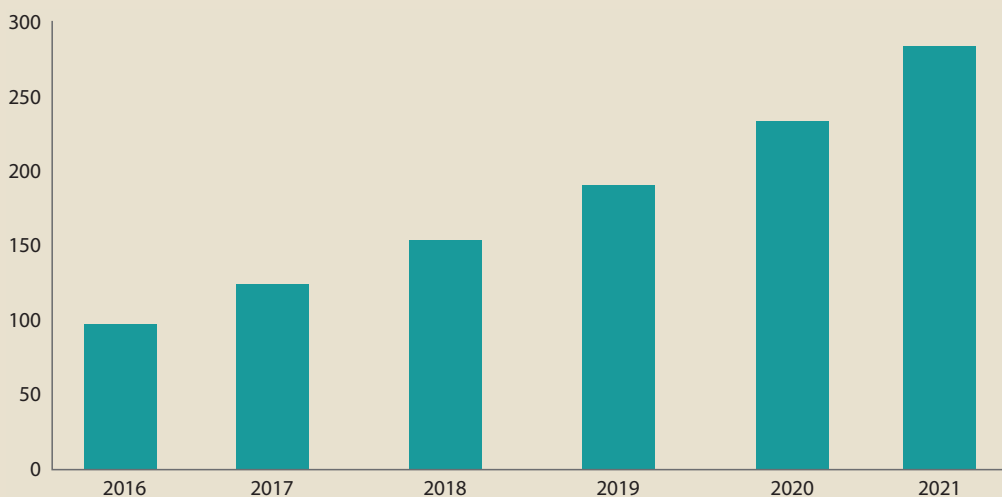


Source: World Bank, World Development Indicators. Last modified 2018.
<http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators>.

FIGURE 5**INTERNET USERS (% OF POPULATION) OVER TIME BY COUNTRY**

Source: World Bank, Individuals using the Internet (% of population). Last modified 2018.
<https://data.worldbank.org/indicator/it.net.user.zs>

As devices of all forms are being equipped to collect data, the data collected can be tapped to develop insights into customers and the environment. Currently, 122 exabytes of data are transferred across the Internet. Cisco forecasts that this will double to 278 exabytes by 2021. Big data are poised to play a more pivotal role in the future as not only the quantity of data increases but also the knowledge of how to use the vast store of information.

FIGURE 6**INTERNET PROTOCOL (IP) TRAFFIC (EXABYTES) PER MONTH**

Source: Cisco, Cisco Visual Networking Index: Forecast and Methodology, 2016–2021. Last updated 15 September 2017.
https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/complete-white-paper-c11-481360.html#_Toc484813970.

While digital technologies have significantly reduced barriers to entry to industries, “winner-takes-all” firms are increasing in all economies. On one hand, individuals and enterprises are able to make use of digital technology to develop new products and services, access global markets, and compete in industries with much lower capital outlays than ever before. On the other hand, as the frontier digital firms’ products are scaleable, nonrivalrous, and without any marginal cost, they are able to become natural monopolies and lay claim to most of the productivity growth and profits. It is becoming increasingly likely that the winner-take-all effect creates natural monopolies that will dominate the digital economy.

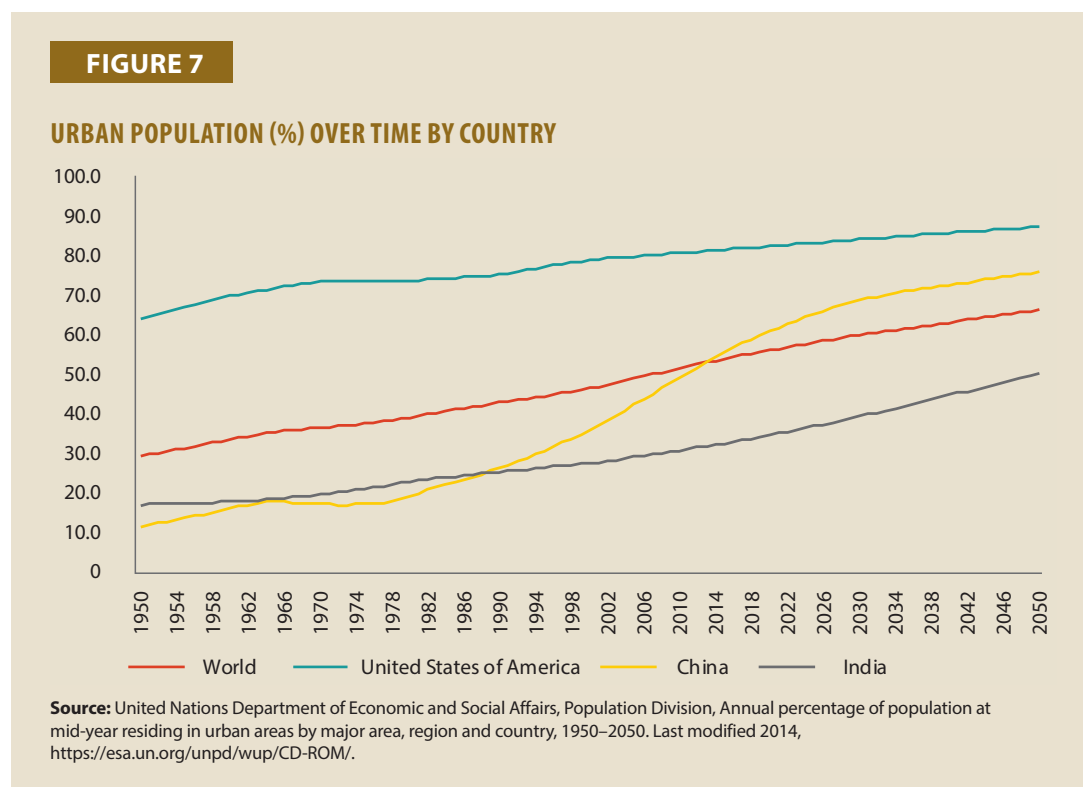
These frontier firms hold most of the data of all consumers, sparking concerns over the loss of privacy. Moreover, digitization is also seen as a threat to long-term employment as AI and machine learning automate existing jobs and even perform at an enhanced efficiency compared to humans.

As Gordon observed, “The problem created by the computer age is not mass unemployment but the gradual disappearance of good, steady, middle-level jobs that have been lost not just to robots and algorithms but to globalisation and outsourcing to other countries, together with the concentration of job growth in routine manual jobs that offer relatively low wages [9].”

Hyperurbanization

Currently, half of the world’s population lives in cities. According to the UN, two-thirds will do so by 2050. This is in stark contrast to a global urban population of only 29.6% in 1950 [10].

The concentrations of talent, knowledge, and ideas in cities allow for synergies such as the rapid exchange of ideas and knowledge spillovers. It is no surprise that cities have produced the most significant innovation and economic growth. The top 600 cities in the world account for 60% of global GDP [11].



Richard Florida, author of *The Rise of the Creative Class*, posited the notion of “spiky” cities [12]. He argued that cities, not entire nations, will be the major nodes of growth and centers of innovation. We have begun to see intimations of the broader implications of his thinking in organizations such as the C40 initiative, which is a grouping of mayors from over 60 major cities to tackle common challenges of managing urban stress and climate change.

Effective Governance

Governance is generally assumed to be the specific and limited responsibility of the state apparatus. However, when we deal at the level of entire societies and even more broadly, at the level of the general course of humanity, this very limited scope of meaning is clearly inadequate.

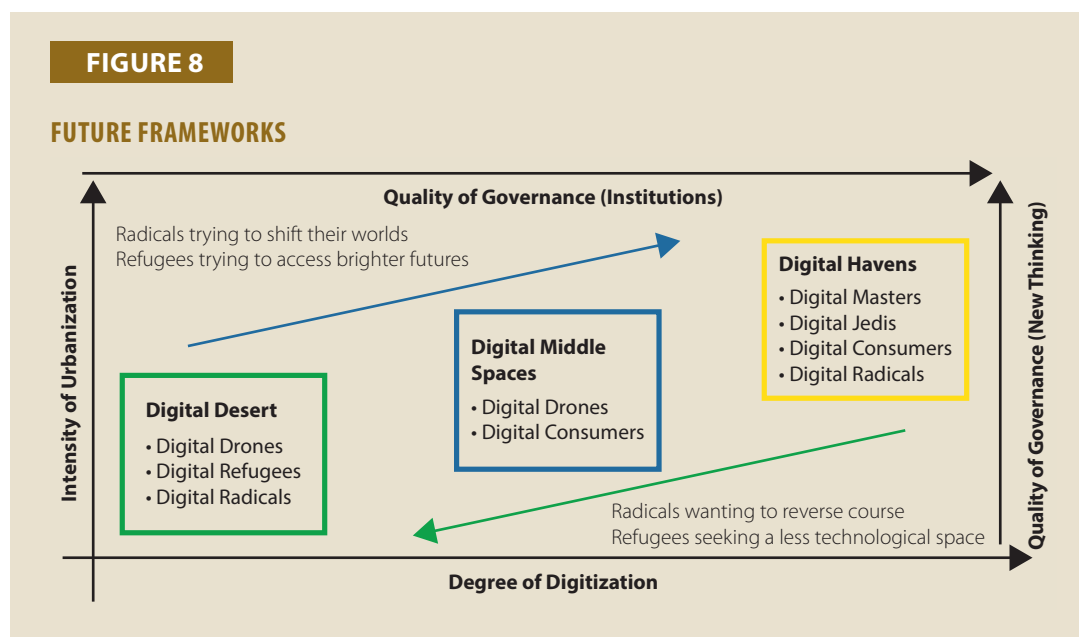
The future is a course for which the determination has multiple streams of contribution. Governance must have a broader application, which calls for the contributions of civic, academic, and corporate leaders. This is especially so when dealing with the critical uncertainties of the imperative of institutions, the curse of consumption, and the mystery of productivity.

The critical uncertainty of greatest consequence is whether and how effective governance can be achieved and thereby arrive at credible institutional frameworks, moderation of consumption, and a better understanding of productivity and how to sustain it.

Future Frameworks

Future economies will be defined by their level of digital advances, and digital advances will be overwhelmingly concentrated in select frontier economies, while the vast majority of laggards falls behind. There are two frameworks that will assist the understanding of the new world: the Digital Cities Framework will distinguish economies by their digital development; and the Digital Population Framework will segment the population by their constituencies.

Under the Digital Cities Framework, three categories of economies may emerge: the digital havens; the digital middle spaces; and the digital deserts.



Digital Havens

Digital havens have undergone extensive digitization. These are the economies that are at the frontier and pushing the boundaries of innovation. They have world-class infrastructure, both physical and digital, to facilitate digital interactions, which are the main activities of the global economy.

The governance space has evolved with reinvigorated institutions and policy solutions to ensure that side impacts from digitization are moderated through social support and skill development programs.

Havens have moderated the curse of consumption through changed social norms emphasizing the economics of “enough.” This change is further buttressed by the systemic adoption of energy efficiency, alternative energy, and recycling practices.

The mystery of productivity has been partially resolved through a mix of improved measurement methodologies including hybrid productivity measures and a better, more relevant understanding of the nature of digitization.

The vast quantities of data generated are kept securely in data centers defended by advanced cybersecurity systems. There are also established public databases with a high quality and quantity of data available to businesses and individuals. Access to the high-speed Internet is available throughout the havens.

The adaptation of regulations has maintained a healthy ecosystem in which digital businesses can thrive; regulatory sandboxes are readily introduced to ensure that enterprises are able to experiment with the latest technology. Key digital industries and digital frontier firms thrive in the haven cities and are significant contributors to the economy in terms of productivity, employment, and economic growth.

There are digital identities for all citizens. All personal data are completely digitized onto microchips, and citizens are able to conduct complex transactions securely. Furthermore, the high levels of cybersecurity provide individuals with the confidence to participate fully in the digital economy.

The opportunities in these havens are abundant and there is a concentration of wealth, talent, and ideas. Some examples of such cities could be London, New York, Paris, Tokyo, Hong Kong, Singapore, Chicago, Shenzhen, Guangzhou, Shanghai, Los Angeles, Tel Aviv, San Francisco, Tallinn, and Dubai.

Digital Middle Spaces

Middle spaces share the characteristics of havens but not to the same degree. While physical infrastructure is adequate, digital infrastructure remains lagging behind the havens.

There are insufficient data centers in the cities and they rent data centers from digital havens to store the data generated. There is a significant lag before new technologies are adopted.

Digital identities remain under development. Moreover, cybersecurity has vast room for improvement, and these middle spaces become major sources for cybercrimes.

Their governance models also remain under development and are inadequate to cope with the side impacts of digitization. Middle spaces are at perennial risk of brain drain as their best and brightest leave for the opportunities only to be found in havens.

Digital Deserts

Digital deserts have struggled to keep up with the digital revolution. Digitization has seemingly skipped these cities. Physical and digital infrastructures are in tatters. Significant investment is needed to upgrade the existing infrastructure to meet the needs of citizens. Furthermore, the cities are constricted by conflicts and tension at the structural, social, and political levels.

There is a dearth of innovative enterprises. Unemployment rates are high, and the digital deserts remain at the bottom of the GDP per capita table.

Governance models are poorly developed. There is low trust in institutions, and a general malaise pervades society. Many digital deserts continue to be extraction economies feeding the demand of havens and middle spaces.

Digital Stratification

The Digital Population Framework stratifies the population into five main groups indexed by their relationship to digitization.

The digital masters are the owners of digital frontier firms that have become natural monopolies. These include current digital giants, like Facebook, Apple, Amazon, Netflix, Google (FAANG), Baidu, Alibaba, Tencent (BAT), and their future iterations or successors. Digital masters are concentrated in the digital havens.

The digital jedis are individuals who possess high levels of digital skills and the tacit knowledge that are highly valued in this era. They are among the top 1% of the population. Most developed their skills within the digital havens; others who had the resources to pick up skills in other worlds eventually gravitated toward the digital havens.

The digital drones are individuals with mediocre digital skills. With AI and machine learning taking up most of the high-value-added activities, they are left with low-value-added jobs and are poorly remunerated. This group is crowded into the digital middle spaces and digital deserts.

There will also be those whose skills or inclinations are incongruent with the worlds they live in. The first group, which are more moderate, can be broadly termed digital refugees. They could be individuals with or who aspire to gain high levels of digital skills but are geographically located outside havens and need to find ways to migrate. Conversely, they could also be individuals in the digital havens who seek a less digitized experience and desire to move to middle spaces.

Digital radicals attempt to disrupt their respective worlds through extreme ends. Digital radicals in the digital havens have high levels of digital skills, but use their capabilities to gain undue power through cybermanipulation. Radicals in the digital deserts are individuals with high levels of digital skills but have ideological agendas that drive them to infiltrate havens and middle spaces.

Sense-Making the Future of Growth

The imperative for strong institutions, the curse of consumption, and the productivity mystery needs attention if we are to cram more of the future population into haven- and middle space-like worlds. The response to these challenges must be found in the realm of ideas, in the domain of social attitudes, and through the prism of leadership.

We need new thinking. And time is pressing as the side impacts of eroding institutions, resource depletion through relentless consumption, and low productivity bleed into each other, creating social and political forces that are upsetting long-held norms at the structural level.

The challenges are profound and broad. Skidelsky held that, “The truth is that we cannot go on successfully automating our production without rethinking our attitudes toward consumption, work, leisure, and the distribution of income [13].”

Policymakers, economists, and the business community need to be cognizant that we are moving toward a situation of hybrid productivity, where both humans and algorithms are responsible for directing and creating output. Our efforts in increasing productivity can no longer be solely focused on extending just labor and capital productivity.

Research efforts are needed to better understand this new digital phenomenon that we are facing to guide the formulation of measurement frameworks allowing us to assess our productivity better.

Governments, not companies, are at the crux of the change and the response to change. Nouriel Roubini captured this neatly when he observed that, “Advanced economies have a large stake in addressing the causes of the productivity slowdown before it jeopardises social and political stability [14].” Trump, Brexit, and Alternative for Germany (AfD) and other populist parties in advanced economies such Italy and Austria speak to the prescience of Roubini’s warning. The rising tide of protectionism, antiimmigration, mainstreaming of racism, and surge of pro-nationalism are eroding institutional strengths within and between countries.

Governments can take the lead in encouraging social resilience through a combination of policy action and vision in leadership. We are now in imminent danger of actualizing a vision Maynard Keynes articulated in a 1930 publication called *Economic Possibilities for Our Grandchildren*, where he warned of the prospect of “technological unemployment,” defined as “unemployment due to the discovery of means of economising the use of labour outrunning the pace at which we can find new uses for labour [15].”

Governments need to step in to provide targeted support to aid those experiencing difficulties in making the change. They must make substantial and sustained public investments in merit goods of education, especially lifelong learning, skill development, and transition support for workers who fall out of employment due to digitization. We need more digital jedis, fewer drones and refugees, and certainly no radicals.

It is also governments that must forge a concordat with digital masters, the owners of natural monopolies in the digital economies, to better regulate, shape, and police the digital space to protect the interests of their citizens as well as ensure social and political stability.

As in all profound challenges, what needs doing is simple enough to state. But none of what is stated is simple to do. Nonetheless, a way must be found if we are to enlarge the space of digital havens and middle spaces and constrict the space of digital deserts.

Optimizing the Future

We need new thinking, greater social resilience, and more relevant leadership across political, civic, corporate, and academic spaces. Generating these much-needed virtues begins by recognizing and accepting two fundamental truths.

The first is that governance is a distributed responsibility. The second is that resolving the imperative of institutions, the curse of consumption, and the mystery of productivity is a profound challenge needing urgent attention and imminent action across broad fronts.

Taking the initiative to optimize the future rather than relying on past models or even transient solutions to present challenges is necessary if we are to confront and overcome the more fundamental imperatives that challenge the growth story.

Our choice of future depends on it.

References

1. Haldane A. *Growing, Fast and Slow*. University of East Anglia; 2015.
2. Hausmann R. The productivity of trust. Project Syndicate, 23 December 2014.
3. Pilling D. *The Growth Delusion*. New York: Tim Duggan Books; 2018.
4. Krugman P. *The Age of Diminishing Expectations*. Cambridge, MA: MIT Press; 1994.
5. Solow R. We'd better watch out. *New York Times*, 12 July 1987.
6. Selçuk B. Comparisons between the Long Depression, the Great Depression and the Global Financial Crisis. *International Journal of Management Economics and Business* 2017; 8(16): 223–243.
7. Brynjolfsson E., Oh J.H. The attention economy: Measuring the value of free digital services on the Internet. Paper presented at the 33rd International Conference on Information Systems, Orlando, FL, 2012.
8. Sanjeev R., Kamat S., Prakash S., Weldon M. Will productivity growth return in the new digital era? *Bell Labs Technical Journal* 2017; 20: June 2017.
9. Gordon R.J. *The Rise and Fall of American Growth*. Princeton, NJ: Princeton University Press; 2016.
10. United Nations Department of Economic and Social Affairs, Population Division. Annual percentage of population at mid-year residing in urban areas by major area, region and country, 1950–2050. Last modified 2014. <https://esa.un.org/unpd/wup/CD-ROM/>.
11. Milken Institute. The shifting economic power of cities. Last updated May 2016. <http://www.milkeninstitute.org/events/conferences/global-conference/2016/panel-detail/6217>.
12. Florida R. The world is spiky. *Atlantic Monthly*, October 2005.
13. Skidelsky R. Labor's paradise lost. Project Syndicate, 21 June 2012.
14. Roubini N. Populists and productivity. Project Syndicate, 3 June 2016.
15. Keynes J.M. *Economic Possibilities for Our Grandchildren*. *Essays in Persuasion*. New York: Harcourt Brace; 1932.

SUSTAINABLE PRODUCTIVITY

THE NEW FRONTIER FOR PRODUCTIVITY

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Fiji
Hong Kong
India
Indonesia
Islamic Republic of Iran
Japan
Republic of Korea
Lao PDR
Malaysia
Mongolia
Nepal
Pakistan
Philippines
Singapore
Sri Lanka
Thailand
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