Productivity
Analysis

Financial Inclusion and Total Factor Productivity in Nepal

Asian Productivity Organization

FINANCIAL INCLUSION AND TOTAL FACTOR PRODUCTIVITY IN NEPAL

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EXECUTIVE SUMMARY

The financial sector is considered an engine for enhancing productivity and, thereby, economic growth. Nonetheless, the implications of the financial sector's development, including inclusive finance, are not yet clear, since the literature provides different views. While inclusive finance can be a necessary condition for lowering risks and costs of production, capital formation and lowered information costs may drive productivity.

In the context of Nepal's effort to promote financial inclusion, considering it a key inclusive growth driver, the recent restructuring of the state into seven provinces has further decentralized economic activities, including financial inclusion. The promotion of financial inclusion becomes effective only if the inclusion enhances the total factor productivity (TFP). While most of the literature shows a positive impact of financial inclusion on TFP in developing economies, the relationships between Nepal's decentralized development and financial inclusion initiatives need careful examination.

Financial institutions were minimal in Nepal until the early 1990s but expanded rapidly after the 2000s. When the number peaked in 2010, financial consolidation measures were introduced. Still, the financial inclusion indicators, such as geographical presence, and the financial deepening indicators have been overwhelming. Nepal's central bank, Nepal Rastra Bank (NRB), has been strategically implementing financial inclusion to enhance inclusive growth and development. Digital payments and fintech have been instrumental to this path.

While financial inclusion has been expanding as a topmost priority, the current distribution of inclusion is uneven. Of the seven provinces, financial inclusion is least developed in Karnali province, followed by Madhesh and Sudurpaschim. This inclusion data indicates the development status of each region and thus may have substantial implications for the productivity analysis. Having access

to and using quality and affordable financial products enables optimal resource allocation, fostering productivity. Therefore, we studied whether financial inclusion enhances the TFP in Nepal at the province level.

The study used Nepal's province-level annual data on TFP, the financial inclusion index (FII), government efficiency (GE), Human Development Index (HDI), and urbanization rate (UR) ranging from the fiscal years 2018–19 to 2023–24. TFP was the dependent variable while the FII was the primary interest variable. The other three variables, GE, HDI, and UR, were control variables that were believed to affect TFP in addition to the FII. TFP was computed based on the Cobb-Douglas production function. The provincial real gross domestic product (RGDP) was readily available, the labor force was distributed at the province level from national data based on the population share, and capital stock data was estimated with the perpetual inventory method (PIM) and then redistributed to each province.

The study estimated the FII by considering the three dimensions of access, usage, and quality of financial services and by incorporating the additional Nepal-specific inclusion indicators. Indicators were selected, the normalized weight was assigned, and then the index was estimated. Thereafter, the TFP was estimated with the residual of the logarithmic form of the Cobb-Douglas production function. Finally, we estimated the fixed effect (FE) panel regression model. This model was chosen based on the unique and time-invariant characteristics like ethnic and cultural composition, historical progress and infrastructure level, geographical location, climate, and natural resources, among others across the provinces that may influence both TFP and financial inclusion.

The estimated FII for each province truly reflects the current financial situation. While financial inclusion is increasing each year in each province, the index is the highest in the Bagmati province, followed by Gandaki, Lumbini, Koshi, Sudurpaschim, and Karnali, and is the lowest in the Madesh province. Provinces that are less developed in terms of financial services, urbanization, literacy, and infrastructure have the lowest FII score.

The province-level TFP estimates show increased trends in all provinces, reflecting the improvements in efficiency and productivity across regions. While the Bagmati province consistently shows the highest TFP values, Gandaki province follows close behind: these two provinces have better financial

inclusion and other indicators like the GE, UR, and HDI. However, all the provinces show a general upward trend in TFP over the years, and their TFP values are beginning to converge, especially for those provinces with TFP values around 1. This suggests that less productive provinces are moving faster and narrowing the gap between themselves and the higher-performing provinces.

The estimation model used was the FE panel regression model. First, given the panel structure and nature of the data, both random effect (RE) and FE models were estimated. Then the Hausman test was conducted to identify the best-suited model. The test preferred the FE, and so did our argument.

The results of the estimated model show that financial inclusion positively affects productivity. A one-unit increase in FII was shown to increase TFP by 0.67 unit, holding other variables constant. This means improvements in financial inclusion are associated with improvements to the productivity level as well. Likewise, GE positively improves TFP, and UR also has a similar impact. However, the relationship between TFP and HDI was statistically insignificant. While conducting the goodness of fit and robustness tests, the estimated model was found to be statistically robust.

Based on the study findings, five key issues have been raised. First, the significant positive relationship between FII and TFP suggests that increased access to financial services enables people and businesses to make more productive investments across all provinces. This demands targeted policies to expand financial services to boost productivity, meaning that financial inclusion promotes economic inclusion. Second, the central bank needs to ponder on the effectiveness of financial institutions and the stability of the financial system as well as the regulatory environment, which also affects productivity. Third, government efficiency is vital in fostering productivity levels, requiring that the provincial government spend the allocated budget in full. Fourth, development activities such as urbanization play a transformative role in enhancing productivity across the provinces. Fifth, the statistical insignificance of the relationship between HDI and productivity might indicate a mismatch between academic and industry demands for labor.

We conclude that financial inclusion positively affects TFP. In the case of the three control variables, GE and UR play a positive role, with UR having the highest impact on productivity growth. The third control variable, HDI, does

not have a direct effect on productivity. These findings are consistent with the available literature. The test indicators confirm the robustness of the results obtained. The study findings provide new insights into and policy discourse regarding Nepal's productivity growth.

The research outcomes provide some key policy implications. Since the finance for growth hypothesis is significant for Nepal, financial inclusion is a catalyst for enhancing productivity. Nepal's central bank can therefore support higher growth and sustainable economic development by improving financial access to underserved areas, promoting financial innovation and fintech, and enhancing financial literacy and consumer protection measures: all key pillars of financial inclusion. Ensuring effective services, robust financial infrastructure, and a systemic and strategic approach to financial development are in place is equally important, not only for promoting financial inclusion but also for other enablers such as the efficiency of institutions.

Another implication is the role of GE and UR in higher productivity gain. These both have a similar impact on productivity. Higher government spending can also promote urban infrastructure development. Therefore, higher spending targeted at urban infrastructure is required for higher productivity growth. While effective governance provides better government services, ensures state-of-the-art infrastructure, and ensures proper regulations and policies are in place, these measures are also complementary to urbanization and, as a result, industrialization and rural-urban linkage. Finally, while human resources are vital to productivity growth, Nepal's health and education do not appear to be linked to enhancing productivity yet. The insignificant relationship between human development and higher productivity growth suggests that the education and health policies need to be reorientated to be more skill based and industry linked.

BACKGROUND

Higher economic growth requires a better developed financial sector. The literature evidences that financial sector development is one of the major prerequisites for economic development. Empirical literature, including King and Levine (1993) and Levine and Zervos (1998), shows a positive relationship between the developed financial sector and economic growth. The general argument is that a better-developed financial sector promotes saving, enables the efficient allocation of financial resources, and provides channels for sharing risks. In addition, it is also evidenced that a developed financial sector increases the productivity of economic growth (Ayyagari et al., 2007). The initial thinking regarding finance and growth was propounded by Schumpeter (1911) and was later further discussed by McKinnon (1973) and King and Levine (1993).

The financial sector has also been perceived as an engine of sustainable economic development. Inclusive growth seems to be possible through inclusive finance, which has positive implications for distributing growth dividends (Balakrishnan et al., 2013). A deepened and efficient financial system provides better ways of financing and an effective intermediation service, and it supports proper allocation of risks and returns among stakeholders. Therefore, a developed financial sector helps lower both the risks and costs in producing goods and services, working as a lubricant for growth and employment (Sen, 2010). Furthermore, Levine (2004) argues that an efficient financial system enables an ideal environment for external finance, thereby addressing the financing constraints necessary for higher growth.

Financial development consists of three factors: depth, access, and efficiency of financial institutions and markets. Financial institutions comprise banking, insurance, non-bank financial institutions, and mutual funds, while financial markets comprise both stock and bond markets (Sahay et al., 2015). A developed financial market should have both financial institutions and markets such that

the financial resources are channeled in a balanced way. This is because both institutions and markets affect short-term and long-term resources, sources of saving and sectors in which to invest, and the distribution of risk and returns, among other factors. Financial inclusion, however, is access to financial products and services, financial literacy, and consumer protection measures. In other words, inclusive finance is where financial services are within easy reach of consumers who are well-informed regarding the wise usage of financial products and services. Furthermore, consumers should be protected from financial fraud and abuse. Therefore, a developed financial system is an inclusive one.

By understanding this connection, Nepal has embarked on a journey toward financial inclusion, recognizing its pivotal role in fostering economic development and reducing poverty. Nepal's efforts have seen a significant expansion of formal financial services, with initiatives aimed at extending banking facilities to previously underserved populations, particularly in rural and remote areas. The government and Nepal's central bank, NRB, have implemented various initiatives to improve access to financial services, including expanding banking networks, promoting digital financial technologies, and strengthening regulatory frameworks. The government of Nepal has recognized financial inclusion as a key pillar for economic growth, mainstreaming its role in inclusive development.

Financial inclusion provides the capital and information for the producers, thus, should accelerate productivity. While the value of agriculture within Nepal's GDP is substantial[1] and the agriculture sector is largely self-reliant, financial inclusion can boost access to agricultural investment. Furthermore, while Nepal's capital market is still at a nascent stage, industry and service sector firms also rely on bank loans as their primary source of investment.[2] These realities further heighten the role of financial institutions in enhancing productivity. In our analysis and theoretically, TFP represents the efficiency with which inputs are utilized in the production process and is a critical determinant of sustaining economic growth. This is further elaborated on in the coming sections.

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[1] According to the National Statistics Office, agriculture, forestry, and fishing contributed 29.2% to the GDP in 2024.

[2] The financial development index of the International Monetary Fund (2023) shows that the financial institutions index remains 0.417 while the financial market index is 0.0006. For details, visit https://data.imf.org/?sk=f8032e80-b36c-43b1-ac26-493c5b1cd33b.

Several pieces of empirical evidence show that financial inclusion is associated with higher TFP growth (Yao, 2011; Arif-Ur-Rahman & Inaba, 2020). Similarly, Ezzahid and Elouaourti (2018) argue that the relationship between financial development and TFP is significantly positive. However, economists diverge significantly on the finance for growth hypothesis even though some early economists recognized the significance of the finance-growth relationship (Goldsmith, 1969; McKinnon, 1973). Therefore, the decomposition of TFP determines the production level and, thereby, the economic growth trajectory. TFP reveals what factors trigger growth in addition to labor and capital, and it enables identification of the key drivers beyond technology, such as financial inclusion and innovation. TFP decomposition becomes much more important in some regions, especially developing nations, as highlighted by Adnan et al. (2019) and Srinivasan (2005).

Nepal has made substantial progress in financial inclusion in recent years. After the rapid expansion of financial institutions and their branches following the financial sector reforms, NRB is now in a financial consolidation phase. The financial deepening indicators, such as broad money to the GDP, credit to GDP, and deposit to GDP ratios, are well above the region's average. Nepal stands second highest in terms of credit-to-GDP ratio in the whole of Asia. The population per branch and other financial services are also rapidly expanding (see Table 1 and Table 2). NRB has emphasized the inclusive access and usage of financial services across Nepal. In 2015, Nepal enacted a new constitution and restructured the state into seven provinces. The province-level data on the production and financial services are available from 2017 only. While the regulatory requirements of access and usage across provinces is mandatory, it should also contribute to productivity growth to justify the central bank's policy of intervention for financial inclusion. Therefore, whether financial inclusion enhances productivity becomes an empirical question.

The finance for growth hypothesis remains debatable in Nepal. Empirical evidence shows that financial development largely supports economic growth (Bist & Bista, 2018; Paudel & Acharya, 2020), while the banking sector plays a key role in growth compared to the capital market (Kharel & Pokhrel, 2012). Despite the positive impact of the overall growth, Nepal's concerns of volatile economic growth, premature deindustrialization, and poor performance of agriculture and industry alongside the emergence of the low-productive services sector sheds doubt on whether financial development as a whole

supports productivity growth. Since the state restructuring, inclusive finance and the growth and development agenda have been further mainstreamed. However, the question is whether inclusive financial services can be the catalyst in promoting sustainable growth. The impact of financial inclusion on broader economic outcomes, particularly TFP, remains underexplored within the Nepalese context. Furthermore, the state-level FII and TFP data are unavailable, making us unable to observe the impact of costly mandatory access and usage policies enforced by Nepal's central bank.

Therefore, understanding the relationship between financial inclusion and TFP is essential for formulating evidence-based policies and strategies aimed at fostering sustainable economic development in Nepal. This research will provide valuable insights into designing evidence-based policies and strategies for financial inclusion, ensuring TFP growth in Nepal. The research outcomes may be useful for prioritizing initiatives aimed at reducing barriers to financial inclusion, particularly in rural and remote areas, to enhance overall economic productivity. Furthermore, the study can be a baseline to further explore sectoral factor productivity due to the emergence of financial services.

The report is divided into five chapters. The first chapter introduces the research topic. The second chapter highlights the trends and status of financial inclusion and TFP, both in regional and local contexts. The third chapter discusses the data used and the methodology adopted in the study. Chapter 4 presents the findings and discusses the results. Chapter 5 concludes the research with policy implications and potential areas of policy reforms.

FINANCIAL INCLUSION AND TOTAL FACTOR PRODUCTIVITY IN NEPAL

Growth of Financial Institutions and Financial Deepening in Nepal

Financial institutions were minimal in Nepal until the early 1980s. Until 1980, there were just four financial institutions licensed by NRB, all of which were under full government ownership. The growth in the number of financial institutions escalated after the introduction of a financial sector reform program in 1985 that induced the involvement of the private sector in financial services. The number of commercial banks rose from three in 1985 to 13 in 2000, and those new banks were private (Table 1).

TABLE 1

GROWTH OF FINANCIAL INSTITUTIONS IN NEPAL.

Institutions	1980	1990	2000	2010	2020	2024
Commercial Banks	2	5	13	27	27	20
Development Banks	2	2	7	79	20	17
Finance Companies	–	–	47	79	22	17
Microfinance Institutions	–	–	7	18	85	53
Infrastructure Banks	–	–	–	–	1	1
Total	4	7	74	203	155	108
Bank Branches				2,265**	9,765	11,530
Population per Branch*				11,753**	3,072	2,529

*Branches of microfinance institutions also included.
**Data from January 2012.
Source: Nepal Rastra Bank (2018, 2024)

After the second phase of financial sector reform initiated in the early 2000s, there were significant changes in the financial legislation and infrastructures that led to rapid expansion in both the number of service providers and the scale. Even after the financial consolidation measures taken in the last decade, the total number of financial institutions licensed by NRB was 108 in 2024 (Table 1). The scale of the financial system has deepened significantly over the years as shown by monetization and intermediation data. For instance, the broad money-to-GDP ratio was about 23% in 1980 and increased more than fourfold by 2024. Likewise, the credit-to-GDP ratio was very minimal, about 8%, in 1980 but soared to 91% in 2018 (Table 2).

TABLE 2

FINANCIAL DEEPENING INDICATORS, % OF GDP.

Year (Mid-July)	Money-to-GDP Ratio	Private Sector's Credit	Deposit
1980	22.6	8.2	14.4
1990	30.5	11.3	21.2
2000	56.0	28.8	40.8
2010	77.2	42.0	52.0
2020	108.8	84.3	98.7
2024	122.1	91.2	113.1

Source: Nepal Rastra Bank (2024).

Despite the significant growth, the effectiveness and efficiency of intermediation was questioned. Other issues, such as asymmetric distribution and poor financial literacy, were also observed to be problematic. Financial institutions' access, quality, and governance were major challenges noticed. In the meantime, NRB introduced financial consolidation measures in 2010 with a moratorium on new licenses, mergers, and acquisitions. These measures gained momentum in the later phases with a capital hike plan. All these measures substantially reduced the number of institutions: 164 banks and financial institutions were merged to become just 42 by December 2018 after NRB's policy of mergers and acquisitions.

Financial Inclusion Status and Policy Initiatives

Nepal has made substantial progress toward financial inclusion in recent years. This has also been indicated by the financial institutions and the deepening

indicators discussed in the earlier section. NRB, which is responsible for the financial inclusion mandate, has been putting continuous effort into expanding access, promoting literacy, and emphasizing consumer protection measures. Nepal's population per branch is about 4,500, not including microfinance institutions. If these are included, the per-branch population becomes around 2,500 (Table 3). However, distribution of access is equally important. While Bagmati and Gandaki provinces are better off in all indicators, Madhesh and Karnali provinces are worst off. Nonetheless, all the provinces have crossed the 50% threshold of financial literacy (Table 3). This indicates that the users have financial knowledge, attitudes, and behavior and if access is available, they can make better financial decisions.

TABLE 3

PROVINCIAL DATA ON FINANCIAL INCLUSION, JULY 2024.

Province	Population per Branch*	Financial Literacy (%)**	Bank Accounts* (per 100,000 adult population)	Financial Inclusion Index†
Koshi	5,037	57.0	2,026	0.27
Madhesh	8,540	52.0	1,674	0.15
Bagmati	2,680	64.5	3,856	0.98
Gandaki	2,982	62.4	3,137	0.53
Lumbini	4,902	55.6	2,358	0.31
Karnali	7,124	59.7	1,824	0.14
Sudarpaschim	6,963	57.5	1,955	0.18
Nepal	4,501	57.9	–	–

* The data excludes microfinance institutions, which account for about 50% of the total bank branches.
** Nepal Rastra Bank (2022).
† Calculated by authors. See Chapter 3 for details.
Source: Nepal Rastra Bank (2024) and as indicated.

NRB has been implementing financial inclusion strategically, with the aim of enhancing inclusive growth and development. The goal is to develop inclusive financial services for higher productivity across sectors and regions, thereby promoting inclusive growth across the provinces. The Nepal Financial Inclusion Roadmap (2017–2030), the Financial Literacy Framework 2022, and the Financial Inclusion Policy 2024 are in place, and a dedicated department was formed in 2023 for inclusion initiatives. For consumer protection, NRB

has regulated banking service charges and an online grievance handling portal is in place for complaint redress. Similarly, financial literacy materials, campaigns, and targeted interventions are also in place. Digital banking and fintech are being promoted to extend services in remote areas at cheaper costs. QR code payments have revolutionized payment modes, and the overall payment and settlement infrastructure is being modernized continuously, which has altogether revolutionized the traditional banking ecosystem.

Total Factor Productivity in South Asia and the Role of Financial Inclusion

The growth of TFP remains highly volatile in Nepal, particularly in recent years. The TFP's trend line is downward sloping, in line with the further decreasing trend of the South Asian average. However, Nepal's recovery rate following state restructuring and the enabling of a decentralized development approach is very promising (Figure 1). This is also relevant to financial inclusion, which has been rapidly increasing. TFP growth in Nepal was above the trend line until 2005, fluctuated until 2016, and has grown exponentially since 2017.

FIGURE 1

TOTAL FACTOR PRODUCTIVITY TRENDS IN SOUTH ASIA AND NEPAL.

Source: Saha (2021).
Note: The data includes the South Asian economies, namely Bangladesh, India, Nepal, Pakistan, and Sri Lanka.
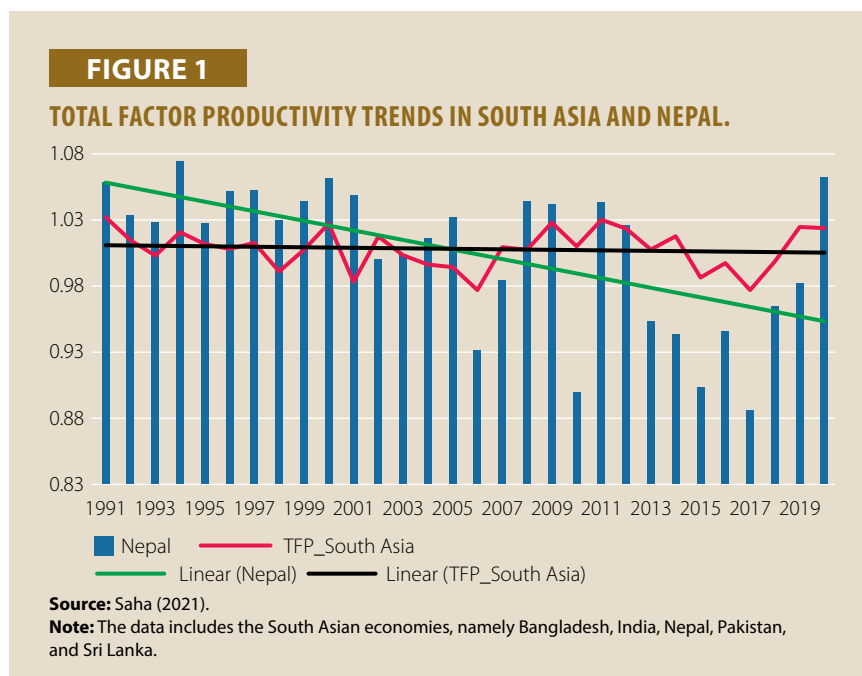
FIGURE 2

FINANCIAL SERVICES AS A CHANNEL TO GROWTH.
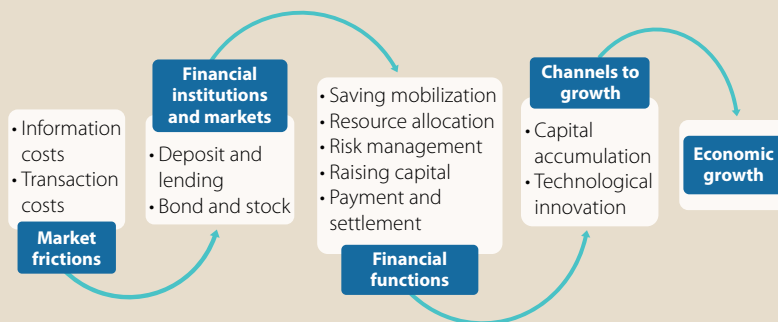
Source: Levine 1997 [691].

When individuals and firms have access to quality and affordable financial products, optimal resource allocation occurs, which ultimately fosters TFP growth. Poor financial services hinder TFP growth, as evidenced by Fukao and Kwon (2006). Nonetheless, inclusion may not always promote growth but can contribute to deterioration, as evidenced in Colombia (Gómez Gómez et al., 2020). While inclusion creates the channel, efficiency and affordability are equally important.

Financial inclusion creates channels for higher growth. Access to financial services helps address market frictions, which then creates a channel for capital and technology. The primary sources of productivity are labor, capital, and technology, but the financial system also supports firms in capital accumulation and innovation. Therefore, better financial services are believed to enhance productivity and economic growth. The growth finance nexus and its channels to productivity are presented in Figure 2.

As shown in Figure 2, financial inclusion can start the process of providing investors with an opportunity for economic participation with diversified risks. While digital financial services and fintech have been revolutionized in recent years around the world, including in Nepal, financial access is becoming much more innovative, efficient, and affordable, which further enables financial inclusion and overall income level (Dos Santos & Kvangraven, 2017; Klapper,

2018; Liu & Walheer, 2022). This is because access to quality and affordable financial services supports households and firms in not only generating capital but also promoting human capital and social welfare, thereby enabling the achievement of sustainable economic growth (Liu, 2018). Therefore, the reason behind the recent exponential growth of productivity shown in Figure 1, and whether this growth is primarily a result of financial inclusion, needs to be diagnosed. The study's findings regarding the financial factors for productivity growth have policy implications for the central bank and the government.

DATA AND METHODOLOGY

Data and Sources

The study is based on secondary data. The study used Nepal's province-level annual data on TFP, the FII, GE, HDI, and UR from the fiscal years 2018–19 to 2023–24.[1]

In our study, TFP was the primary interest variable that measured the production efficiency given the inputs, such as labor, capital, and technology. TFP was computed based on the Cobb-Douglas production function. For this, we used the provincial RGDP, labor force, and capital stock data. The provincial RGDP data is available from Nepal's National Statistics Office website. The annual time series data on the provincial labor force is not available for Nepal, therefore, the labor force of each province was calculated by multiplying the working-age population percentage[2] by the total population of each province. Similarly, the total capital stock at both the national and province level is also not readily available for Nepal. To calculate this, we estimated the national-level capital stock data using the PIM method as applied by NRB (2017), and then we redistributed it to each province according to their population share based on the assumption that capital distribution is related to the labor force.

Using PIM, the series of capital stock was constructed in Equation 1:

$$K_t = (1-\delta)\, K_{t-1} + I_t \qquad \text{Equation 1}$$

K_t and K_{t-1} are the capital stock at time t and $t\text{-}1$, and δ is the depreciation rate, which was assumed to be 6% per annum based on the methods used by NRB (2017). The initial capital stock was computed as $K_{1975} = I_{1975}/(\delta + g)$, and g was the average growth rate of the investment (gross fixed capital formation)

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[1] Nepal's fiscal year starts mid-July. For simplicity, fiscal years are referred to using the second half of the fiscal year cycle. For example, 2019 means fiscal year 2018–19.

[2] The working age population percentage of the seven provinces was obtained from the Labour Force Survey 2017/18 and is assumed to be of a similar proportion for the entire study period.

obtained from the historical average of the entire available capital formation series, ranging from 1975 to 2024. Although our study did not cover that entire period, we considered the historical national capital stock growth as information from which we could derive the provincial capital stock.

Calculating the Financial Inclusion Index

We computed the FII, the primary explanatory variable of the study, ourselves since no series is readily available for Nepal. We considered the three dimensions of financial inclusion: access, usage, and quality of financial services, using the definitions of the World Bank Group (2012). The World Bank Group (2012) defines the three dimensions as follows:

a) **Access:** Financial institutions' capacity to provide financial services and products, which is linked to the regulatory, market, and technology environments. Access indicators reflect the depth of outreach of financial services, such as penetration of bank branches, ATMs, or point of sale devices in rural areas.

b) **Usage:** How clients use financial services, such as the regularity and duration of the financial product/service over time (for example, average savings balances, number of transactions per account, number of electronic payments made, number of bank accounts, number of loans, or number of mobile banking accounts).

c) **Quality:** The ability of the financial service or product to meet the needs of the consumers. The quality dimension includes financial service affordability, convenience, and public trustworthiness. Product fit, transparency, safety, consumer protection, and financial literacy can also be used as quality indicators.

Based on these, the financial service indicators included bank accessibility (BA), ATM numbers (ATM), deposit accounts (DA), deposit per capita (DPC), loan per capita (LPC), deposit ratio (DR), loan ratio (LR), active mobile banking accounts (MB), active internet banking accounts (IB), active debit card accounts (DC), and financial literacy (FL). Microfinance institutions do not provide services such as mobile banking, internet banking, and debit card and ATM services, but commercial banks, development banks, and financial institutions do. Since digital technology is vital for financial inclusion in

today's era, our study focused on the latter institutions and excluded microfinance data when computing FII. Due to the lack of yearly financial literacy data, the study assumed that financial literacy was more or less constant over the review period. The data on financial literacy is from NRB (2022), while the rest of the data were obtained from published sources of NRB. The FII is therefore defined in Equation 2.

$$FII = f\,(BA+ATM+DA+DPC+LPC+DR+LR+MB+IB+DC+FL) \quad \text{Equation 2}$$

The study adopted the methodology of Hu et al. (2021) to construct the FII. The construction of the FII consisted of four steps: indicator selection, indicator normalization, weight measurement, and index formation.

Indicator Selection

The study used 11 indicators in three dimensions. Branch access, ATM access, deposit accounts, deposit ratio, loan ratio, mobile banking accounts, and financial literacy were used based on the research methods of the *Nepal Financial Inclusion Report* (International Finance Corporation & United Nations Capital Development Fund, 2023). In the context of growing financial digitalization in Nepal, internet banking and debit card accounts are indeed relevant and important indicators of financial inclusion that can substantially enhance access even in remote areas. Therefore, these two indicators were added to better estimate financial access. We also included the deposit ratio and loan ratio following the approach of Hu et al. (2021). The dimensions, indicators, and definitions of the indicators are shown in Table 4.

TABLE 4

INDICATORS OF FINANCIAL INCLUSION.

Dimension	Number	Indicator	Definition
Access	1	Branch access	No. of bank branches per 100,000 adult population
	2	ATM access	No. of ATMs per 100,000 adult population
Usage	3	Deposit accounts	No. of depositors with financial intermediaries per 1,000 adult population
	4	Deposit per capita	Deposit amount/total population

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Dimension	Number	Indicator	Definition
Usage	5	Loan per capita	Loan amount/total population
	6	Deposit ratio	Deposit amount/RGDP
	7	Loan ratio	Loan amount/RGDP
	8	Active mobile banking accounts	No. of active mobile banking accounts per 1,000 adult population
	9	Active internet banking accounts	No. of active internet banking accounts per 1,000 adult population
	10	Active debit card accounts	No. of active debit card accounts per 1,000 adult population
Quality	11	Financial literacy	Financial literacy score of each province as per NRB (2022)

Note: No., number; RGDP, real gross domestic product; NRB, Nepal Rastra Bank.
Source: International Finance Corporation & United Nations Capital Development Fund, 2023; Hu et al., 2021; Authors.

Although financial literacy and financial consumer protection are both widely used as quality indicators, this study focused solely on financial literacy. This is because financial consumer protection is highly subjective and qualitative, so it is difficult to measure it quantitatively. Furthermore, consumer protection helps enhance financial inclusion by ensuring public trust in the financial system. Therefore, we argue that the consumer protection measure has been expedited in line with the expansion of financial access. The financial access and consumer protection measures in Nepal are summarized in Chapter 2.

Indicator Normalization

Financial inclusion indicators have different measurement units. Therefore, normalizing the data before constructing the FII was crucial to ensure comparability without distorting the differences in the ranges of values. The study used min-max normalization as shown in Equation 3, which scales data to a range of zero to one as follows (Hu et al., 2021).

$$x'_{ijt} = \frac{x_{ijt} - x_{jt}^{min}}{x_{jt}^{max} - x_{jt}^{min}}$$

Equation 3

In this equation, x'_{ijt} is the normalized value of the jth indicator of the ith province in year t, x_{ijt} is the original value of the jth indicator of the ith province in year t, and x_{jt}^{max} and x_{jt}^{min} are the maximum and minimum values, respectively, of the jth indicator in year t.

Weight Assignment

The study adopted the entropy method as suggested by Hu et al. (2021) to assign weights to different indicators. We evaluated the degree of disorder or uncertainty (entropy) in a dataset to determine how informative each indicator was and assigned weights by measuring the level of variations within each indicator. Using this method, indicators with low entropy (high variability) were assigned higher weights as they provided more distinct and useful information, and indicators with high entropy (low variability) were given lower weights because they contributed less to the overall differentiation of the observations.

Assigning weights to the indicators involved four steps. At first, proportion (probability distribution), p_{ijt}, was calculated in Equation 4, which represents the normalized j^{th} indicator of the ith province in the year t as a percentage of the sum of the jth indicator across all provinces in year t; p_{ijt} is the proportion of the ith province for the jth indicator and n is the total number of provinces.

$$p_{ijt} = \frac{x'_{ijt}}{\sum_{i=1}^{n} x'_{ijt}}$$

Equation 4

Next, the entropy for each jth indicator, e_{jt}, was calculated in Equation 5.

$$e_{jt} = -k. \sum_{i=1}^{n} p_{ijt} . \ln(p_{ijt})$$

Equation 5

In Equation 5, e_{jt} is the entropy of the jth indicator, p_{ijt} is the proportion calculated in Equation 4, and k is a constant that ensures $0 \leq e_{jt} \leq 1$. K is calculated in Equation 6.

$$k = \frac{1}{\ln(n)}$$

Equation 6

Then, using Equation 7, the degree of divergence, d_{jt}, for each indicator was calculated, where d_{jt} represents the information contained in the jth indicator.

$$d_{jt} = 1 - e_{jt} \qquad \text{Equation 7}$$

A higher value indicates more variability, meaning the indicator is more informative. Lastly, the weight, w_j, for each indicator, j, was determined in Equation 8 using each indicator's degree of divergence, d_{jt}; w_{jt} is the weight assigned to indicator j, and m is the total number of indicators.

$$w_{jt} = \frac{d_{jt}}{\sum_{j=1}^{m} d_{jt}} \qquad \text{Equation 8}$$

Index Formation

After normalizing and assigning weights, the composite index was calculated using Equation 9 by taking a weighted sum of the normalized values for each observation.

$$FII = \sum_{j=1}^{m} w_{jt} \cdot x'_{ijt} \qquad \text{Equation 9}$$

FII is the composite index for observation i, w_{jt} is the weight assigned to indicator j, x'_{ijt} is the normalized value of the jth indicator for i^{th} province, and m is the number of indicators.

Control Variables for the Study

The control variables in the study included government efficiency (GE_{it}), urbanization rate (UR_{it}) and the Human Development Index (HDI_{it}). We included GE_{it} as a control variable following the approach of Yao (2011). GE_{it} is the spending capacity of each province measured as the ratio of actual government spending out of the total allocated budget for the given fiscal year using Equation 10.

$$GE_{it} = \frac{Actual\ Government\ Spending\ (AGS_{it})}{Total\ Allocated\ Budget\ (TAB_{it})} \qquad \text{Equation 10}$$

The UR over the years for each province (UR_{it}) was obtained from Bhattarai et al. (2023).[3] The provincial Human Development Index (HDI_{it}) was reassigned to the provinces based on the *Nepal Human Development Report* (Government of Nepal & United Nations Development Programme, 2020). This report provides both national and provincial-level HDIs for 2020. Based on the national HDI positions in the later periods, we reassigned the provincial HDI

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[3] The study provides the percentage of urban areas in each province in 2017 and the average annual percentage growth. This annual percentage growth is then added to the subsequent year to estimate the level of urbanization for the rest of the years.

for the rest of the years, assuming that the provincial HDI progressed with the national trends from 2020 until 2023. The HDI data for 2024 is not yet available.

Estimating Total Factor Productivity

Following Cobb and Douglas (1928), the study used the Cobb-Douglas production function in Equation 11.

$$Y = A \cdot K^{\alpha} \cdot L^{1-\alpha} \qquad \text{Equation 11}$$

Y is the total output measured as the GDP, K is the physical capital, L is the labor force, A is the technology level representing the efficiency of production, α is the output elasticity of capital, and $1-\alpha$ is output elasticity of labor.

Rearranging Equation 11 to get A, we calculated the potential TFP in Equation 12.

$$A = \frac{Y}{K^{\alpha} \ L^{1-\alpha}} \qquad \text{Equation 12}$$

The dependent variable output and independent variables labor and capital were transformed into log form to estimate the Cobb-Douglas production function in logarithmic form as shown in Equation 13.

$$lnRGDP = \beta_0 + \alpha \ lnK + (1-\alpha) \ lnL + e_t \qquad \text{Equation 13}$$

β_0 is the constant term and e_t is the residual. The regression residual of Equation 14 is the representation of TFP. TFP here considers both labor and capital contributions. To get TFP in normalized form, the residual was then converted to the anti-log form, to its exponential function. The residual (e_t) captures elements such as innovation and technical advancement that propel productivity growth beyond quantifiable inputs, reflecting the efficiency with which inputs are employed.

The Model Specification of the Study

Finally, using the data generated with the aforementioned methods, the following model, shown in Equation 14, was constructed to explore the relationship between TFP and FII.

$$TFP_{it} = \beta_0 + \beta_1 FII_{it} + \beta_2 GE_{it} + \beta_3 UR_{it} + \beta_4 HDI_{it} + \mathcal{E}_{it} \qquad \text{Equation 14}$$

TFP_{it}, *FII_{it}*, *GE_{it}*, *UR_{it}*, and *HDI_{it}* are total factor productivity, financial inclusion index, government efficiency, urbanization rate, and Human Development Index respectively, generated based on the earlier discussions, for the ith province in year *t*, while the ε_{it} is the white noise error term. The model specification of Equation 14 established the relationships in which we were interested, i.e., the impact of financial inclusion on productivity. To further establish the core relationship of the *FII_{it}* and *TFP_{it}*, we included *GE_{it}*, *UR_{it}*, and *HDI_{it}* as control variables. We expected a positive relationship between all the included explanatory variables and *TFP_{it}*.

Financial inclusion contributes to factor productivity by improving access to financial resources and services to individuals and firms, enabling more efficient capital allocation and financial intermediation. The effect of financial inclusion on TFP growth is due to its role in providing loans to support production transformation based on specialization and cooperation (Hu et al., 2021). Financial inclusion improves the efficiency of resource allocation across the country, providing easy access to credit to boost investment in productive sectors and helping them to expand and operate efficiently, as discussed in Chapter 2. By effectively directing funds into profitable investments, financial intermediaries promote capital formation and factor productivity, thereby promoting growth (Bencivenga & Smith, 1991; Pagano, 1993). Likewise, the government's efficiency regarding the successful implementation of better government policies, regulations, and public service delivery helps reduce costs and enhance productivity for businesses and individuals, raising TFP. Arrow and Kurz (1970) found that all public expenditure items significantly affect productivity.

Similarly, a higher HDI reflects a healthier, skilled, educated, and economically well-established workforce that is more productive, innovative, and efficient, contributing directly to productivity growth. Romer's endogenous growth theory (Romer, 1994) posits that human development (particularly education) drives innovation and knowledge spillovers, which increase productivity. Similarly, a high degree of urbanization provides better infrastructure, opportunities, and services. It also facilitates interaction among people and businesses, leading to faster knowledge transfer and innovation, which can boost productivity and TFP. Glaeser (2010) discusses the concept of agglomeration economies and how urban concentration promotes economic benefits like cost savings and knowledge sharing. Thus, from both theoretical

and practical points of view, we expected a positive correlation between TFP and FII, GE, HDI, and UR.

Each province has unique and time-invariant characteristics, like ethnic and cultural composition, historical progress and infrastructure level, geographical location, climate, and natural resources, that may influence both TFP and financial inclusion. Moreover, unobserved provincial factors are likely correlated with financial inclusion and other predictors. Using a normal panel regression (pooled ordinary least squares) method would not have addressed the structural and socioeconomic differences across the provinces and would have led to biased estimates. To provide more accurate and unbiased estimates, we needed to control the unobserved, time-invariant provincial factors that differ across Nepal's seven provinces. We thus first tested whether RE or FE models were more suitable and chose the appropriate model.

RESULTS AND DISCUSSIONS

This chapter details the data analysis and results. It begins with estimations of FII and TFP, followed by descriptive statistics like summaries and correlations. Then it estimates the model to explore relationships among variables backed by robustness tests. Finally, it discusses the findings and their implications for financial inclusion and productivity analysis.

Estimating the Data

Financial Inclusion Index

The FII for each province accurately reflects the current financial situation. The estimated FII for each province is presented in Annex A1. The financial inclusion is increasing each year in every province. The index is the highest in the Bagmati province, followed by Gandaki, Lumbini, Koshi, Sudurpaschim, Karnali, and finally Madesh. High levels of urbanization, greater concentration of financial institutions, better infrastructure, higher literacy and income levels, and greater adoption of digital payments could be reasons behind the higher FII in Bagmati province. Madesh, Karnali, and Sudurpaschim provinces are quite underdeveloped in terms of financial services, urbanization, literacy, and infrastructure, therefore their FII remains the lowest. However, the average index increased over the review period. For instance, the average FII was 0.18 in 2019 but doubled in six years to be 0.36 in 2024, justifying the financial access data and inclusion measures discussed in Chapter 2.

Total Factor Productivity

Following the methods explained in Chapter 3 and Equation 13, the estimated results of the TFP level are summarized in Annex A2. The trend of TFP growth is provided in Figure 3. The TFP level seems to be increasing in each province, reflecting the improvements in efficiency and productivity across regions.

Bagmati province consistently shows the highest TFP values, starting at 1.11 in 2019 and reaching 1.49 in 2024. This indicates that Bagmati is leading in TFP

development, with continuous improvement over the years. Gandaki province follows Bagmati, being the second highest. Its TFP value was less than 1 in 2019 (0.94) and jumped to 1.4 in 2024. Bagmati and Gandaki provinces do have better financial inclusion and other indicators such as GE, UR, and HDI. While Karnali and Koshi show substantial progress in TFP, Sudurpaschim, Lumbini, and Madhesh provinces' TFP level is still less than 1, indicating that they are less productive. Out of the seven provinces, Madesh province has the lowest TFP values, with a mean of 0.787. However, all the provinces show a general upward trend in TFP over the years (Figure 3).

The TFP data shows some convergence among the provinces, especially for those with TFP values around 1 (Karnali, Koshi, Sudurpaschim, and Lumbini), which are gradually increasing their productivity levels. This suggests that these provinces are improving and narrowing the gap between themselves and higher-performing provinces. In contrast, the significant and accelerating growth of Bagmati province indicates divergence from the other provinces, particularly Madesh, which is not only the lowest in TFP but is also growing at a slower pace. The widening gap between Bagmati and Madesh illustrates the potential risks of increasing regional disparities in factor productivity.

FIGURE 3

TOTAL FACTOR PRODUCTIVITY GROWTH.

Legend: Koshi, Madesh, Bagmati, Gandaki, Lumbini, Karnali, Sudurpaschim

Source: Authors' estimates.
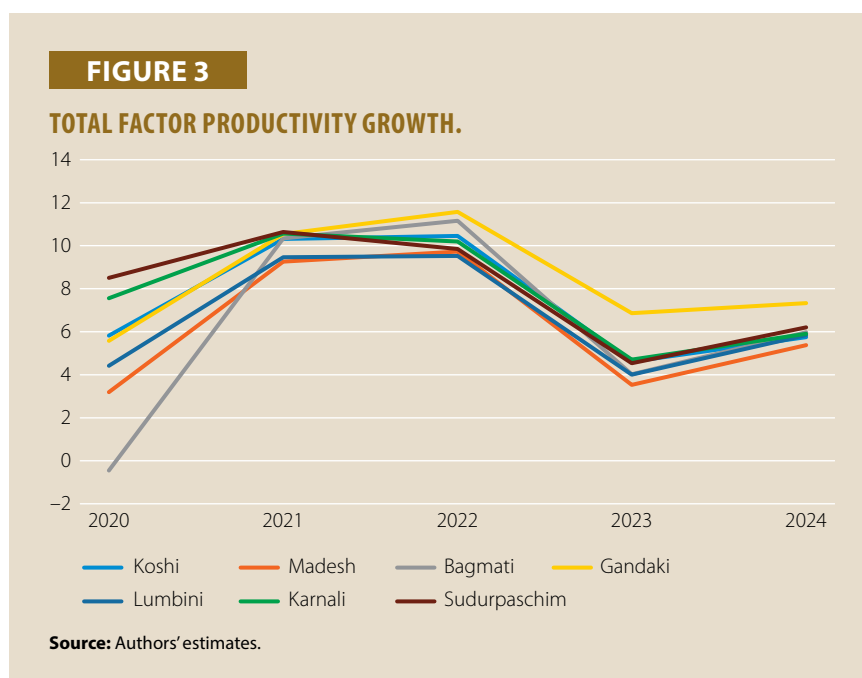
TFP growth remained robust in the estimation periods. While TFP grew at a higher rate in each province from 2020 to 2022, it grew at a slower rate in 2023 but picked up shortly in 2024. The decreased TFP growth rate after 2022 is likely due to the impact of COVID-19 and supply chain disruptions due to the geopolitical tensions causing global inflationary pressure, import restrictions imposed in Nepal, and tighter monetary policy, among other factors. The higher growth rates in Gandaki province are likely due to its more educated and skilled workforce, improved road networks and connectivity, efficient agricultural practices, diversification into high-value crops, and a thriving tourism industry.

Data Description

Descriptive Statistics

This section presents the descriptive statistics of the variables included in the study, including the estimated data. The average TFP is 1.018, indicating efficient resource utilization. The relatively small standard deviation (SD) compared to the mean suggests that TFP values are consistent and tightly grouped around the average, with less variation in productivity across the provinces, with a minimum value of 0.672 and a maximum of 1.487. The average FII is 0.283, indicating relatively low financial inclusion across the provinces. The SD of the FII is nearly as large as the mean, which means financial inclusion is not uniform across the states, with some provinces showing deficient levels (0.037) and others nearing full inclusion (0.984; Table 5).

TABLE 5

DESCRIPTIVE STATISTICS.

Variable	Mean	Standard Deviation	Min	Max
Total Factor Productivity (TFP)	1.018	0.197	0.672	1.487
Financial Inclusion Index (FII)	0.283	0.255	0.037	0.984
Government Efficiency (GE)	0.664	0.103	0.354	0.923
Human Development Index (HDI)	0.57	0.048	0.501	0.664
Urbanization Rate (UR)	0.072	0.041	0.01	0.164

Source: Authors' calculation.

GE is moderate across provinces with a mean of 0.664. The SD of 0.103 suggests less variability in GE compared to TFP and FII. The mean HDI of 0.570 indicates

that, on average, the provinces have moderate achievements in health, education, and standard of living. The SD of 0.048 shows that the HDI values are relatively close to the mean. Similarly, the mean U of 0.072 suggests low UR on average across the provinces. The SD of 0.041 indicates some variability across provinces. The variables are normally distributed according to the Shapiro-Wilk test.

Correlation

The Pearson correlation matrix shows a strong positive and statistically significant correlation between TFP and FII. It validates the inclusion of the control and interest variables in the model since it reveals that the control variables GE and UR have positive and statistically significant correlations with TFP, as per our expectations (Table 6).

TABLE 6

PAIRWISE CORRELATIONS MATRIX.

Variables	(1)	(2)	(3)	(4)	(5)
(1) Total Factor Productivity (TFP)	1.000				
(2) Financial Inclusion Index (FII)	0.808	1.000			
	(0.00)				
(3) Government Efficiency (GE)	0.407	0.192	1.000		
	(0.00)	(0.22)			
(4) Human Development Index (HDI)	0.769	0.910	0.218	1.000	
	(0.00)	(0.00)	(0.20)		
(5) Urbanization Rate (UR)	0.393	0.770	0.160	0.581	1.000
	(0.01)	(0.00)	(0.31)	(0.00)	

Source: Authors' estimation.

Model Estimation and Results

Next, we estimated our model of interest to observe TFP and FII relations. Equation 14 was first estimated with a panel regression RE model followed by the FE model. For the panel regression of seven provinces over six years, we could have used the RE or FE model. Nepal's seven provinces may have random characteristics over the period as they do diverge in their levels of

development. Nonetheless, they may have had some common, permanent, underlying effects that were constant over the entire study period. Therefore, we needed to statistically test before finalizing the model and interpreting the results. In the RE model, province-specific effects are random variables that are uncorrelated with the explanatory variables; however, in the FE model, province-specific effects are random variables that are allowed to be correlated with the explanatory variables. We therefore conducted a test to identify which model was the best fit for the data.

Given the panel structure of the data, both RE and FE models were first estimated to determine which was more appropriate for capturing the relationship between financial inclusion and productivity across time and the seven provinces. Hausman's (1978) test, which assesses whether the unobserved individual-specific effects are correlated with the explanatory variables, was employed to decide between the RE and FE models. A significant result suggests that the FE model should be preferred over the RE model (Schmidheiny, 2014). In our test, the Hausman test rejected the null hypothesis with a chi-square value of 20.1, while the p-value was 0.005. This suggested that the FE model was more appropriate than the RE model, which was in line with our assumptions. We expected this result because although the FII varies substantially from one province to another, it tends to be consistent over time within a province. We believed that these regional differences, which are constant over time, could be correlated with TFP and other control variables. The FE model helps to isolate the effect of financial inclusion on productivity by accounting for these regional characteristics. Furthermore, control variables like GE, HDI, and UR also vary significantly from one province to another but tend to be consistent over time within each province. This consistency means that province-specific factors related to governance, human development, and urbanization are better captured by FE, to ensure that the impact of GE, HDI, and UR on TFP is accurately measured without any bias from unobserved regional differences. These regional characteristics can correlate with TFP and the other variables, making FE the appropriate choice to control for these unobserved factors. Therefore, while we also reported the estimation results of the RE model, empirical inferences and discussions are based on the FE model.

To address the heteroscedasticity and autocorrelation issues, we could have employed robust standard errors. However, since we had a small T, we discarded the autocorrelation issues and, after applying the FE model, we

assumed that error terms would become homoscedastic. We followed the argument that for a small T and the within transformation, our error terms would be homoscedastic and serially uncorrelated (Wooldridge, 2010).

TABLE 7

REGRESSION RESULT WITH RANDOM EFFECTS AND FIXED EFFECTS.

Variables	(1) Random Effects	(2) Fixed Effects
Financial Inclusion Index (FII)	1.283*	0.670**
	(0.147)	(0.263)
Government Efficiency (GE)	0.428*	0.298**
	(0.100)	(0.108)
Human Development Index (HDI)	−1.710*	0.134
	(0.588)	(2.073)
Urbanization Rate (UR)	−3.245*	6.689**
	(0.460)	(2.929)
Constant	1.565*	0.0672
	(0.315)	(1.135)
Observations	35	35
R-squared	0.780	0.878
Number of ids	7	7
F-stat		4.54
P-value of the F-stat		0.0033

Note: Values in parenthesis are standard errors.
* Indicates significance at the 1% level.
** Indicates significance at the 5% level.
Source: Author's estimati on.

The estimation results indicate that financial inclusion positively affects productivity. The FE model estimates show that the FII has a significant positive impact on TFP (Table 7). For instance, a one-unit increase in FII is associated with a 0.67-unit increase in TFP, holding other variables constant. This means improvements to financial inclusion are associated with improvements to the productivity level as well. This result aligns with the empirical results of Yao (2011), Hu et al. (2021), Arif-Ur-Rahman and Inaba (2020), and theoretical

literature by Goldsmith (1969) and Shaw (1973). Likewise, GE can also make some positive improvements to TFP. The regression coefficient of GE is 0.298, which is significant at the 5% level, indicating that a one-unit increase in GE leads to a 0.298 increase in TFP, holding other variables constant. This result is similar to the results of Wu et al. (2017). Similarly, UR also has a similar impact, the regression coefficient of UR being substantially larger (6.689) and significant at a 5% level. This result is consistent with the results of Glaeser (2010), Kumar and Kober (2012), and Mitra (2002). Nevertheless, the relationship between TFP and HDI is statistically insignificant. According to Miller and Upadhyay (2002), human capital plays a smaller role in enhancing growth through TFP. A study by Dahal (2013) also found that the effect of higher education is ambiguous in enhancing TFP in Nepal. The findings of Ezzahid and Elouaourty (2018) also state that human capital does not improve TFP directly.

The 0.88 value of R-square indicates a higher explanatory power of the variables included in the model of the TFP variations. The F-test shows that the overall model is statistically significant at the 1% level, indicating an overall model significance.

Discussion of the Findings

The findings of the study offer some new insights into Nepal's productivity growth. While our assumption that financial inclusion does improve TFP proved true, only two of the three control variables proved significant. The following discussion is based on the findings.

First, the significant positive relationship between FII and TFP suggests that increased access to financial services enables people and businesses to make more productive investments in Nepal across all provinces. Financial inclusion allows more people to engage in economic activities, invest in productive assets, and manage risks by improving access to credit, savings, and other financial products. This leads to higher levels of entrepreneurship across provinces, greater capital accumulation, and more efficient allocation of resources, all of which contribute to enhanced productivity. This finding highlights the role of NRB in promoting productivity and, thereby, higher growth.

Furthermore, financial inclusion may also facilitate technological adoption and innovation, as businesses with better financial support are more likely to invest

in new technologies and improve their production processes. This relationship supports the views of Goldsmith (1969), McKinnon (1973), and Shaw (1973), who argued that financial access promotes economic growth by reducing financial constraints and improving resource allocation. Empirical studies by Yao (2011) and Arif-Ur-Rahman and Inaba (2020) also provide similar evidence of financial inclusion being associated with higher TFP growth. Therefore, the positive effect of financial inclusion on productivity highlights the potential for targeted policies to expand financial services, especially in underserved areas, as a means to foster productivity and, ultimately, economic growth in Nepal.

Second, although the findings suggest that FII is indeed a catalyst for increasing TFP in Nepal, it becomes imperative to understand that the overall impact of financial inclusion on TFP depends upon several other factors, such as the effectiveness of financial institutions, the stability of the financial system, and the regulatory environment. If these concerns are systematically addressed, then financial inclusion can significantly amplify productivity. On the other hand, without supportive policies and in the absence of robust financial infrastructure, the gains from financial inclusion might be diluted, limited, or slow to materialize.

Third, a significant positive relationship between GE and TFP suggests that an efficient and capable government plays a vital role in fostering productivity levels. Effective governance provides better infrastructure, streamlined regulations, and enhanced public services, which creates an environment conducive to business activities and economic development. A government that efficiently upholds the rule of law, enforces contracts, and mitigates bureaucratic obstacles can reduce transaction costs, facilitate investment, and encourage innovation to drive productivity improvements. Additionally, effective governance can attract foreign investment by creating a stable and predictable policy environment, which further supports productivity by bringing in new technologies and fostering competition, as evidenced by Wu et al. (2017).

Fourth, the significant positive relationship between UR and TFP suggests that the process of urbanization plays a transformative role in enhancing productivity across the provinces in Nepal. Urban areas often serve as hubs for economic activity, innovation, and access to a larger pool of skilled labor, which collectively contribute to higher productivity levels. As people move to urban centers, they have greater access to employment opportunities, better infrastructure, and essential services, which can lead to more efficient

production processes and increased output. Urbanization also facilitates the concentration of industries and businesses, fostering knowledge spillovers, collaboration, and economies of scale. In such environments, firms can more easily share resources, attract talent, and access markets, all of which help drive productivity growth. The government should, therefore, implement policies supporting sustainable urban development by investing in urban infrastructure, improving transportation networks, and addressing challenges like housing and environmental sustainability to maximize the productivity gains associated with urbanization.

Finally, the insignificant relationship between TFP and HDI suggests that higher levels of human development, as measured by health, education, and standard of living, do not directly translate into productivity gains in Nepal. Although improvements in education, health, and general well-being are crucial for overall societal progress, they might not have an immediate impact on productivity within the economy's current structure. In Nepal, structural factors such as the mismatch between educational outcomes and labor market demands, limited job opportunities, and a lack of effective channels for utilizing skills could be dampening the impact of human development on productivity. A similar finding of Dahal (2013) shows that the effects of higher education on productivity in Nepal are ambiguous, possibly due to the education system's alignment with labor needs or other inefficiencies in human capital utilization. This suggests that policy reorientation is needed to focus on better aligning human development efforts with economic needs (e.g., through vocational training and skill development programs tailored to market demands) and to ensure that health and education improvements are effectively integrated into productivity-enhancing sectors.

CONCLUSION AND POLICY IMPLICATIONS

Theory and evidence show that financial inclusion is a catalyst for increasing productivity. Nevertheless, the available findings lack consensus regarding whether finance supports economic growth. This uncertainty is a concern, especially for developing economies like Nepal. While many central banks are rigorously emphasizing their role in financial inclusion to support the legal mandate of sustainable growth, the relationship between financial inclusion and TFP remains unexplored, especially in the context of Nepal. Using the annual data from 2019 to 2024 of the seven provinces after Nepal restructured its state in 2015, the study establishes the relationship between financial inclusion and TFP using the FE model. The additional three variables, provincial GE, UR, and HDI, were also included as control variables. We first developed the FII of Nepal's seven provinces, estimated TFP, and finally estimated the model. Nepal has been rapidly expanding its access to finance and surpassing deepening indicators in the entire Asian region. Similarly, TFP also witnessed a rapid upsurge after 2018. Therefore, financial inclusion and TFP needed to be explored to observe the causality.

Based on the findings, the study concludes that financial inclusion positively affects TFP. Similarly, two of the three control variables, GE and UR, have a positive role in enhancing TFP. UR has the highest impact on productivity growth, being more than unitary. However, the third control variable, HDI, has no direct role in affecting productivity. These findings are consistent with the available literature. The test indicators confirm the robustness of the results obtained. The study findings provide new insights into and policy discourse regarding Nepal's productivity growth.

The research findings provide several policy implications. The first implication is that the finance for growth hypothesis matters for Nepal. Financial inclusion

is a catalyst for enhancing productivity. Since financial inclusion is the mandate of NRB, Nepal's central bank, it can support higher growth and sustainable economic development by improving financial access to underserved areas, promoting financial innovation and fintech, and enhancing literacy and consumer protection measures: all key pillars of financial inclusion. Ensuring effective services, robust financial infrastructure, and a systemic and strategic approach to financial development are in place is equally important, not only for promoting financial inclusion but also for other enablers such as the efficiency of institutions.

Another implication is the role of GE and urbanization in higher productivity gain. These both have a similar impact on productivity. Higher government spending can also promote urban infrastructure development. Therefore, higher spending and a higher UR are equally required for higher productivity growth. Effective governance provides better government services and ensures that state-of-the-art infrastructure and proper regulations and policies are in place. These are also complementary to urbanization and, thereby, industrialization and rural-urban linkage. Finally, while human resources are vital to productivity growth, Nepal's health and education do not appear to be linked to enhancing productivity yet. The insignificant relationship between human development and higher productivity growth suggests that the education and health policies need to be reorientated to be more skill-based and industry-linked.

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ANNEXES

FINANCIAL INCLUSION INDEX ESTIMATION.

Province	2019	2020	2021	2022	2023	2024	Mean
Koshi	0.125	0.155	0.192	0.228	0.251	0.271	0.204
Madesh	0.037	0.057	0.089	0.113	0.131	0.147	0.096
Bagmati	0.586	0.682	0.793	0.885	0.948	0.984	0.813
Gandaki	0.275	0.324	0.383	0.463	0.503	0.534	0.414
Lumbini	0.146	0.176	0.214	0.266	0.294	0.315	0.235
Karnali	0.041	0.059	0.085	0.104	0.122	0.140	0.092
Sudurpaschim	0.065	0.086	0.116	0.146	0.164	0.177	0.126

TABLE A2

TOTAL FACTOR PRODUCTIVITY ESTIMATION.

Province	2019	2020	2021	2022	2023	2024	Mean
Koshi	0.807	0.854	0.942	1.041	1.089	1.152	0.981
Madesh	0.672	0.693	0.758	0.831	0.861	0.907	0.787
Bagmati	1.105	1.100	1.214	1.349	1.404	1.487	1.277
Gandaki	0.940	0.992	1.097	1.224	1.308	1.404	1.161
Lumbini	0.800	0.835	0.915	1.002	1.042	1.103	0.949
Karnali	0.811	0.872	0.964	1.063	1.113	1.178	1.000
Sudurpaschim	0.784	0.851	0.941	1.034	1.081	1.148	0.973

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ABBREVIATIONS

BA	Bank accessibility
DC	Debit card
DA	Deposit accounts
DPC	Deposit per capita
DR	Deposit ratio
FE	Fixed effect
FII	Financial inclusion index
FL	Financial literacy
GDP	Gross domestic product
GE	Government effectiveness
HDI	Human Development Index
IB	Internet banking
LR	Loan ratio
LPC	Loan per capita
MB	Mobile banking
NRB	Nepal Rastra Bank
PIM	Perpetual inventory method
QR	Quick response
RE	Random effect
RGDP	Real gross domestic product
SD	Standard deviation
TFP	Total factor productivity
U	Urbanization

LIST OF CONTRIBUTORS

NEPAL RASTRA BANK
Guna Raj Bhatta
Deputy Director of the Economic Research Department

Shikha Pokhrel
Assistant Director of the Economic Research Department

ASIAN PRODUCTIVITY ORGANIZATION
Santi Setiawati
Program Officer, Multicountry Division 2