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The Productivity and Future Growth Potential of Indonesia

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Abstract

The output per worker of Indonesia has been on a downtrend since 2010, with total factor productivity (TFP) and capital stock largely stagnant if not declining. This paper discusses stylized facts that may explain recent trends in the productivity and growth potential of Indonesia. The decomposition of output per worker reveals the declining contribution of human capital, which is also most negative among peer countries. The growth in labor productivity has been concentrated within sectors, implying room for gains from labor reallocations. A substantial share of employment and credit in Indonesia has shifted to the relatively unproductive service sectors, particularly wholesale and retail trade. In terms of firm dynamics, the contribution of large firms in Indonesia has been lackluster compared to regional peers while the productivity of micro, small and medium enterprises remains stagnant. Considering that human capital and TFP measures of Indonesia are lagging behind middle-income peers, there is wide scope for Indonesia to catch up. However, the potential output of Indonesia also faces new risks from the COVID-19 pandemic. We expect that the short-term effect of the pandemic on capital accumulation and the long-term effect on human capital pose the highest risk while labor inputs appear to be more resilient. Meanwhile, the potential productivity gains from accelerated digital adoption and sectoral reallocations are more uncertain.

Keywords: productivity; growth decomposition; potential output; COVID-19

JEL classifications: J21; J24; O41; O47

1. Introduction

Following the decades of steady growth performance, Indonesia was momentarily upgraded to an upper-middle-income country by the World Bank shortly before COVID-19 hit the economy. Over the past five decades prior to 2020, the GDP of Indonesia had grown at an annual average of 6%, only interrupted by Asian Financial Crisis (AFC) in 1998. The country emerged from the crisis to resume stable growth at approximately 5% per year and a significant gain in poverty reduction, with the poverty rate reduced by more than half since the crisis. The timing of the COVID-19 crisis is reminiscent of the 1998 AFC, which also hit during the

time Indonesia was upgraded to a higher income bracket (Figure 1). Subsequent to several years of strong growth, GDP of Indonesia fell by 2.1% in 2020 due to the global pandemic. Concurrently, the nationwide poverty and unemployment rates increased to 10.2% and 7.1%, respectively. Even though Indonesia faces new uncertainties from the pandemic, President Joko Widodo assures that the country will obtain high-income status by 2045.

The more recent trend in the economic growth of Indonesia, however, spells less optimism. Prior to the Covid-19 pandemic, output per worker has been even on a downtrend since 2010 (Figure 2). The decomposition of growth per worker reveals an even more alarming trend: the contribution of human capital has consistently declined over the past two decades. Meanwhile, total factor productivity (TFP) growth and capital stock have been largely stagnant.

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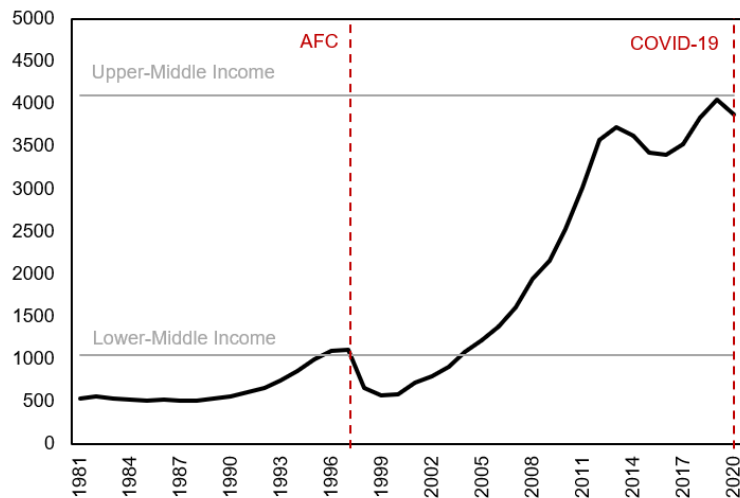


Figure 1. GNI per Capita of Indonesia
(GNI per capita in Adjusted Current USD, in percent)
Source: World Bank

Furthermore, the contribution of TFP to both aggregate output and output per worker growth dropped in 2015–2019 from the preceding periods, possibly indicating the start of a productivity downtrend.

The stagnation in productivity can be linked to the structural transformation of the country. As measured by output per worker, productivity growth is concentrated only within specific sectors, while labor movement from low-productivity to high-productivity sectors is not sufficient. Instead, there has been a shift in labor and financial resources towards service sectors, such as trade and public services, which are not particularly productive. While the infrastructure drive of the government should yield long-term gains, it may contribute to lackluster productivity growth in the short term due to the stagnant labor productivity in construction and an uncompetitive market dominated by SOEs.

It is generally believed that Indonesia needs to grow by at least 6% to accelerate its escape from the middle-income trap. We project that for the country to reach this growth rate, the TFP growth will need to increase by 3%, or one percentage point higher than the annual average over the past few years, holding other components of growth at their pre-Covid-19 movement on average. This is an un-

derestimate since the pandemic may slow input growth, requiring larger productivity growth at least in the short term. Based on the preliminary evidence, we believe that the pandemic will primarily hurt the growth potential of Indonesia through its short-term effect on capital accumulation and long-term effect on human capital. Labor input remains relatively resilient while scarring remains uncertain. Disregarding disruption from the pandemic, the position of Indonesia behind the technological frontier implies broad scope for improving its productivity. It will require Indonesia to decisively pursue human capital investments, further physical capital deepening, and structural reforms involving services trade liberalization and facilitation of foreign direct investment (FDI), among other policies.

This article has two main objectives: to review the recent productivity trends of the economy of Indonesia, and to gauge the potential effects of COVID-19 on potential growth. On the former objective, this article updates the big picture of productivity with the latest data as well as explores issues related to the dimensions of structural change, firm size, and international TFP frontier. In doing this, we hope to map the key areas for further studies and identify policy suggestions to rejuvenate the

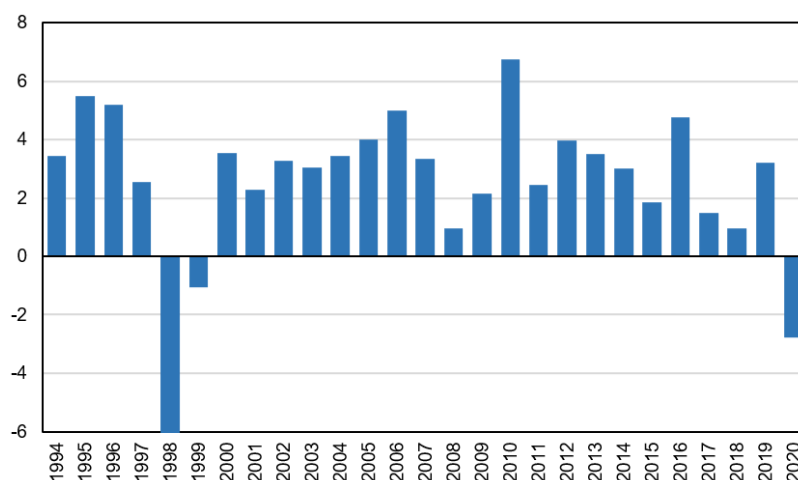


Figure 2. The Output Gap and Output per Worker of Indonesia

(real gross value added per worker growth, in percent)

Source: Statistics Indonesia (BPS); authors' calculations

productivity growth of Indonesia.

This article proceeds as follows. Section 2 reviews the literature to obtain the basic framework for our productivity analysis. Section 3 describes the various data and the methods used. Section 4 discusses the results of our examination in several subsections: subsection 4.1 decomposes the aggregate output and output per worker growth of Indonesia; subsection 4.2 describes the possible productivity implications of labor movements between sectors in Indonesia and infrastructure development; subsection 4.3 discusses productivity from the perspective of firm size and subsection 4.4 from the global productivity frontier; while subsection 4.5 explores the possible effects of COVID-19 on the potential growth of Indonesia. Section 5 concludes with an outline of policy suggestions.

2. Literature Review

The literature on growth accounting and productivity stretches back to the early 1950s, with Solow (1957) proposing an interpretation for the residual of an aggregate production function. The most basic form of this production function is the Cobb-Douglas production function, specifying output (Y) as a function

of physical capital (K) and labor (L): $Y = AL^{1-\alpha}K^\alpha$ (Cobb & Douglas 1928). The terms $1 - \alpha$ and α are the output elasticities of labor and capital, respectively, while A is the residual representing Total Factor Productivity (TFP). Of this production function, countless growth accounting analyses have been conducted, many of which are surveyed in Crafts & Woltjer (2019).

A complementary tool to analyze productivity is based on a shift-share analysis, originating from the regional science literature (Perloff et al. 1960). One application is to decompose productivity growth into its “within” and “between” or “structural” effects, which can be implemented at the sectoral (McMillan & Rodrik 2011) or the firm-level (Baily et al. 1992). The idea is that productivity growth can originate from “within” economic sectors, including from capital accumulation, technological change, or the reallocation of inputs between firms within a given sector. On the other hand, “structural” productivity growth arises from the movement of labor across sectors, particularly from low-productivity to high-productivity ones. McMillan & Rodrik (2011) discover that “structural” growth was important in developing countries during 1990–2005, contrary to high-income countries where the period of sectoral reallocation was past and growth within sectors

was more important. However, only Asia enjoyed positive structural change while Africa and Latin America faced negative contribution from structural change.

The issue of structural growth is closely related to the literature on the patterns of development. Countries are believed to undergo a structural change where labor moves from agriculture to industries and then services, each phase of which is associated with higher productivity. However, the recent experience of several developing countries hints at “premature deindustrialization”, where their manufacturing share of the economy declines sooner than historically in developed countries (Buera & Kaboski 2009; Rodrik 2016). There is concern that the early rise in services does not bode well for income growth, considering the evidence that unconditional convergence of labor productivity is only discovered in the manufacturing but not in service nor agricultural sector (Rodrik 2013). The phenomenon of premature deindustrialization has also been documented in Indonesia (Aswicahyono, Hill & Narjoko, 2013). Ryandiansyah & Azis (2018) also confirm that the shift to services in Indonesia has not been productivity-enhancing, an observation that this article will reiterate.

Finally, this article is related to the rapidly growing literature on the economic impact of COVID-19, specifically on productivity. The effect of COVID-19 has been discussed from the lens of growth accounting and productivity decomposition by di Mauro & Syverson (2020), de Vries, Erumban & van Ark (2021), and Fernald & Li (2021), from which the analysis of this article draws heavily. Based on lessons from past crises, there is a risk that COVID-19 may inhibit productivity through scarring effects, even though there is also the possibility of a positive cleansing effect. Several works have employed timely granular data to establish the empirical evidence of these effects. For example, Andrews, Charlton & Moore (2021) use detailed accounting and pay slip data from Xero, a cloud-based accounting software platform operating in Australia, New Zealand, and the UK. They uncover

signs that labor reallocation during COVID-19 has been linked to productivity. Meanwhile, Bloom et al. (2021) utilize a panel survey of firms in the UK and arrive at similar findings that there have been positive between-firms effects as less productive firms contract. Considering that such rich and timely data are rarely available in developing countries, there is a notable research gap as most analyses have been conducted with regards to developed countries, with a few exceptions such as Ahumada et al. (2021). This article seeks to contribute by examining the early evidence on the potential productivity effects of COVID-19 in Indonesia.

3. Method

This article covers a broad range of descriptive analysis to review the productivity and growth potential of Indonesia. First, we conducted decomposition of both aggregate output and output per worker growth into their standard components. We used data from Penn World Table (PWT) 10.0, which is available up to 2019, in addition to national accounts data from Statistics Indonesia (BPS).

The growth in output per worker can be decomposed into contributions from changes in physical capital, human capital, and the residual TFP. TFP measures gains in economic efficiency (the quantity of output produced with a given quantity of input), including those driven by technological progress. Decomposing output growth requires an assumption regarding the production function of the economy. This paper follows the classical approach of using the Cobb-Douglas production approach to decompose output per worker growth and estimate TFP.

$$Y = AK^\alpha(LH)^{1-\alpha} \quad (1)$$

Y, A, K, L, and H are output, TFP, physical capital, labor, and human capital. α denotes the capital share of income, assumed to be 0.3. The growth in output per worker is divided into components by

taking logarithms of both sides and first differences.

$$\Delta \ln(Y/L) = \alpha[\Delta \ln(K/L)] + (1 - \alpha)\Delta \ln H + \Delta \ln A \quad (2)$$

The right-hand side of the equation states that output is the sum of TFP growth, capital stock growth, and employment growth, respectively.

Productivity is a general concept that can be measured using different indicators, including TFP. However, TFP estimates may vary in scope and definition depending on the specification of the production function. Considering that our production function for output per worker explicitly specifies the human capital term H , the residual TFP will exclude the aspects of productivity directly related to human capital, as it is already separated into its components. However, we adopt a broader definition of productivity, including both residual TFP and human capital. It will align with our measure of *sectoral* "labor productivity," calculated as output per worker in a given sector. In this case, "labor productivity" will implicitly include human capital since there are no sectoral human capital data to separate it as its term. Later in section 4.4, we used a cross-country measure of TFP that includes the effect of human capital accumulation.

Second, we decomposed the labor productivity of Indonesia into its within and structural components, informing about the structural transformation of Indonesia. Following the shift-share analysis in McMillan & Rodrik (2011) and Timmer, de Vries & de Vries (2015), labor productivity growth can be decomposed with the following equation:

$$\begin{aligned} \Delta P &= \sum_i (P_i^T - P_i^0)S_i^0 + \sum_i (S_i^T - S_i^0)P_i^0 \\ &+ \sum_i (P_i^T - P_i^0)(S_i^T - S_i^0) \end{aligned} \quad (3)$$

Where P_i is labor productivity and S_i is the employment share of sector i . The first term on the right-hand side is within productivity while the last two denote structural productivity. Specifically, the second term denotes static reallocation or between-sector growth, which is the effect of workers moving

to sectors with higher *initial* productivity. Meanwhile, the third term represents dynamic reallocation or cross-sector growth, which is positive when workers move to sectors experiencing positive productivity *growth*.

The rest of the analysis will mostly be descriptive analysis drawn from various data sources, depending on the topical issues discussed. We obtained sectoral GDP, employment, and investment data from BPS, as well as data on informality, GDP by firm size, and the labor force during COVID-19. We also used data compiled by the CEIC Premium Database and PWT 10.0 for international comparisons.

4. Results and Analysis

4.1. Decomposing the Growth and Productivity of Indonesia

We start our discussion with the decomposition of *aggregate* output of Indonesia (Figure 3). Historically, capital and labor inputs have been the more consistent drivers of growth while residual TFP has been more volatile. Output growth prior to 1990 is primarily driven by population growth, which has since stabilized at a lower level. Capital contribution has been the most stable, hovering around 2 percent. Labor and capital inputs hit their lowest points in 2000–2004, a recovery period following AFC. Since the crisis, TFP has driven aggregate output growth in Indonesia. However, this residual term appears to reflect the utilization of excess capacity subsequent to AFC more than the improvements in human capital or competitiveness, at least in the earlier post-crisis years. Furthermore, the contribution of TFP begins to decrease in the latest period, which should be a cause for concern.

Next, we observe the decomposition of the growth in output per worker (Figure 4), which is more closely connected to 'the aspired attainment of Indonesia of high-income status.'¹ The growth in out-

¹In this decomposition, we separated the contribution of hu-

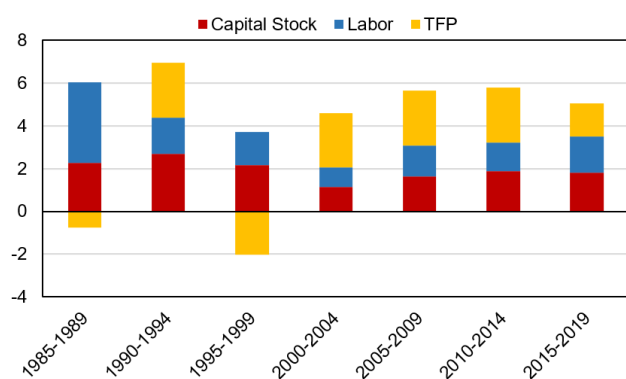


Figure 3. Decomposition of the Growth in Aggregate Output of Indonesia
(contribution to the average annual change in real aggregate output)

Source: BPS; PWT 10.0; authors' calculation

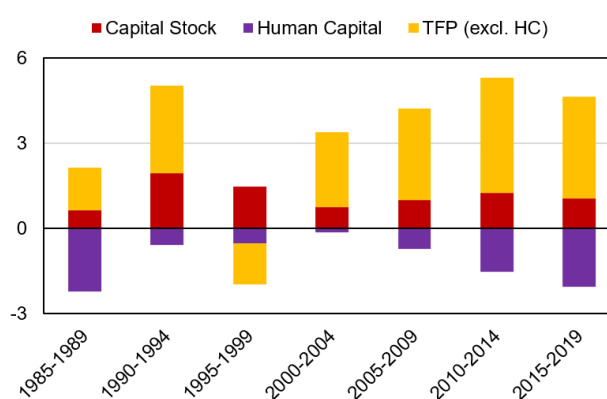


Figure 4. Decomposition of the Growth in Output per Worker of Indonesia
(contribution to the average annual change in real output per worker, in percent)

Source: PWT 10.0; authors' calculations

put per worker of Indonesia is highest in 1990–1994, contributed by high growth rates in both total factor productivity and human capital. Since AFC, output per worker steadily recovers as a result of TFP growth and capital stock accumulation to a lesser extent. However, similar to aggregate output, output per worker declines substantially in the latest period, during which all factors slow in their growth. The average output per worker growth in the past five years has been the lowest supposing we exclude the negative growth periods of 1985–1989 and 1995–1999.

One common factor through all the examined periods is the negative contribution of human capital to output per worker growth. While the issue of labor quality is recurrent in the economic development narrative of Indonesia, the significant negative contribution of human capital warrants further examination into the underlying human capital index from PWT.² We consider the possibility that the de-

composition of output per worker can be biased by constructing the human capital index, which is relatively ridden with assumptions and interpolations³.

Notwithstanding the measurement issues, we do not dismiss the issue of human capital in the growth potential of Indonesia. Firstly, replacing human capital index from PWT with a measure based on the data on the years of schooling from BPS, assuming constant returns to education, yields an equally negative contribution to output per worker growth in most periods. Secondly, the TFP measure from aggregate output decomposition, including human capital but not affected by its measurement, has stagnated if not slightly declined in recent years. This implies that a negative trend of human capital contribution is plausible. Thirdly, a comparison with peer countries using the same human capital index from PWT shows that Indonesia has the most negative contribution of human capital to labor productivity growth (Figure 5). The decomposition of output per worker for China by Brandt et al. (2020),

man capital from residual TFP using the human capital index from Penn World Table (PWT) 10 (Feenstra, Inklaar & Timmer 2015), representing educational attainment and the return to each additional year of education.

²Even though the overall contribution of human capital was negative, the human capital index itself was actually on an increasing trend until 2010, implying that this uptrend failed to keep up with the growth in labor input. This may be a measurement-related artefact since human capital is an index, as opposed to a nominal value as in capital stock.

³Human capital index from PWT is calculated from the average years of schooling and the assumed rate of return to education, the latter is calculated using a Mincerian equation. The first caveat is from the data on the average years of schooling, sourced from Cohen & Soto (2007), which are only at decadal frequency hence the use of linear interpolation in between. Furthermore, the data after 2010 will be based on the 2020 value, which is projected instead of actual.

also using the same index from PWT, results in at least a positive contribution of human capital, implying room for Indonesia to drive growth from human capital.

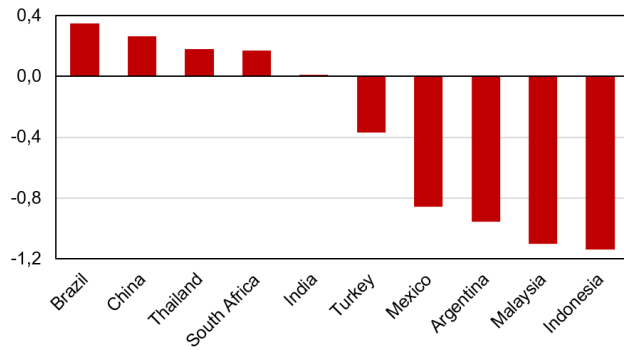


Figure 5. The Contribution of Human Capital in Indonesia is Low Among Peers

(average annual contribution of human capital to labor productivity, 2001–2019, in percent)
Source: PWT 10.0; authors' calculations

The recent drop in output per worker growth in Indonesia also requires an examination of the productivity from the perspective of sectoral dynamics, informing the state of the structural transformation of Indonesia. We discover that the development of Indonesia has benefited heavily from within-sector productivity growth (Figure 6). While the contribution of static reallocation is sizable in the after-crisis periods of 2000–2004 and 2010–2014, it is partially or fully offset by the negative effect of dynamic reallocation, leading to a minuscule contribution of structural productivity growth. The case of Indonesia is more similar to that of Latin America and Africa, where the structural effect is substantial but negative, than to that of East Asian countries such as China, where both within and structural effects are mostly positive (Brandt et al. 2020; McMillan & Rodrik 2011).

Low structural productivity indicates that productivity growth has been concentrated only within specific sectors and that labor is not moving from low-productivity to high-productivity sectors. Specifically, the negative effect of dynamic reallocation means that there has not been much labor movements to sectors whose productivity remains rising de-

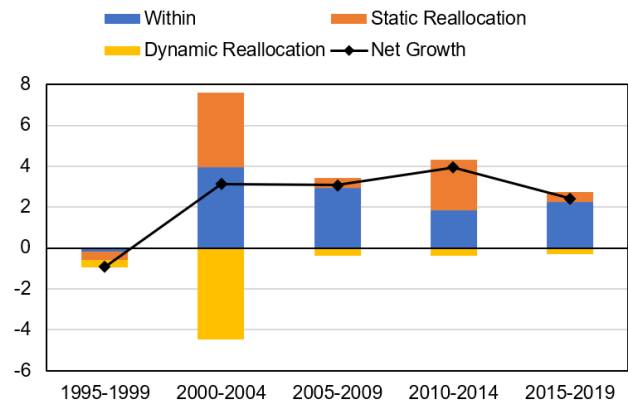


Figure 6. Productivity Growth Concentrated within Sectors

(average annual contribution to the growth in labor productivity, in percentage points)
Source: BPS; authors' calculation

spite the increased number of workers. While the dynamic reallocation component tends to be low or negative, as an increased number of workers mechanically lowers productivity, the case of China shows the possibility of positive dynamic reallocation across periods (Brandt et al. 2020).

Larger structural growth is observed in 2010–2014, during which the effect of static reallocation provides the largest contribution. This is driven by the shift of labor to financial services, construction, and manufacturing, each experiencing an increase of one percentage point in employment share. However, this phenomenon is short-lived except for the manufacturing sector, whose share of employment continues to rise until 2018. The lack of structural growth in Indonesia means room for productivity gains from policies that facilitate labor movement to more productive sectors. This includes supporting the momentum of a potential revival in the share of employment of manufacturing.

4.2. The Shift to Less Productive Sectors

Due to rapid growth and accelerating urbanization, the service and manufacturing sectors become the key source of employment in the last three decades

(Figure 7). The share of labor in agriculture has halved from 54 percent in 1986 to only 27 percent in 2019. Contrarily, between 1990 and 2019, the employment shares of manufacturing industries and construction increase by 5 and 4 percentage points, respectively. The World Bank (2016) note that between 2001 and 2015, 22.2 million out of 23.8 million new jobs are included in the service sector. The manufacturing industry gains 3.2 million jobs, while agriculture and mining lose 1.6 million jobs.

However, workers moving from agricultural to service sectors tend to be employed in less productive activities. Over the past decades, trade service as well as government and non-market services record the highest growth of employment share. However, both service sectors are also among the least productive. There is also a notable increase in the employment share of construction, which has slowly experienced a long-term decline in relative productivity. Those figures conform to the finding of Ryandiansyah & Azis (2018) that the expansion in employment in the service sectors in Indonesia has not been productivity-enhancing. Thus, an in-pouring of labor into low-productivity sectors helps explain the trends observed in output per worker growth.

A substantial share of labor moving from the agriculture sector is now working in trade, restaurant, and hotel and non-market (community, social, and personal) services (Figure 8). By 2019, nearly half (46 percent) of the labor force of Indonesia are working in those sectors, despite their productivity being only half of that of the manufacturing sector. On the other hand, financial, real estate, and business services observe relatively stagnant growth of employment shares. These are higher value-added service sectors whose labor productivity is more than double that of manufacturing.

Notwithstanding their low productivity, demand for services in Indonesia has substantially increased in recent decades, driven by the rapidly growing middle class. The middle class of Indonesia, representing nearly half of all household consumption, has been growing faster than other groups (World

Bank 2019). The expanding size of the middle class represents the potential for higher productivity in service sector. This reaffirms the importance of improving labor productivity through service sector reform.

Indonesia still has ample room to implement policies that boost the productivity of the service sector. One area, for example, is market competition, as services in Indonesia have been less open to competition and FDI. By one measure—the OECD services trade restrictiveness index (STRI)—Indonesia ranks as the most restrictive among the sample and has shown only a slight improvement over time (Figure 9). However, this mostly pertains to the relatively more productive formal sectors such as legal service, logistics, and air transport sector, where regulations have become more stringent (OECD 2021).

In addition to raising its own productivity, reform in the service sector can also boost the productivity of manufacturing. As in Duggan, Rahardja & Varela (2013), easing the restrictions on service-sector FDI in Indonesia is associated with improvements in the perception of service-sector performance and, more importantly, in the productivity of manufacturers. Considering the strong interlinkages of services with other productive sectors, particularly manufacturing, increasing openness can create a positive feedback loop generating a greater impact on overall economic performance.

In addition to labor, an increasing share of financial resources has also been channeled to the less productive service sectors. The share of outstanding bank credit to the service sector has risen from 45% in 2002 to 65% in 2019, the majority of which is in the wholesale and retail trade and restaurants, which also have the largest growth of credit share following construction (Figure 10). As previously discussed, the labor productivity of these sectors has consistently underperformed since 1994 and has been trending downward in recent years in relative terms. By contrast, manufacturing has undergone a steep decline in credit share since 2002 despite being one of the relatively productive sectors.

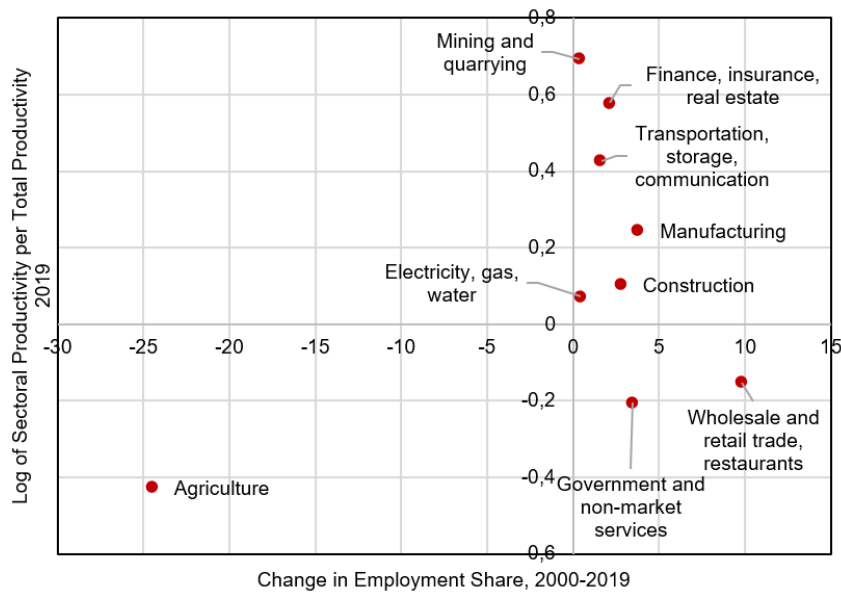


Figure 7. Labor Moving Out of Agriculture Sector

Source: BPS; authors' calculations

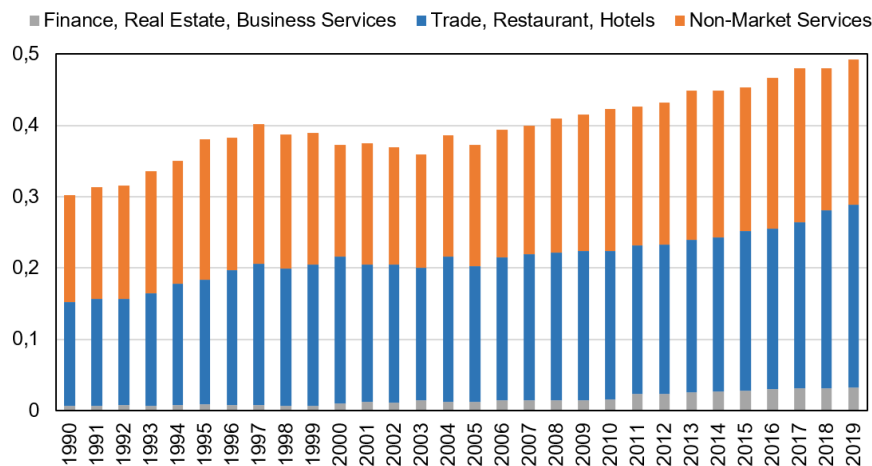


Figure 8. Employment in Services is Concentrated in Services with Lower Productivity
(share of total employment)

Source: BPS; authors' calculations

Despite starting small at merely 3%, the share of bank credit to construction has increased to nearly 10% in 2019, especially since the starting of the infrastructure drive of President Joko Widodo in 2014. The construction sector is among sectors whose relative labor productivity has been trending downward over the past few decades, albeit not lower than manufacturing in level. While infrastructure development is expected to yield gains over the long

term, it may not help productivity growth in the short term, considering the stagnant labor productivity of the construction sector.

Based on the incremental capital-output ratio (ICOR), the impact of infrastructure investment on growth seems to be meager and declining, at least in the short term. Using the estimates of infrastructure investment compiled from various sources

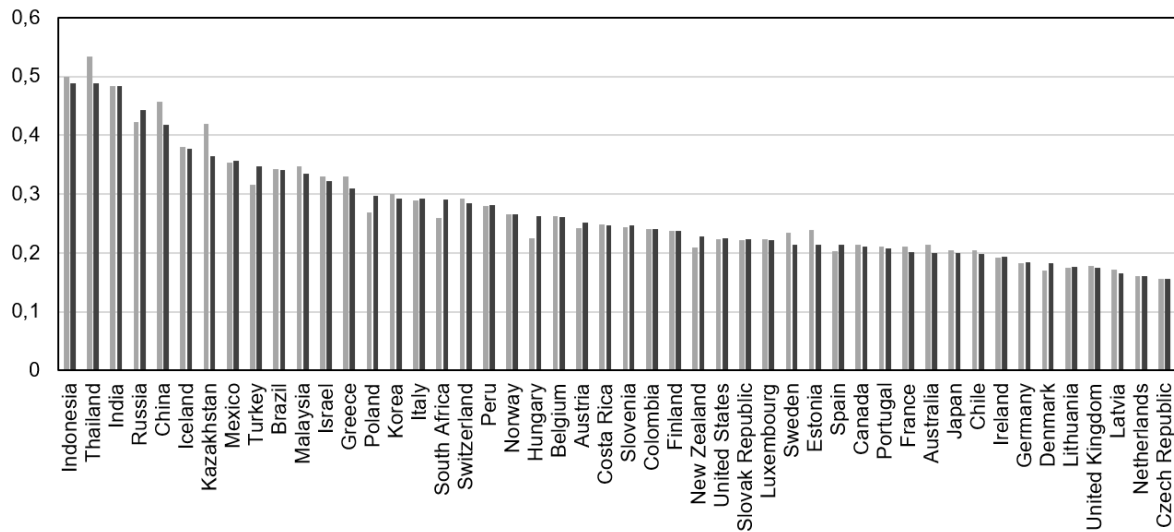


Figure 9. High Service Trade Restrictiveness Hinders Productivity Improvements
 (simple average of STRI across 22 service sectors in 2019 and 2020)
 Source: OECD; authors' calculations. Higher STRI indicates higher restrictiveness

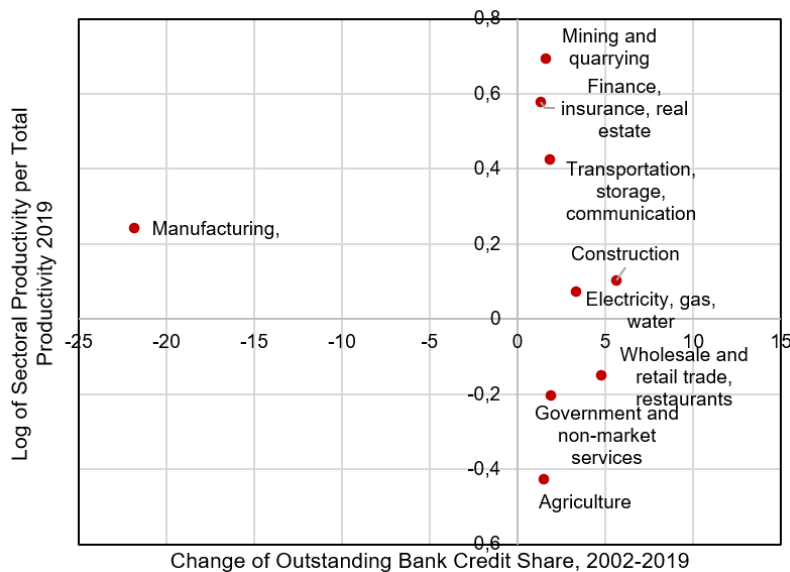


Figure 10. The Share of Bank Credit to Service Sectors has Increased
 Source: OJK; authors' calculations

ranging from government spending to SOE capital expenditure, the gross fixed capital formation of Indonesia can be divided into infrastructure and non-infrastructure. ICOR estimates that infrastructure investment (on total output, due to unavailable data for the output of infrastructure sector) has been steadily increasing in the past six years (Figure 11),

indicating the declining efficiency of infrastructure capital. It suggests that the recent push to accelerate infrastructure development has not been reflected in output growth. However, it should be cautioned that ICOR may be a crude measure; the rise in the infrastructure ICOR can be due to a cyclical downturn in output, mainly since the return to in-

infrastructure usually accrues over the long term with a considerable lag.

Furthermore, the infrastructure credit boom has been driven by several state-owned enterprises, which may not be conducive to productivity growth. The share of SOEs in total bank credit to construction has sharply increased from 4% to 30% in merely six years (Figure 12). In nominal terms, outstanding bank credit in construction SOEs has multiplied tenfold in the last five years, from IDR 10 trillion in 2015 to IDR 109 trillion in 2019. This explosive growth has been led by one SOE: Waskita Karya, representing 15% of total outstanding bank credit to construction in 2019; both building infrastructure projects as contractors and investing in them.

4.3. The Role of Large Firms and SMEs

At the more microeconomic level, the issue of productivity is closely related to firm dynamics. One aspect of firm dynamics in the distribution of firm size is the composition of large companies and micro, small and medium enterprises (SMEs). The prevalence of large companies can be supportive to growth and productivity due to their economies of scale. In addition to having more resources to innovate and invest in efficiency, large firms also tend to be active exporters as they often outgrow their domestic markets, subjecting them to more dynamic and competitive ecosystems (McKinsey & Company 2018). Furthermore, there may be productivity spillovers from large companies to smaller firms in the value chains as they spearhead process improvements and demand higher efficiency standards. However, the empirical evidence on firm size and productivity is mixed, including in developing countries where large firms may be subject to limited competition and poor management (Bloom et al. 2010; De & Nagaraj 2014; Dhawan 2001; Li & Rama 2015; Pagano & Schivardi 2003; Van Biesebroeck 2005). It suggests competition among large firms, among others, as one precondition for them to deliver productivity gains.

Unfortunately, Indonesia lags behind its regional peers in terms of contribution from large firms. The revenue of large companies, classified as those with at least \$500 million of annual revenue, only stands at 14% of GDP in Indonesia, far behind 81% in Singapore and 42% in Malaysia (Figure 13). Large companies in Indonesia also exhibit less growth; the average large firms in Indonesia grow by 0.8% per year between 1995 and 2016, far below GDP growth of more than 4%. Meanwhile, in Malaysia, Singapore, and Thailand, the revenue of large firms generally grow faster than GDP growth. A survey also reveals that large Indonesian companies in the top-quartile reap merely 47% of their revenue from new products, compared with 55% in China and 63% in India. The lackluster performance of large firms in Indonesia may be related to state regulations and protections, exports orientation, and broader industrial policies (Tijaja & Faisal 2014). It may also be intertwined with the natural resources wealth of Indonesia, as primary commodities constitute at least approximately 40% of the revenue of large companies in Indonesia. This contrasts with the profile of large companies in Southeast Asia as well as developed East Asia, many of which operate in secondary and tertiary sectors.

On the other hand, MSMEs dominate the firm distribution in Indonesia, with implications for productivity. According to data from the Ministry of Cooperatives and SMEs, MSMEs constitute 99.99% of enterprise units and 97% of employment while contributing 57.2% of GDP, 14.4% of non-oil and gas exports, and 54.9% of investment in 2018. The composition of MSMEs is also more skewed towards micro-firms than regional peers, with mid-tier companies amounting to less than 0.1% of all firms, compared to 0.3% in Thailand, 0.4% in the Philippines, and 1.5% in Malaysia. Furthermore, the labor productivity of MSMEs also tends to be more stagnant than large firms (Figure 14).

Therefore, it is imperative to improve the productivity of these smaller firms, which can put competitive pressure on bigger companies as they grow. To raise the productivity of MSMEs, the govern-

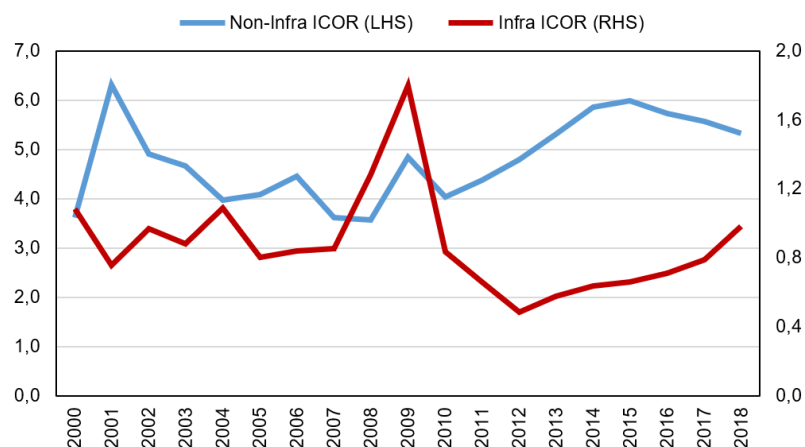


Figure 11. The Impact of Infrastructure Capital on Growth has Not Materialized
(incremental capital-output ratio ICOR)

Note: ICOR is calculated as the ratio of real infrastructure or non-infrastructure investment to the change in total real GDP. Total real GDP is used as the denominator due to unavailable data for the corresponding sectoral output
Source: World Bank; PROSPERA INFRA-Dashboard; author's calculations

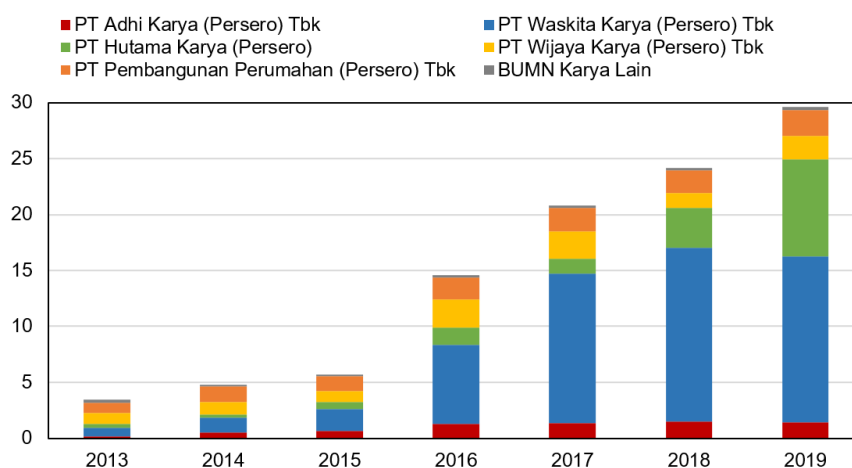


Figure 12. The Share of SOEs in Construction Credit has Dramatically Increased
(share of total outstanding bank credit in the construction sector)

Source: OJK; SOE financial statements; authors' calculations

ment may need to push these firms into the formal economy, facilitating access to credit, legal protection, government aid, supply chains integration, and export opportunities. However, addressing the pervasive informal sector in Indonesia is more complex than simply reducing formalization costs (Rothenberg et al. 2016). There is evidence that MSMEs remain informal due to the uncertain benefits of formalization and the notion of a dual economy. Informal firms serve different customer segments, including as inexpensive suppliers for

larger formal firms. In this case, the recommended policy response is to further strengthen and communicate the benefits of formalization and expand the middle class to raise the demand for formal sector products.

4.4. The Wide Scope for Productivity Improvement

The scope for enhancing the productivity of Indonesia remains widely open when we put the

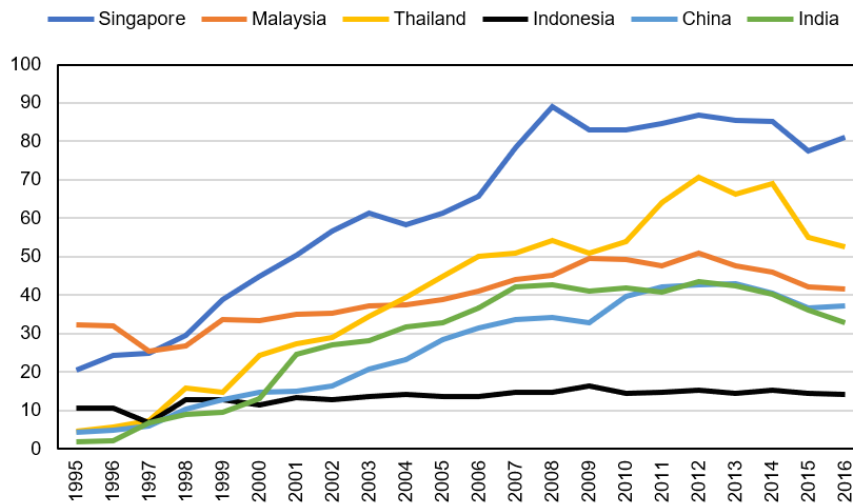


Figure 13. The Large Firms in Indonesia Play A Relatively Low Role

(share of the revenue of the large firms to GDP; large firms are defined as those with annual revenue of at least \$500 million)

Source: McKinsey Global Institute

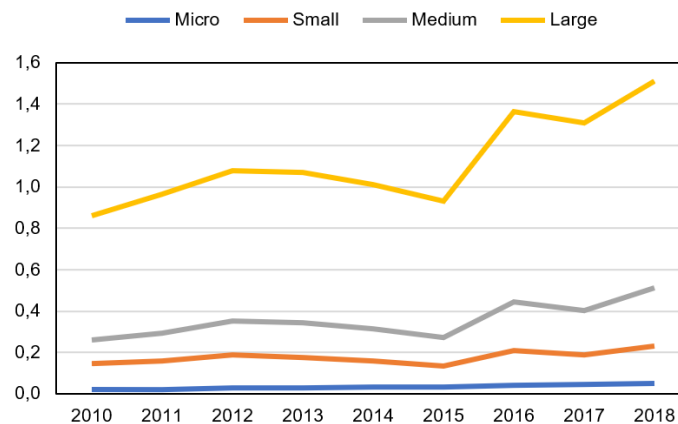


Figure 14. The Laborproductivity of MSMEs of Indonesia has Mainly been Stagnant

(current IDR billion per worker, by firm size)

Source: The Ministry of Cooperatives and SMEs; BPS; authors' calculation

TFP of Indonesia in an international perspective. The TFP levels of Indonesia remain distant and show no signs of catching up with the global technological frontier. The TFP of Indonesia is less than half that of the United States and lags behind the TFP levels of other middle-income countries (Figure 15). Therefore, Indonesia must catch up with global leaders and its peers through the transfer of technology and state-of-the-art management practices. In Indonesia, technology spillover from MNEs occurs mainly through the worker mobility chan-

nel, implying that technology that quickly spills over is the tacit component of technological knowledge (Olayinka & Loykulnanta 2019). Domestic firms appear to have a greater absorbing capacity when their workers collaborate with foreign employees who have previously worked under the MNEs with superior technology. This allows FDI in MNE to be a crucial catalyst for improvements in the TFP of Indonesia.

In addition to attracting more MNEs, Indonesia must

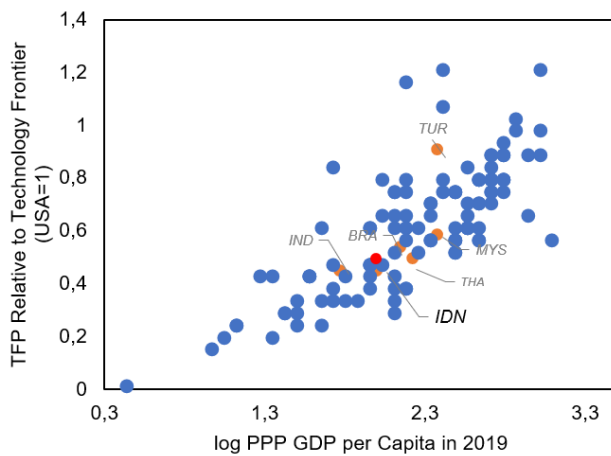


Figure 15. TFP of Indonesia is Still Far Behind the Global Frontier, 2019

Source: PWT 10.0; authors' calculations

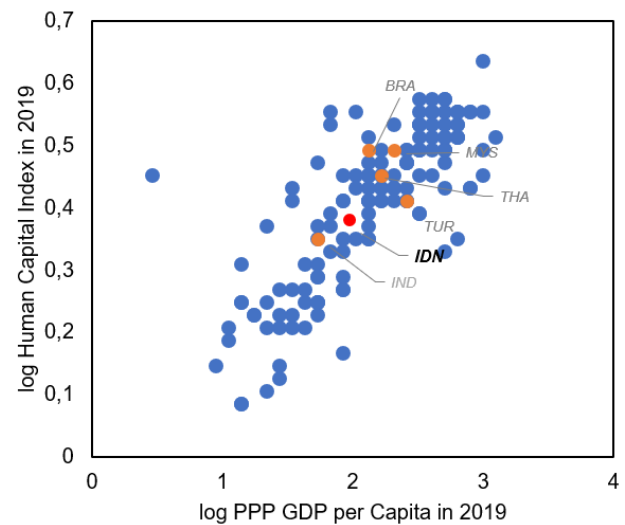


Figure 16. Human Capital Index from PWT Also Lags Behind Peers

Source: PWT 10.0; authors' calculations

continue to invest heavily in human capital (Figure 16). An increase in the human capital base can positively impact TFP growth by facilitating structural change and technological improvement. Moreover, human capital can help to absorb positive externalities from international trade and FDI. Indonesia also needs a much larger pool of skilled and highly educated workers to realize the benefits of lower logistics costs and capture opportunities from the Fourth Industrial Revolution (Indrawati & Kuncoro 2021). Another reason for investing heavily in human capital is the urgency to close the skills gap. Acemoglu & Zilibotti (2001) argue that the gap between the supply and demand for skills may lead to a decline in TFP growth, especially in low-income countries that use technology developed by advanced economies. Unfortunately, the quality of the labor force in Indonesia currently falls behind other countries with the same income group. Notwithstanding the caveats to previously mentioned human capital index from PWT, investment in human capital should be carried out more aggressively.

Another pivotal driver of TFP growth is physical capital deepening. Physical capital deepening refers to an increase in the proportion of the capital stock to the number of labor hours worked. Movements in this ratio are closely tied to movements in la-

bor productivity; all other things are held equal. Over the past four decades, Indonesia has made great strides in physical capital deepening (Figure 17). Capital stock per worker has significantly improved and has already caught up with other middle-income countries. Indonesia has a strong record in domestic savings, averaging around 30% of GDP in 1989–2018, well above India (28%), Vietnam (23%), and the Philippines (17%), but remain below China (43%), Malaysia (40%), and Thailand (33%). However, in recent decades, capital stock per worker has grown slower than prior to the Asian Financial Crisis. Recent aggressive investment in infrastructure under the current administration is expected to accelerate the growth of capital stock per worker in the years to come.

Furthermore, Indonesia also needs to address its declining capital-output efficiency. Inefficiency has long been acknowledged as the main obstacle for Indonesia to grow faster. The overall ICOR of Indonesia has deteriorated (increased) in recent years in line with slower output growth. The ICOR value has exceeded 6—double the world average. It is not sufficient to expect higher economic growth from attracting more investment supposing this inefficiency prevails.

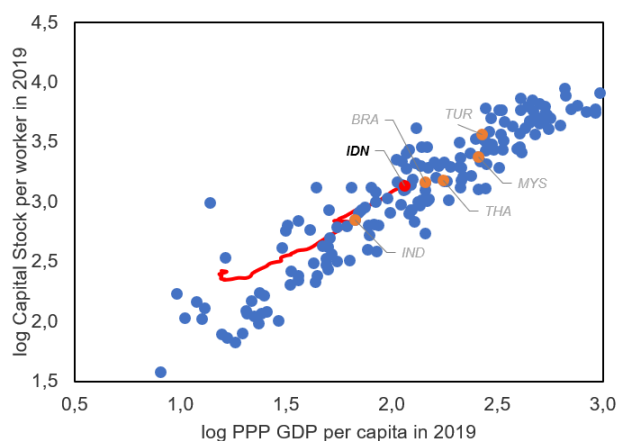


Figure 17. The Capital Stock per Worker of Indonesia has been Catching Up

Note: The red line represents the capital stock per worker of Indonesia at historical levels of income per capita
Source: PWT 10.0; authors' calculations

4.5. COVID-19 and the Growth Potential of Indonesia

The growth potential of Indonesia, already dogged by a productivity downtrend in a few years prior to COVID-19, faces additional risks from the pandemic. This section explores the possible channels through which the pandemic can affect the potential output of the country.

Under the production factor approach, COVID-19 can affect potential output through labor input, human capital, capital stock, and residual TFP. Starting with labor input defined as the number of employed workers, the pandemic can have an adverse effect through channels including but not limited to: (1) decreased labor force participation, particularly women, from childcare needs due to school closures, (2) long-term unemployment from permanent business closures, and (3) early retirements triggered by pandemic situation or policies (Fernald & Li 2021). The effect of COVID-19 deaths should be negligible relative to the size of the labor force of Indonesia, despite the relatively high share of non-elderly deaths in Indonesia (Demombynes et al. 2021). The first channel will mostly be short-term, while the latter two can last near to medium-term. We focus on the first two channels as, to the best

of our knowledge, there has been no wave of early retirements triggered by COVID-19 in Indonesia.

In the first channel, considering that the childcare burden from closed schools is likely to fall on mothers instead of fathers, the decline in female labor force participation (FLFP) in Indonesia appears to be mild. In August 2020, FLFP falls by 1.4 percentage points compared to 1.5 for males, and then in August 2021, it recovers by 0.2 points while male participation falls by a further 0.1 point.⁴ Of women remaining in the labor force of Indonesia in February 2021, 0.5 percent cites housework as the reason to stop working (Table 1). In comparison, the Household Pulse Survey in US census discovers that 0.7 percent of the female labor force does not work because of COVID-19-related school closures. The impact of COVID-19 on female labor input may not persist following the full reopening of schools.

Table 1. The Percent of Labor Force Not Working Due to Housework or Childcare

	Indonesia, Aug 20	Indonesia, Feb 21	US, Jan 21
Male	0.1	0.1	0.2
Female	0.5	0.5	0.7
Total	0.2	0.2	0.4

Source: Sakernas from BPS; US Census, Household Pulse Survey Week 23 Jan 2020–Feb 1, 2021 from Fernald & Li (2021); authors' calculations.

Note: The exact wording in the US Census is COVID-related school closures.

The second channel of long-term unemployment is possibly more significant but contingent on economic recovery and labor market frictions, which are difficult to assess at this stage. The annual unemployment rate of Indonesia rose by 1.9 percentage points in 2020, which, to the extent that it is comparable, is relatively high relative to that of the emerging market peers (Table 2). Following Fernald & Li (2021), we pay particular attention to those not working due to business closures since

⁴FLFP also declines in February 2020 compared to February 2019, but we do not consider this as the effect of COVID-19 since the outbreak in Indonesia only began to be recognized in March 2020.

this category of unemployed people may find it relatively harder to be rehired⁵. A longitudinal survey by Bappenas (2021) indicates that at least 4% of businesses are closed permanently during COVID-19, while 5% are temporarily closed.⁶ In February 2021, 1.2 percent of the labor force stops working due to business closure or bankruptcy; this rises to 2.0 percent supposing we include unemployment due to COVID-19 restrictions, which may imply business closures yet possibly only temporarily. It is lower than similar statistics of 2.4 percent in the US and should translate to less than 1% decline in potential output.⁷ However, this can easily be an underestimate if much unemployment due to other reasons also becomes persistent.

Table 2. The Annual Unemployment Rate of Selected Emerging Market Countries

Country	2019	2020	Point Change
Indonesia	5.2	7.1	1.9
Brazil	11.0	13.9	2.9
India	5.3	7.1	1.8
Malaysia	3.3	4.5	1.2
Mexico	3.5	4.4	0.9
Thailand	1.0	1.7	0.7
South Africa	28.7	29.2	0.5
Thailand	2.2	2.5	0.3
Turkey	13.7	13.1	-0.6

Source: CEIC Premium Database

While the measurable labor input channels seem moderate in Indonesia, the effect of COVID-19 through capital stock may be more sizable. The drop in gross fixed capital formation in 2020 means

⁵Other reasons for stopping work according to the Indonesian labor survey are layoffs, finished contract, and more voluntary reasons such as incompatibility with working environment, housework, and fear of the COVID-19 infection. However, we note that there are other determinants to the persistence of unemployment beyond the initial reasons for unemployment, such as the skills of the workers and sectoral dynamics.

⁶The first three waves of the longitudinal survey are conducted in June 2020, October–November 2020, and March 2020. The percentage of businesses closed permanently is likely an underestimate considering the non-response or attrition of respondents, which may be due to business closure.

⁷This is obtained by calculating the number of unemployed due to business closures relative to potential labor input in 2021–2025, estimated by projecting employment using historical growth rate then applying the HP filter. Even though potential labor input estimates may vary, the effect should remain relatively small.

that capital stock growth falls by one percentage point compared to the pre-COVID-19 trajectory, indicating a 0.3% decrease in potential output. This decline permanently places the potential output of Indonesia on a lower trajectory level unless subsequent investment growth sufficiently overshoots. Scarring may also arise from firm indebtedness, which can inhibit investment for years to come (Demmou et al. 2020). Court data show a sharp increase in debt postponement since mid-2020, which has remained at elevated levels through 2021 (Figure 18). It remains to be seen how many of these cases turn into debt overhangs, but sound economic recovery and credit policy can alleviate this risk.

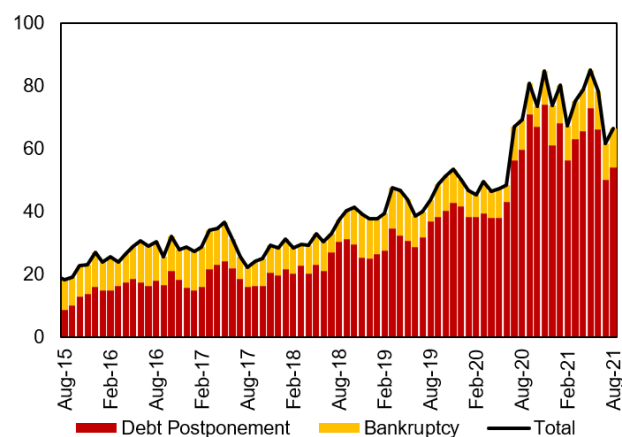


Figure 18. The Increase in Debt Postponement Cases During COVID-19

(bankruptcy and debt postponement cases, three months moving average)

Source: Case Tracking Information System

Sectoral distribution may also affect the degree of the effect of capital stock on potential output as different sectors have different returns on investment. One measure is sectoral ICOR, the amount of additional output produced by an investment in the same year (Figure 19). Unfortunately, since post-2018 data for actual investment breakdown by sector are not yet available, the net adjustment of the effect of capital stock due to sectoral distribution remains ambiguous. We check the breakdown of investing cash flow of listed firms as a limited proxy, finding that investment declines in manufacturing

but not in retail trade (Figure 20).⁸ It can be positive for output in the short term since retail trade has a lower ICOR, but less positive considering that the sector has had relatively low labor productivity and significantly rising ICOR over the past decade. On the other hand, the fall in investment in the manufacturing sector is concerning, considering the challenge of premature deindustrialization in Indonesia. Furthermore, ICOR may not capture the longer-term returns from capital stock accumulation in the manufacturing sector, with higher labor value-added.

Finally, the pandemic can reduce the growth potential of Indonesia through TFP, already declining in the preceding few years. There is a myriad of possible TFP channels, including but not limited to lower productivity due to health protocols enforcement, loss of skills from prolonged unemployment, and adverse sectoral reallocations. In the long term, learning losses from school closures may drag human capital contribution to potential output in future decades. This effect can be substantial considering the existing evidence on the harmful effects of schooling disruptions, including fewer years of schooling, higher probability of unemployment, and ultimately lower lifetime earnings (Belot & Webbink 2010; Ichino & Winter-Ebmer 2004; Jaume & Willén 2019). Even though school closures are substituted with online schooling supported by phone credit aid in Indonesia, there is evidence from the US that the participation of students in class exercises with online schooling decreases permanently for middle and low-income students (Chetty et al. 2020). The World Bank (2021) also estimates that students in ASEAN-5 countries stand to lose 1.2 learning adjusted years of schooling, the highest among subregions in East Asia and the Pacific.

On the other hand, there may be lasting positive TFP gains from the pandemic, such as accelerated digitalization and "cleansing effects" from reallocating resources to more productive sectors or enti-

ties (Caballero & Hammour 1994). Business surveys have discovered that Indonesian businesses have increased their digital adoption during the pandemic, primarily for sales and marketing functions (Bappenas 2021). This digitalization also has the potential to diffuse since small firms adopt digital technology at the same rate as medium to large firms. In contrast, micro-firms lag behind but begin to catch up. Meanwhile, the prospect of TFP gains from a firm-level selection is less specific, considering that the 1998 Asian Financial Crisis eliminated both productive and inefficient firms in Indonesia (The World Bank 2021).

Since many of these channels manifest in the medium to long term, it is too early to estimate the net effect of the pandemic on TFP. A short-term assessment of labor productivity decomposition during COVID-19 reveals that year-on-year decline in semi-annual productivity is mostly composed of static reallocation. Specifically, the negative contribution of static reallocation is mostly from the fall in labor share in manufacturing. Meanwhile, the effect of dynamic reallocation is negative as workers move from sectors where productivity increases, but this is not unique to the COVID-19 period. However, this short-term horizon of productivity decomposition is subject to major caveats since productivity during a shock period is highly volatile and may not necessarily represent longer term trends.

It may be more informative to simply observe the movement of workers between sectors during COVID-19 (Figure 22). Since February 2020, we have observed a decline in the share of employment in manufacturing that boasts relatively higher labor productivity and public administration that is less productive. There is also an increase in the share of agriculture, possibly due to the return of unemployed urban workers to rural hometowns, though this has been partly reversed in early 2021. Interestingly, the share of employment in trade, accommodations, and restaurants seems unaffected by the pandemic as it continues to rise in addition to its previous trend. While this may reflect business resilience in these sectors, it may contribute

⁸Cashflow for investing to total assets of manufacturing firms also falls in 2017 and 2019 but they are not statistically significant.

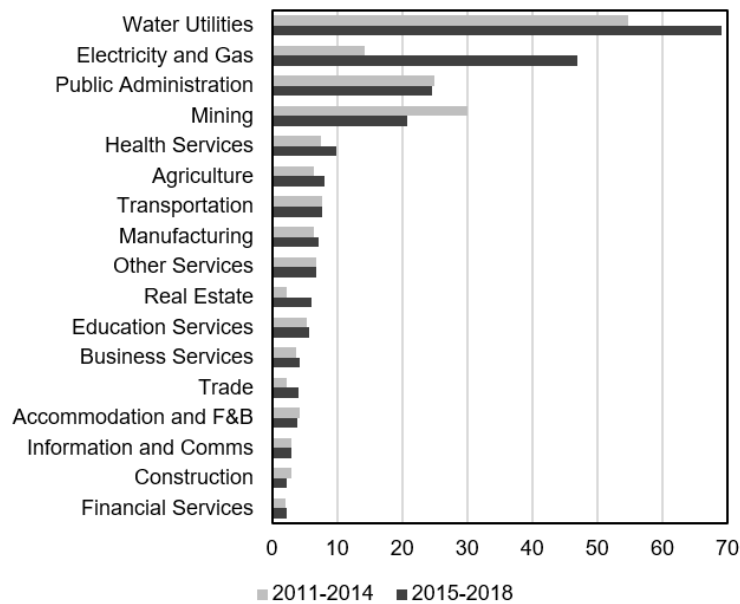


Figure 19. Sectoral ICORs Vary Widely
 (Average ICOR by sector, excluding residential investment)
 Source: BPS; 'authors' calculations

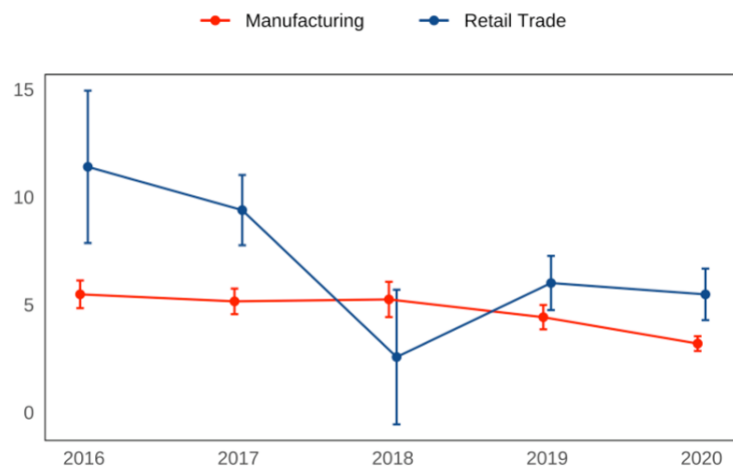


Figure 20. The investment of listed manufacturing firms falls in 2020
 Source: S&P Capital I.Q.; authors' calculations

negatively to structural growth in labor productivity since they have long had lower productivity. Overall, the future productivity effects of recent labor movements seem to be ambiguous.

Regardless of this uncertainty, the extent of economic scarring can still be mitigated by government policies. The government of Indonesia has decisively deployed 9.3% worth of on-budget fiscal

support during COVID-19 (IMF Fiscal Affairs Department, 2021), ranging from electricity discounts to credit restructuring, amounting to approximately 60% of cumulative output shortfall relative to the pre-pandemic trends. These support programs should ideally be followed by structural policies that seek to facilitate the absorption of unemployed workers, stimulate productive capital investments, and en-

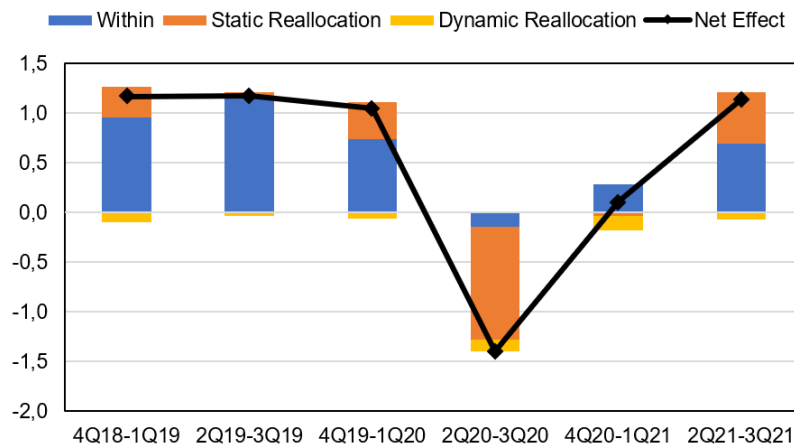


Figure 21. Productivity Drop is Mostly Between-Sector
(semi-annual contribution to year-on-year growth in labor productivity, in percentage points)
Source: BPS; author's calculations

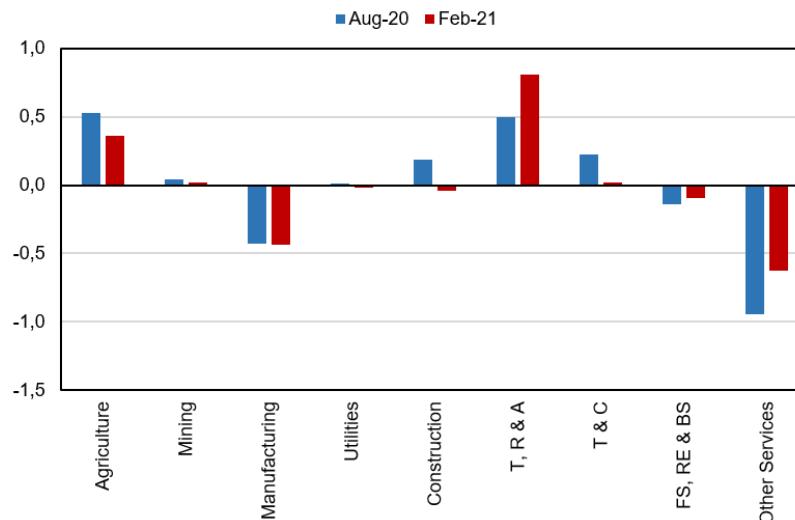


Figure 22. Change in Sectoral Employment Share from February 2020
Note: T, R & A = Trade, Restaurant, and Accommodations; T & C = Transportation and Communications; F.S., RE & B.S. = Financial Services, Real Estate, and Business Services; Other Services = Community, Social and Personal Services.
Source: BPS; authors' calculations

courage reallocation to more productive sectors. Extra attention should be directed to minimizing the adverse effects of learning losses from school closures, considering the lackluster human capital performance of Indonesia prior to the pandemic.

5. Conclusion

Despite the promises of rich natural resources and a burgeoning labor force, the growth of Indonesia has recently been hampered by lackluster productivity developments and deep structural imbalances that must be resolved supposing Indonesia is to achieve its potential growth. Productivity improvements, such as investing in human capital (Indrawati & Kuncoro 2021) and fostering competitive

firm dynamics, are becoming increasingly urgent as Indonesia approaches the phase of demographic aging.

Large private corporations and SOEs that play a central role in the economy must improve their competitiveness to catch up with their emerging market peers, signaling the need for better market forces. On the other side of the spectrum, MSMEs that employ over 90% of the labor force of the county also have great room for productivity improvements. One key area required is digital innovation, which can enhance productivity in various areas including the low-productivity agricultural sector (Schroeder, Lampietti & Elabed 2021). Even though Indonesia is home to several biggest technology companies of Southeast Asia, the ability of Indonesia to harness digital developments lags behind its peers (McKinsey & Company 2018). It further emphasizes the need for sufficient human capital and physical capital to support future and long-term productivity improvements. The scope for improvement is evident from the position of Indonesia behind the global TFP frontier.

In addition to pulling Indonesia back to lower-middle-income status, the COVID-19 pandemic presents additional risks to the potential growth of the country. This article attempts to contribute to the gap in the literature on the productivity effects of COVID-19 in developing economies. While the fall in the quantity of labor input can still be limited by a robust recovery and supportive labor policy, human capital of Indonesia in the following decades is likely jeopardized by learning losses from the pandemic. The drop in investment has also shifted potential output to a lower level than prior to the pandemic, compounded by the declining ICOR of Indonesia. Finally, TFP may decline with the scarring of businesses and workers, though there is also the possibility of gains from accelerated digitalization and sectoral reallocations. While the net effect remains uncertain, it is clear that the government can implement policies to minimize scarring and maximize productivity gains beyond the pandemic.

References

- [1] Acemoglu, D & Zilibotti, F 2001, 'Productivity differences', *The Quarterly Journal of Economics*, vol. 116, no. 2, pp. 563-606. doi: <https://doi.org/10.1162/00335530151144104>.
- [2] Ahumada, H, Cavallo, EA, Espina-Mairal, S, & Navajas, F 2021, 'Sectoral productivity growth, COVID-19 shocks, and infrastructure', *IDB Working Paper Series IDB-WP-1256*, Inter-American Development Bank. doi: <http://dx.doi.org/10.18235/0003411>.
- [3] Andrews, D, Charlton, A, Moore, A 2021, 'COVID-19, productivity and reallocation: Timely evidence from three OECD countries', *OECD Economics Department Working Papers, 1676*, Organisation for Economic Cooperation and Development. doi: <https://doi.org/10.1787/18151973>.
- [4] Aswicahyono, H, Hill, H, & Narjoko, D 2013, 'Indonesian industrialization: a latecomer adjusting to crises', in *Pathways to industrialization in the twenty-first century: New challenges and emerging paradigms*, A Szirmai, W Naude, & A Ludovico (Eds.), Oxford University Press, pp. 193-222.
- [5] Baily, MN, Hulten, C, Campbell, D, Bresnahan, T, & Caves, RE 1992, 'Productivity dynamics in manufacturing plants', *Brookings Papers on Economic Activity. Microeconomics*, vol. 1992, pp. 187-267. doi: <https://doi.org/10.2307/2534764>.
- [6] Bappenas 2021, Hasil survei business pulse gelombang 3, *PowerPoint slides*.
- [7] Belot, M, & Webbink, D 2010, 'Do teacher strikes harm educational attainment of students?', *Labour*, vol. 24, no. 4, pp. 391-406. doi: <https://doi.org/10.1111/j.1467-9914.2010.00494.x>.
- [8] Bloom, N, Mahajan, A, McKenzie, D, & Roberts, J 2010, 'Why do firms in developing countries have low productivity?', *American Economic Review*, vol. 100, no. 2, pp. 619-23. doi: <https://doi.org/10.1257/aer.100.2.619>.
- [9] Bloom, N, Bunn, P, Mizen, P, Smietanka, P, & Thwaites, G 2020, 'The impact of Covid-19 on productivity', *NBER Working Paper, 28233*, National Bureau of Economic Research. doi: 10.3386/w28233.
- [10] Brandt, L, Litwack, J, Mileva, E, Wang, L, Zhang, Y, & Zhao, L 2020, 'China's productivity slowdown and future growth potential', *Policy Research Working Paper, 9298*, World Bank. viewed 1 May 2020, <<https://openknowledge.worldbank.org/handle/10986/33993>>.
- [11] Buera, FJ, & Kaboski, JP 2009, 'Can traditional theories of structural change fit the data?', *Journal of the European Economic Association*, vol. 7, no. 2-3, pp. 469-477. doi: <https://doi.org/10.1162/JEEA.2009.7.2-3.469>.
- [12] Caballero, RJ, & Hammour, ML 1994, 'The cleansing effect of recessions', *The American Economic Review*, vol. 84, no. 5, pp. 1350-1368.
- [13] Chetty, R, Friedman, JN, Hendren, N, & Stepner, M 2020, 'The economic impacts of COVID-19: Evidence from a new public database built using private sector data', *NBER Working Paper, 27431*, National Bureau of Economic Research. doi: 10.3386/w27431.
- [14] Cobb, CW, & Douglas, PH 1928, 'A theory of production',

- The American Economic Review*, vol. 18, no. 1, Supplement, Papers and Proceedings of the Fortieth Annual Meeting of the American Economic Association, pp. 139-165.
- [15] Cohen, D, & Soto, M 2007, 'Growth and human capital: good data, good results', *Journal of Economic Growth*, vol. 12, no. 1, pp. 51-76. doi: <https://doi.org/10.1007/s10887-007-9011-5>.
- [16] Crafts, N, & Woltjer, P 2021, 'Growth accounting in economic history: findings, lessons and new directions', *Journal of Economic Surveys*, vol. 35, no. 3, pp. 670-696. doi: <https://doi.org/10.1111/joes.12348>.
- [17] De, PK, & Nagaraj, P 2014, 'Productivity and firm size in India', *Small Business Economics*, vol. 42, no. 4, pp. 891-907. doi: <https://doi.org/10.1007/s11187-013-9504-x>.
- [18] de Vries, K, Erumban, A, & van Ark, B 2021, 'Productivity and the pandemic: short-term disruptions and long-term implications: The impact of the COVID-19 pandemic on productivity dynamics by industry', *International Economics and Economic Policy*, vol. 18, no. 3, pp. 541-570. doi: <https://doi.org/10.1007/s10368-021-00515-4>.
- [19] Demmou, L, Calligaris, S, Franco, G, Dlugosch, D, McGowan, MA, & Sakha, S 2021, 'Insolvency and debt overhang following the COVID-19 outbreak: Assessment of risks and policy responses', *OECD Economics Department Working Papers, 1651*, Organisation for Economic Co-operation and Development. doi: <https://doi.org/10.1787/747a8226-en>.
- [20] Demombynes, G, De Walque, D, Gubbins, P, & Veillard, J 2021, October 26, *Too young to die: Age and death from COVID-19 around the globe*, World Bank. viewed 15 November 2021, <<https://blogs.worldbank.org/developmenttalk/too-young-die-age-and-death-covid-19-around-globe>>.
- [21] Dhawan, R 2001, 'Firm size and productivity differential: theory and evidence from a panel of US firms', *Journal of Economic Behavior & Organization*, vol. 44, no. 3, pp. 269-293. doi: [https://doi.org/10.1016/S0167-2681\(00\)00139-6](https://doi.org/10.1016/S0167-2681(00)00139-6).
- [22] di Mauro, F, & Syverson, C 2020, June, 'The COVID crisis and productivity growth', *White Paper*, Becker Friedman Institute. viewed 1 November 2021, <<https://bfi.uchicago.edu/working-paper/the-covid-crisis-and-productivity-growth/>>.
- [23] Duggan, V, Rahardja, S, & Varela, G 2013, 'Service sector reform and manufacturing productivity: evidence from Indonesia', Policy Research Working Paper, 6349, World Bank. viewed 1 September 2021, <<https://openknowledge.worldbank.org/handle/10986/13149>>.
- [24] Feenstra, RC, Inklaar, R, & Timmer, MP 2015, 'The next generation of the Penn World Table', *American Economic Review*, vol. 105, no. 10, pp. 3150-3182. doi: <https://doi.org/10.1257/aer.20130954>.
- [25] Fernald, J, & Li, H 2021, 'The Impact of COVID on potential output', *Working Paper 2021-09*, Federal Reserve Bank of San Francisco. doi: <https://doi.org/10.24148/wp2021-09>.
- [26] Ichino, A, & Winter-Ebmer, R 2004, 'The long-run educational cost of World War II', *Journal of Labor Economics*, vol. 22, no. 1, pp. 57-87. doi: <https://doi.org/10.1086/380403>.
- [27] IMF Fiscal Affairs Department 2021, *Fiscal monitor: Database of country fiscal measures in response to the COVID-19 pandemic*, International Monetary Fund. viewed 1 December 2021, <<https://www.imf.org/en/Topics/imf-and-covid19/Fiscal-Policies-Database-in-Response-to-COVID-19>>.
- [28] Indrawati, SM, & Kuncoro, A 2021, 'Improving competitiveness through vocational and higher education: Indonesia's vision for human capital development in 2019–2024', *Bulletin of Indonesian Economic Studies*, vol. 57, no. 1, pp. 29-59. doi: <https://doi.org/10.1080/00074918.2021.1909692>.
- [29] Jaume, D, & Willén, A 2019, 'The long-run effects of teacher strikes: evidence from Argentina', *Journal of Labor Economics*, vol. 37, no. 4, pp. 1097-1139. doi: <https://doi.org/10.1086/703134>.
- [30] Li, Y, & Rama, M 2015, 'Firm dynamics, productivity growth, and job creation in developing countries: The role of micro-and small enterprises', *The World Bank Research Observer*, vol. 30, no. 1, pp. 3-38. doi: <https://doi.org/10.1093/wbro/lkv002>.
- [31] McKinsey & Company 2018, *Outperformers: High-growth emerging economies and the companies that propel them*, McKinsey Global Institute. viewed 1 June 2020, <<https://www.mckinsey.com/featured-insights/innovation-and-growth/outperformers-high-growth-emerging-economies-and-the-companies-that-propel-them>>.
- [32] McMillan, MS, & Rodrik, D 2011, 'Globalization, structural change and productivity growth', *NBER Working Paper, 17143*, National Bureau of Economic Research. doi: 10.3386/w17143.
- [33] OECD 2021, December, *OECD Services Trade Restrictiveness Index (STRI): Indonesia 2020*, Organisation for Economic Co-operation and Development.
- [34] Olayinka, JA, & Loykulnanta, S 2019, 'How Domestic firms benefit from the presence of multinational enterprises: Evidence from Indonesia and Philippines', *Economies*, vol. 7, no. 3, p.94. doi: <https://doi.org/10.3390/economies7030094>.
- [35] Pagano, P, & Schivardi, F 2003, 'Firm size distribution and growth', *Scandinavian Journal of Economics*, vol. 105, no. 2, pp. 255-274. doi: <https://doi.org/10.1111/1467-9442.t01-1-00008>.
- [36] Perloff, RF, Dunn, ES, Lampard, EE, & Muth, RF 1960, *Regions, resources and economic growth*, University of Nebraska Press.
- [37] Rodrik, D 2013, 'Unconditional convergence in manufacturing', *The Quarterly Journal of Economics*, vol. 128, no. 1, pp. 165-204. doi: <https://doi.org/10.1093/qje/qjs047>.
- [38] Rodrik, D 2016, 'Premature deindustrialization', *Journal of Economic Growth*, vol. 21, no. 1, pp. 1-33. doi: <https://doi.org/10.1007/s10887-015-9122-3>.
- [39] Rothenberg, AD, Gaduh, A, Burger, NE, Chazali, C, Tjandraningsih, I, Radikun, R, Sutera, C, & Weilant, S 2016, 'Rethinking Indonesia's informal sector', *World Development*, vol. 80, pp. 96-113. doi: <https://doi.org/10.1016/j.worlddev.2015.11.005>.

- [40] Ryandiansyah, NR, & Azis, IJ 2018, 'Structural change, productivity, and the shift to services: the case of Indonesia', *Economics and Finance in Indonesia*, vol. 64, no. 2, pp. 97-110. doi: <https://doi.org/10.47291/efi.v64i2.593>.
- [41] Schroeder, K, Lampietti, J, & Elabed, G 2021, *What's cooking: digital transformation of the agrifood system*, World Bank. doi: <https://doi.org/10.1596/978-1-4648-1657-4>.
- [42] Solow, RM 1957, 'Technical change and the aggregate production function', *The Review of Economics and Statistics*, vol. 39, no. 3, pp. 312-320. doi: <https://doi.org/1926047>.
- [43] Tijaja, J, & Faisal, M 2014, 'Industrial policy in Indonesia: A global value chain perspective', *ADB Economics Working Paper Series, 411*, Asian Development Bank. viewed 1 September 2021 <<https://www.adb.org/publications/industrial-policy-indonesia-global-value-chain-perspective>>.
- [44] Timmer, M, de Vries, GJ, & De Vries, K 2015, 'Patterns of structural change in developing countries, in *Routledge handbook of industry and development*, J Weiss & M Tribe (Eds.), Routledge, pp. 79-97.
- [45] Van Biesebroeck, J 2005, 'Firm size matters: Growth and productivity growth in African manufacturing', *Economic Development and Cultural Change*, vol. 53, no. 3, pp. 545-583. doi: <https://doi.org/10.1086/426407>.
- [46] World Bank 2016, 'Indonesian economic transformation and employment: policy input for an indonesia jobs strategy', *Report No: AUS13186*. viewed 1 September 2021, <<https://openknowledge.worldbank.org/handle/10986/24928>>.
- [47] World Bank 2019, *Aspiring Indonesia—Expanding the middle class*. doi: <https://doi.org/10.1596/33237>.
- [48] World Bank 2021, *East Asia and Pacific economic update, October 2021: Long COVID*. doi: <https://doi.org/10.1596/978-1-4648-1799-1>.