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Impacts of sectoral labour productivity growth of emerging countries in East Asia

Hidekatsu Asada
Saitama University, Japan

Abstract

This paper aims to examine the impact of sector-specific labour productivity growth on the overall labour productivity growth of emerging countries in East Asia to investigate which effect of labour productivity growth played a decisive role in the overall productivity growth; and what the contributions of sectors to the overall productivity gains were. The shift-share analysis of the labour productivity was applied to the time-series data of the APO Productivity Database 2019 Version 1 and decomposed overall labour productivity growth into the growth of the sectoral labour productivity within the sector and the effects brought by inter-sectoral labour reallocation. The result of the shift-share analysis revealed that the services sector had made a substantial contribution to the overall labour productivity growth of emerging countries in East Asia both in terms of labour productivity growth within the sector and labour reallocation to the services sector. Based on the result of the analysis, this paper includes discussion on possible policy options for boosting labour productivity of these countries to sustain their medium- and long-term economic growth.

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Contact: Hidekatsu Asada - asada@mail.saitama-u.ac.jp.
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1. Introduction

Emerging countries in East Asia such as China, Indonesia, Malaysia, the Philippines, Thailand and Vietnam are currently recording high growth compared to developed countries but also to emerging economies in other regions. These countries have belonged to a group of middle-income countries with substantial improvement in living standards. These countries' successful records of economic growth were brought by dynamic structural change: shift from agriculture-based and commodity export-led industrial structure to a more diverged one led by the manufacturing sector and the services sector.

Against this backdrop, these countries in East Asia have set a target year for achieving a higher level of economic development. For example, according to the World Bank's classification, Malaysia, which is now an upper middle-income country, aims to become a high-income country by 2024 in the Interim Review of the Eleventh Five-Year Plan published in October 2018. Similarly, Thailand's 20-year national strategy formulated in October 2018 aims to become a high-income country by 2037. The Philippines, a low middle-income country, has set a goal of becoming a high middle-income country by 2022 under the current "Philippine Development Programme 2017 -2022".

In this process of structural transformation, along with capital accumulation through foreign direct investment and domestic savings mobilisation, the reallocation of labour from sectors with low labour productivity to sectors with higher labour productivity, has been a driving force for industrialisation in these countries.

This structural transformation was attributable to a set of policy measures including ensuring macroeconomic stability; promoting regulatory reform conducive to private investment; human capital development with particular emphasis on education; and implementing outward-oriented industrialisation strategies such as trade and investment liberalisation. These policy measures contributed to improving quality of inputs and boosting productivity (Stiglitz, 1996: Van Ark and Timmer, 2003).

However, as discussed in the "middle-income trap" (Gill and Kharas, 2017), growth led by inputs of production factors such as capital and labour eventually reaches its limit, and the effect of production factor inputs on economic growth gradually diminishes. In addition to a decline of the marginal productivity of capital, factors contributing to this decline include the depletion of the surplus labour in terms of labour input and a rise in real wages (Lewis, 1954), as well as a decline in the population of young people due to the declining birth-rate accompanying economic development (World Bank, 2015).

For middle-income countries to achieve long-term economic growth, the improvement of labour productivity will be a challenge in the context of upgrading the industrial structure. In this paper, the main research questions are twofold: (i) Which effect of labour productivity growth plays a decisive role in overall productivity growth? and (ii) What are the contributions of sectors to the overall productivity gains?

To answer these questions, this paper examines the impact of sector-specific growth of labour productivity on the overall labour productivity growth of emerging countries in East Asia by the shift-share analysis of labour productivity. By decomposing the productivity growth into the growth of the sectoral labour productivity within the sector and the effects brought by inter-sectoral labour reallocation, the shift-share analysis provides the contributions of sectoral labour productivity growth to the overall labour productivity growth in detail.

The rest of the paper is structured as follows: Section 2 reviews preceding literatures related to the labour productivity growth in East Asia. Section 3 presents Analytical methods and Data, followed by Results and Discussion in Section 4. Then, in Section 5, Policy Issues

for Continuous Improvement of Labour Productivity is discussed. Section 6 provides the Conclusion.

2. Literature review

A number of papers discussed the importance of labour productivity growth on economic development and their determinants by using the decomposition method such as the shift-share analysis with different level of sectoral disaggregation. As examples that focused on East Asian countries, McMillan and Rodrik (2011) decomposed the overall growth of labour productivity into the within effect and the structural effect (the sum of the shift effect and the cross effect) of nine sectors for the period over 1990 to 2005. The study covered 38 developed and developing countries in Asia, Latin America and Africa and discussed that the bulk of the difference of the labour productivity growth of Asia, and Latin America and Africa were explained by the pattern of the structural change – labour reallocation from low-productivity sector to high ones. Molnar and Chalaux (2015) measured changes in labour productivity in agriculture, mining, manufacturing (14 subsectors) and services (19 subsectors) over 2000 to 2011 in China and OECD countries. As in the previous study, the analysis result showed that most of the changes in labour productivity in both China and OECD countries were caused by changes in labour productivity within the sector and that the contribution of intersectoral labour reallocation in China was higher than that in OECD countries, which contributed to a higher rate of increase in labour productivity of the Chinese economy as a whole compared to OECD countries.

In terms of the drivers of the overall productivity growth, the importance of the services sector is highlighted in the existing studies. Van Ark and Timmer (2003) examined the contribution of the sectoral labour productivity growth of nine countries/areas in East Asia comprised of 10 sectors for the period over 1985 to 2001. The study concluded that the manufacturing sector drove much of the labour productivity in Asia, while the contribution of the services sector, in particular, ICT-related services became important as the income-level rose. Lee and Mckibbin (2014) measured sectoral labour productivity growth of three sectors comprised of agriculture, manufacturing, and services from 1990 to 2005 in Japan, South Korea, China, Hong Kong, Taiwan, and Southeast Asian countries. The study observed that labour reallocation between sectors contributes to the growth of labour productivity in many East Asian countries, and that labour reallocation to the services sector played an important role. Üngör (2017) highlighted the important contributions of the manufacturing sector, and the wholesale and retail trade, hotels and restaurants sector for explaining the gap of labour productivity growth between East Asia and Latin America over the period 1963 to 2010.

As the contribution of this paper to these existing studies on labour productivity in East Asia, the shift-share analysis is conducted on selected emerging countries in East Asia from to from 1980 to 2017 that enables to capture the most updated development of sectoral labour productivity growth and its contribution to the overall labour productivity growth of each country. The shift-share analysis reveals how the services sector contributed substantially to the overall labour productivity growth in emerging countries in East Asia both in terms of labour productivity growth within the services sector and labour reallocation to the services sector. In addition, this paper also aims to discuss possible policy options for boosting labour productivity of these countries to sustain their medium- and long-term economic growth in a context of the countries covered in the shift-share analysis.

3. Analytical methods and data

The impact of changes in sectoral labour productivity on changes in the overall labour productivity in the economy will be analysed by using the shift-share analysis (Timmer and Szirmai, 2000; McMillan and Rodrik, 2011; Molnar and Chalaux, 2015). Following Molnar and Chalaux (2015), the overall labour productivity growth is decomposed into sectoral labour productivity comprised of three effects: (1) "within effect"; (2) "shift effect", and (3) "cross-effect".

The labour productivity (*P*) of the economy is shown by the output (*Y*, real GDP is used here) and the number of workers (*L*) as follows. The suffix *i* represents each sector and *t* represents the year.

$$P_t = \frac{Y_t}{L_t} \tag{1}$$

The overall labour productivity of the economy is the sum of all sectors, as shown below.

$$P_t = \frac{Y_t}{L_t} = \sum_i Y_{it} / \sum_i L_{it} \tag{2}$$

Furthermore, the overall labour productivity of the economy is shown by the weighted average of the share of the number of workers in each sector in the total number of workers as follows.

$$P_t = \sum_i P_{it} \frac{L_{it}}{L_t} \tag{3}$$

The growth of labour productivity in each sector from the previous period (*t -1*), expressed as $(\Delta P_{it})$is shown as follows.

$$\Delta P_{it} = \sum_i \Delta P_{it} \frac{L_{i\,t-1}}{L_{t-1}} + \sum_i P_{i\,t-1}\, \Delta(\frac{L_{it}}{L_t}) + \sum_i \Delta\, P_{it} \Delta(\frac{L_{it}}{L_t}) \tag{4}$$

The three effects presented in this shift-share analysis are as follows.

- The first term is the "within effect" that represents the effect of the growth of labour productivity in each sector on the overall labour productivity growth, assuming that the number of workers in each sector remains unchanged. For example, if capital accumulation and technology progress are effective, it will be positive (McMillan and Rodrik, 2011). Skills development is another source of this effect.
- The second term is the "shift effect" that represents the impact of sectoral labour reallocation on the overall labour productivity growth, assuming that labour productivity in each sector remains unchanged. For example, this effect is positive when there is labour reallocation from sectors with low labour productivity to sectors with high labour productivity.
- The third term is the "cross effect", and the residual of the two effects above indicates the impact of changes in both the employment share and labour productivity in each sector on the overall labour productivity growth. A positive value is a case where labour reallocation occurs in sectors where labour productivity continues to rise, or workers exit sectors where labour productivity continues to decline (complementary effect). On the other hand, negative trends occur when workers leave sectors where labour productivity continues to rise, or when labour reallocation occurs in sectors where labour productivity continues to decline (substitution effect).

The APO Productivity Database 2019 Version 1 produced by the Asian Productivity Organization (APO) is used for this analysis (APO, 2019). This database provides consistent and detailed annual data of sectoral output and employment of East Asian countries from the

1970s to 2017. The countries for the analysis are China, Indonesia, Malaysia, the Philippines, Thailand and Vietnam. The following nine sectors are used for sector classification: (1) Agriculture, hunting, forestry, and fishing; (2) Mining and quarrying; (3) Manufacturing; (4) Electricity, gas, and water supply; (5) Construction; (6) Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants; (7) Transport, storage and communications; (8) Financial intermediation, real estate, renting and business activities; and (9) Community, social and personal services.

This paper extends the coverage of the analysis to the latest year to 2017 to capture the latest progress of structural transformation in emerging countries in East Asia. Examples of the structural transformation include the digitisation of the economy, which has been accelerated in recent decades, and the expansion of services trade, represented by inbound tourism. Additionally, the paper examined the labour productivity of the services sector at a more detailed subsector level, as provided by the APO Productivity Database 2019 Version1.

It should be noted that the following issues concerning the data constraint in this analysis are not fully reflected: (1) labour reallocation within the manufacturing sector from the labour-intensive subsector to the capital- and technology-intensive subsector such as high-tech products with higher added value cannot be measured since a more detailed classification of the manufacturing industry is not provided except for some countries and periods; (2) only data on the number of workers by sector is provided, although it is desirable to use data on labour input hours (man-hour). For example, seasonal labour movement patterns such as engaging in agriculture during the busy season and migrating to urban areas during the off-season are not sufficiently reflected; and (3) a sheer size of the informal sector of the emerging countries could bias the GDP statistics of these countries (ILO, 2018: Nomura et al., 2009).

4. Results and Discussion

As the results of the shift-share analysis, it was observed that there were variations among countries and periods, overall, there seems a tendency that both the within effect and the shift effect contributed positively to the overall productivity growth during the periods covered in this analysis. Figure 1 shows the contribution of the three effects (Within effect, shift effect and cross effect, respectively) to the overall labour productivity growth of each country over 1980-2017. Table 1, 2 and 3 display the sectoral impact of each effect in detail by cumulative changes.

Among the countries covered in this exercise, China recorded the highest growth in labour productivity among the countries analysed, to a large extent, thanks to the growth of the within effect of the manufacturing sector. Molnar and Chalaux (2015) argue that the main factors behind these changes were technology transfers associated with foreign direct investment reallocation and the acquisition of new technologies through mergers and acquisitions.

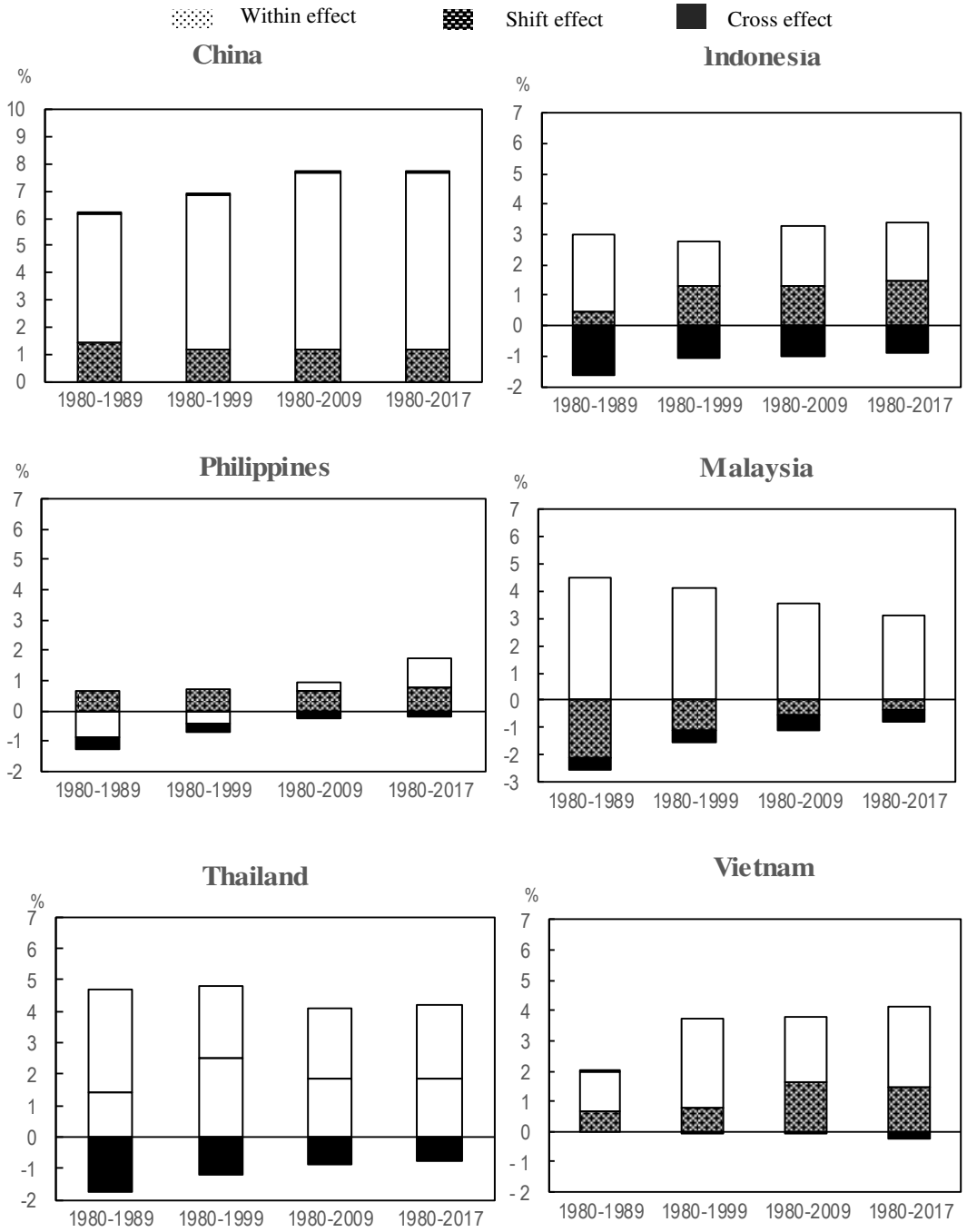
However, there are differences in the contribution by the period in the Southeast Asian countries. For example, in 1980-2017, the contribution rate of the manufacturing sector's within effect to the overall labour productivity growth (*i.e.* the ratio of growth of the within effect to overall labour productivity growth) was 34.7% in Malaysia, followed by China, Indonesia, the Philippines and Thailand at some 25%

The within effect of the services sector centred on "Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants" and "Transport, storage and communications" contributed relatively stable, in particular after 2000 to the overall growth of labour productivity in each country.

In terms of the impact of labour reallocation, the positive shift effect indicates that labour reallocation from sectors with low labour productivity to sectors with higher labour productivity progressed. Over 1980-2017, the shift effect was positive in all the countries except Malaysia. This was largely due to labour reallocation from the mining and quarrying sector. Looking at the shift effect of the "Agriculture, hunting, forestry and fishing" sector in Table 2, it was negative throughout the analysis period in all the countries, indicating that exit from this sector (a decline in the share of the sector's total workforce) progressed.

Figure 1. Contributions to overall labour productivity growth

Average growth rate per year

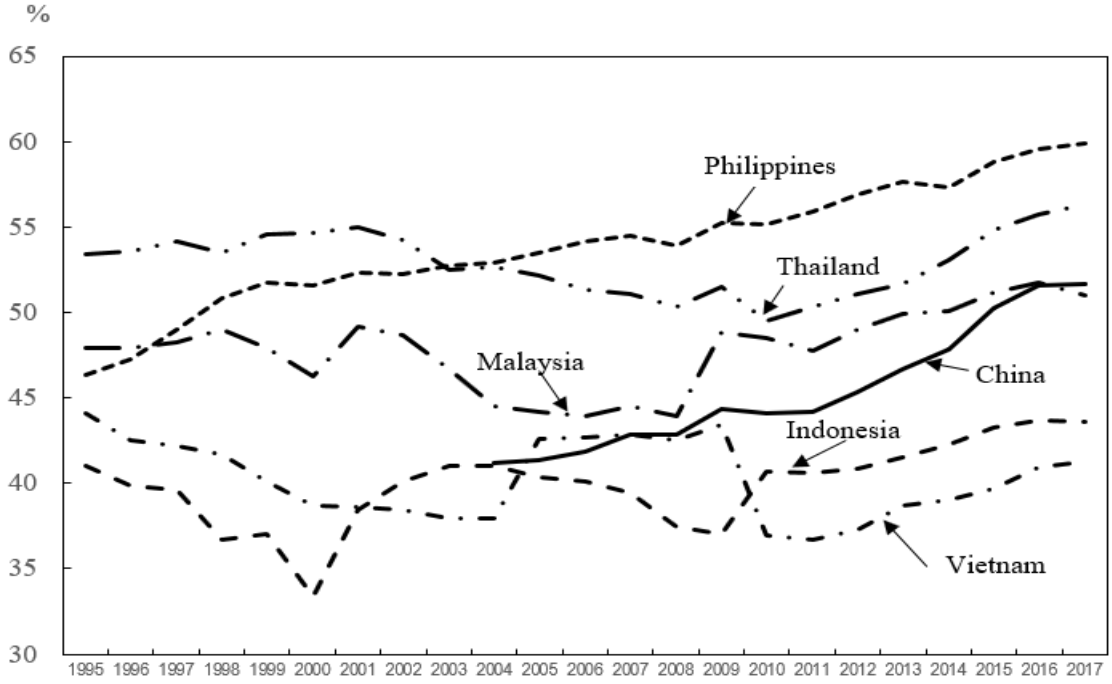


Source: Author's calculation from the Asian Productivity Organization (APO), *APO Productivity Database 2019 Version 1*.

In the manufacturing sector, labour reallocation to this sector generally contributed to improving overall labour productivity of the analysed countries over 1980 - 2017 except for the Philippines and Malaysia. In line with the studies reviewed in Section 2, the results of the analysis show that the services sector played an important role in the growth of overall labour productivity throughout each country and period.

Figure 2 shows the share of the services sector in GDP of each country. The share of each country was on an increasing trend since 2010, and as the experience of OECD member countries shows, the share of the services sector in GDP is expected to increase with the growth of GDP per capita.

Figure 2. Services sector's share of GDP



Note: China's data are available from 2004.
Source: World Bank (2019), *World Development Indicators Database*.

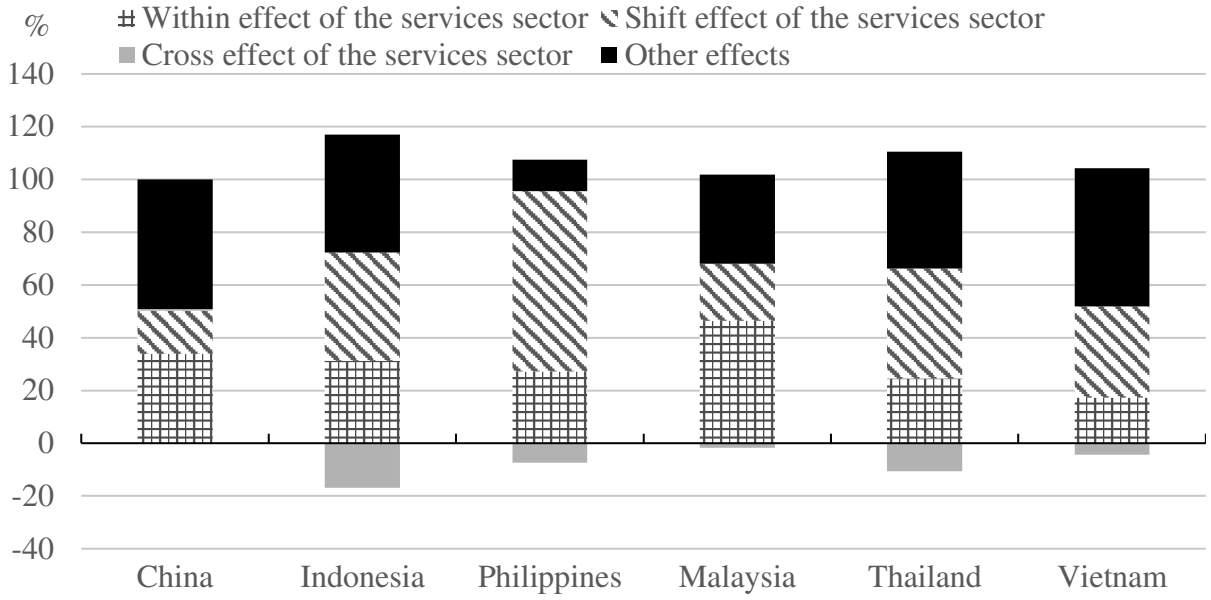
Figure 3 shows the contribution of each effect to the overall growth in labour productivity in the services sector, comprised of "Wholesale, retail, automotive and household goods repair, hotels and restaurants", "Transportation, storage and communications", "Finance, real estate, rental and other business-related services" and "Community, social and personal services" over 1980 – 2017.

Looking at the contribution rate of the services sector to the overall labour productivity growth, the rates ranged from 47.5% in Vietnam, the lowest to 88.2% in the Philippines, the highest. Labour reallocation to the services sector contributed to the growth of overall labour productivity. The total effects of the labour reallocation to the services sector (the sum of the shift effect and the cross effect) ranged from 17.1% in China to 60.9% in the Philippines. Figure 4 shows the contribution rate of the sub-sectors of the services sector. Contribution to overall economic labour productivity growth of each sub-sector has been observed, while its impact was diverged by country.

Compared to the within effect and the shift effect, the overall impact of the cross effect was relatively small, while there is the difference by country and period. Overall, the "Mining and quarrying" sector tends to be a large contributor to the cross effect.

Figure 3. The contribution rate of the services sector to the overall labour productivity growth

Average growth per year over 1980 to 2017

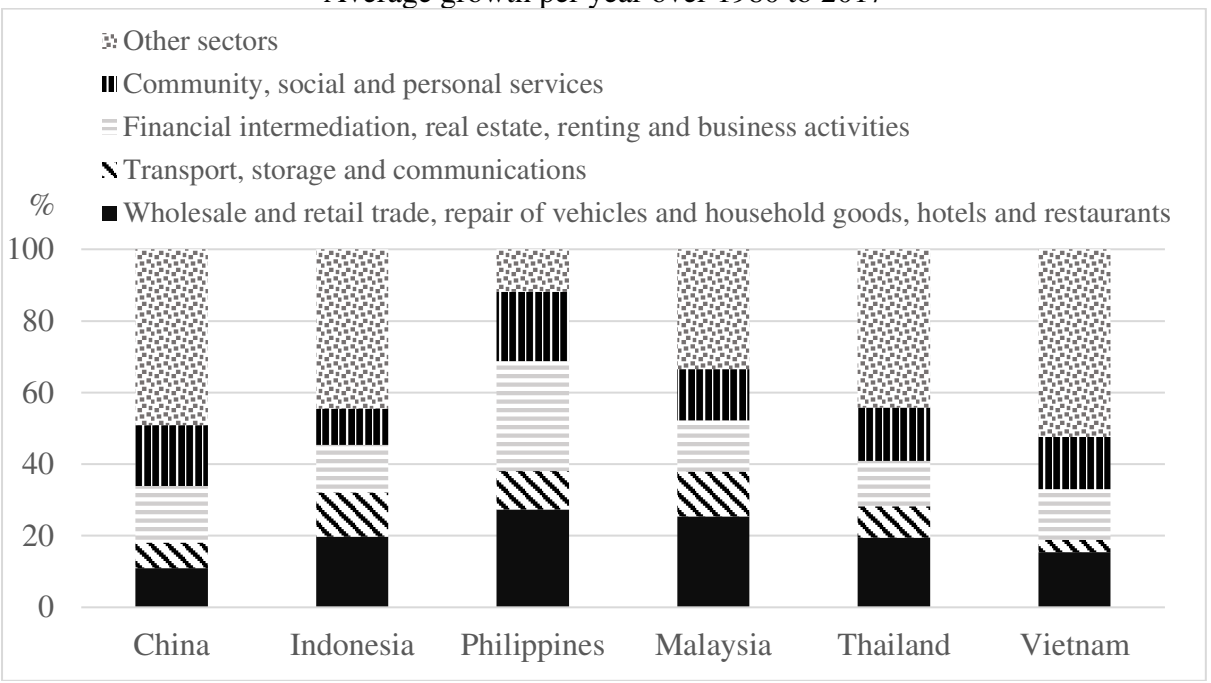


Note: Other effects are the sum of labour productivity growth in sectors other than the services sector.

Source: Author's calculation based on Asian Productivity Organization, *APO Productivity Database 2019 Version 1*.

Figure 4. Contribution rate of the sub-sectors of the services sector to the overall labour productivity growth

Average growth per year over 1980 to 2017



Source: Author's calculation based on Asian Productivity Organization, *APO Productivity Database 2019 Version 1*.

5. Policy Issues for Continuous Improvement of Labour Productivity

In the countries covered in this analysis, sustained growth of overall labour productivity over the medium to long-term is important for sustaining economic growth. In lower middle-income countries like Indonesia, the Philippines, and Vietnam, workers in the agricultural sector, which still accounts for a large share of the total number of workers, still have potential to be transferred to more productive manufacturing and services industries. In addition, China, Thailand, and Malaysia, which are upper middle-income countries, need to promote the development of services sectors towards the ones with higher labour productivity, such as information and communications, innovation support, and professional business services. Expanding services contents of the manufacturing productions such as research and development, design, and marketing will lead to higher added value in the manufacturing industry.

In order to promote the services sector with higher labour productivity, it is important to improve the competitive environments by lowering entry barriers to these sectors. For this purpose, it is necessary to simplify the procedures for obtaining business licenses to establish one-stop centres where various procedures can be carried out in an integrated manner. Furthermore, in these countries, state-owned enterprises have a large market share, especially in the area of information and telecommunications, and entry regulations are often in place, it is necessary to equalise the competitive environment between them and new entrants by creating level-playing fields (OECD, 2018; World Bank, 2016). To promote business-friendly regulatory reforms, Thailand, the Philippines, and Malaysia have set concrete targets to improve their rankings based on the World Bank's *Ease of Doing Business* ranking of each country and are making holistic efforts across the government.

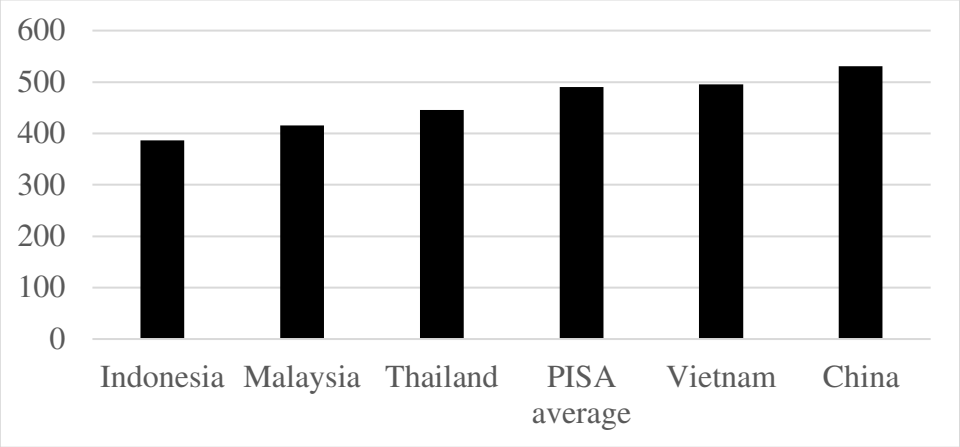
Additionally, capturing the opportunities brought by technology progress, notably digitalisation could enable the economy to boost productivity and to expand new business activity. Increased ICT use has transformed the services sector by making many services storable, transportable over internet and telephone connections, and tradeable across the countries through digital and other means. (Ghani, 2010). These transformations have had significant impacts on the productivity of sectors such as telecommunications, financial services, and data processing and distribution. The development of low-cost and high-quality information and telecommunications infrastructure should be emphasised to make the most of the benefit of digitalisation. Liberalising foreign investment in the services sector is also beneficial by facilitating access to the global technology frontier.

Regarding human resource development, continuous efforts at each stage of basic education, higher education, and skills training for working people will be an issue. Regarding basic education, the enrolment rate by age group reached approximately 90% in Indonesia, the Philippines, and Thailand, and almost 100% in the other countries (From World Bank, *World Development Indicators* database). Figure 5 shows the performance of the mathematics of the *OECD Programme of International Student Assessment* (PISA) in 2015. With a global average of 490, China (Beijing, Shanghai, Jiangsu and Guangdong) and Vietnam exceed the global average, while Indonesia, Thailand, and Malaysia are below the global average (The Philippines did not participate.). Without the steady acquisition of basic education content, it will be extremely difficult to acquire higher skills such as ICT utilisation. Therefore, efforts to improve academic ability at the basic education stage are required.

Regarding higher education, the most recent enrolment rates are shown in Figure 6. The enrolment rates in China, Malaysia and Thailand, which are upper middle-income countries, exceeded 40%. Considering that the enrolment rates in higher education were in the

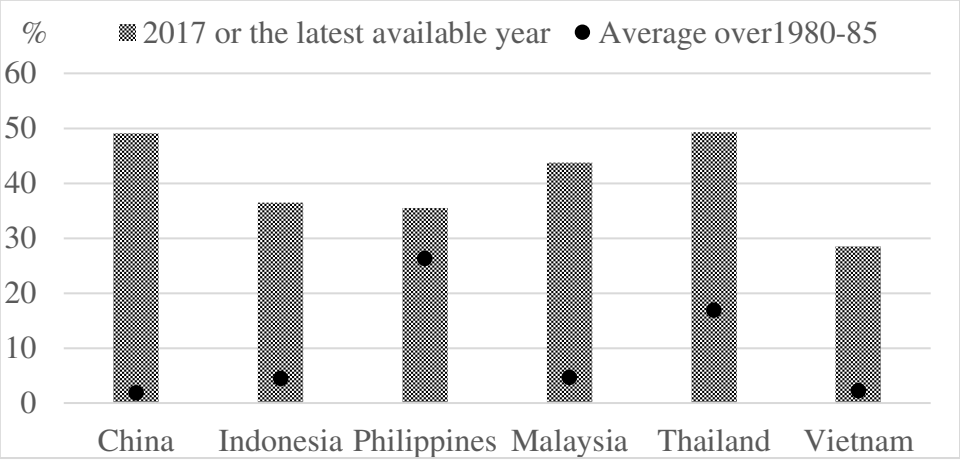
single-digit range in most of these countries in the 1980s, this suggests that there has been a rapid popularisation of higher education. However, as shown in Figure 7, looking at the unemployment rate of young people (15 -24 years old) by educational attainment, in Southeast Asian countries the unemployment rate of those who have completed higher education is much higher than that of those who are without, showing a clear contrast with developed countries.

Figure 5. Performance of mathematics in the OECD Programme for International Student Assessment in 2015



Note: Data for China covers only the cities of Beijing, Shanghai, Jiangsu and Guangdong.
Source: OECD (2018), *Programme for International Student Assessment 2015*.

Figure 6. Enrolment rate to the tertiary education



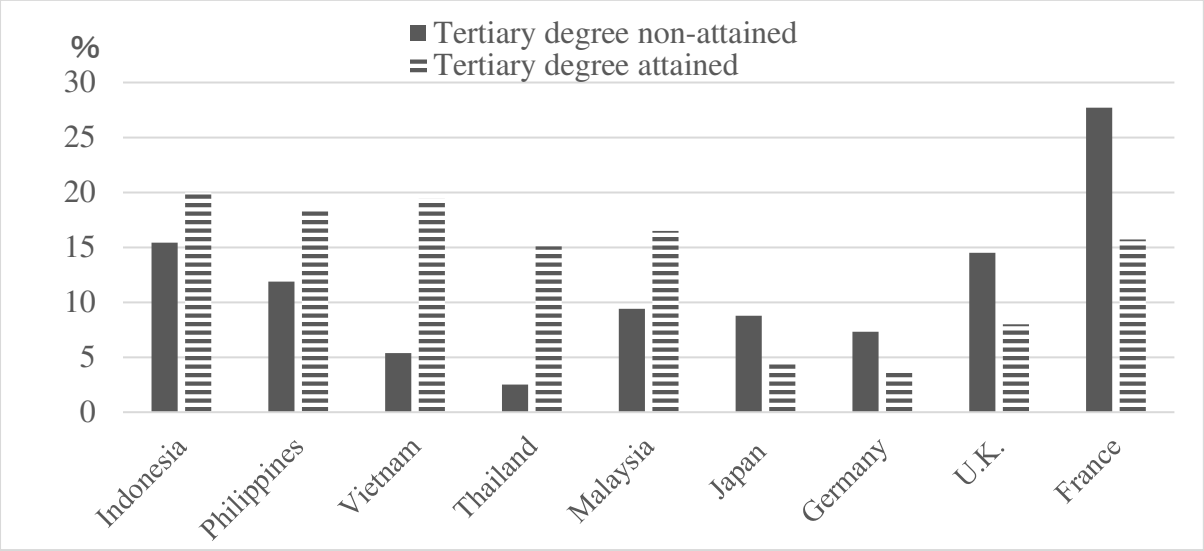
Source: World Bank (2019), *World Development Indicators Database*.

One of the reasons for this is that, due to the delay in the transformation of the industrial structure in these countries, the employment opportunities for graduates of higher education are not sufficiently provided. It will be necessary to increase labour demand for highly skilled human resources by steadily implementing the measures described above to promote the services sector with higher labour productivity.

From the perspective of the labour supply side, based on the analysis that there is a large mismatch between the contents acquired at universities, etc. and the skills required by industry, the importance of technical and vocational education and training that strengthens cooperation among the government, universities, and industry and enhances the employability (employability) of students has been pointed out (OECD, 2017). As an example, the Malaysian government established a task force in the government with the participation of universities

and industries. The task force aims to promote the dual system (Dual System), which organically links the field of education in Germany with the field of actual work, throughout the country (OECD, 2019).

Figure 7. The unemployment rate of youth (15-24 years old) by educational attainment in 2016



Source: International Labour Organization (2019), *ILOSTAT Database*.

Finally, regarding measures to improve the skills of workers who work as members of society, for example, in European countries where unemployment rates remain high, policies such as requiring vocational training as a condition for unemployment insurance benefits have been implemented. However, in major emerging countries in East Asia where unemployment rates remain low on the whole, such incentives do not work well.

To address this situation, in Thailand, under the Skills Development Training Act, firms employing 100 or more people are obliged to implement skills development programs for their employees. Firms that do not implement such programs are obliged to make payments to the vocational training fund of the Ministry of Labour. However, given a large pool of non-regular workers in the emerging countries in East Asia, there is a need to examine further what measures should be taken to develop human resources for them who often lack adequate educational opportunities and are currently work at low wages.

6. Conclusion

As we have seen, the emerging countries in East Asia have greatly diversified from their agricultural and commodity export-led economic structures, and this diversification has been the driving force for their high growth. The process has been driven by both the increase in labour productivity brought about by capital accumulation, technology adaption and the quality of workers within each sector, as well as the labour reallocation from sectors with low labour productivity to sectors with high labour productivity.

In order to sustain economic growth over the long term, in addition to improving labour productivity within the sector, it is necessary to facilitate labour reallocation to sectors with high labour productivity. In particular, for upper middle-income countries to become developed countries, a comprehensive policy framework targeting subsectors, such as information and communications, innovation, and professional business services, is required to generate higher labour productivity, especially within the services sector.

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Table 1. Sectoral contribution of the within effect on the overall productivity growth, %

China	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	1.67	1.48	1.27	1.18
Mining and quarrying	0.16	0.26	0.34	0.33
Manufacturing	0.89	1.71	1.87	1.93
Electricity, gas and water supply	0.06	0.09	0.18	0.18
Construction	0.05	0.13	0.21	0.28
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	0.47	0.25	0.43	0.46
Transport, storage and communications	0.15	0.31	0.42	0.41
Financial intermediation, real estate, renting and business activities	0.91	0.90	0.97	0.93
Community, social and personal services	0.40	0.52	0.81	0.82
Total impact of whithin effect	4.78	5.64	6.48	6.51
Overall growth of labour productivity	6.19	6.84	7.66	7.72

Indonesia	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	0.34	0.45	0.44	0.52
Mining and quarrying	-0.07	-0.11	-0.12	-0.11
Manufacturing	0.94	0.70	0.74	0.62
Electricity, gas and water supply	0.02	0.04	0.06	0.05
Construction	0.20	0.01	0.07	0.09
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	0.05	-0.06	0.14	0.17
Transport, storage and communications	0.09	0.02	0.15	0.28
Financial intermediation, real estate, renting and business activities	0.88	0.39	0.37	0.18
Community, social and personal services	0.10	0.03	0.16	0.15
Total impact of whithin effect	2.53	1.45	2.00	1.94
Overall growth of labour productivity	1.36	1.72	2.27	2.48

Philippines	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	0.09	0.12	0.18	0.22
Mining and quarrying	0.01	0.02	0.02	0.02
Manufacturing	-0.15	0.04	0.19	0.38
Electricity, gas and water supply	0.06	0.03	0.09	0.12
Construction	-0.78	-0.50	-0.29	-0.19
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	-0.28	-0.11	0.03	0.18
Transport, storage and communications	-0.02	-0.04	0.05	0.09
Financial intermediation, real estate, renting and business activities	0.06	-0.09	-0.07	0.01
Community, social and personal services	0.14	0.07	0.08	0.13
Total impact of whithin effect	-0.88	-0.45	0.28	0.96
Overall growth of labour productivity	-0.60	-0.02	0.68	1.48

Malaysia	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	0.54	0.45	0.48	0.42
Mining and quarrying	2.58	1.65	0.99	0.66
Manufacturing	0.56	0.69	0.89	0.79
Electricity, gas and water supply	0.08	0.12	0.12	0.11
Construction	0.00	0.02	0.00	0.06
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	0.20	0.45	0.39	0.37
Transport, storage and communications	0.17	0.22	0.21	0.24
Financial intermediation, real estate, renting and business activities	0.15	0.24	0.19	0.14
Community, social and personal services	0.26	0.26	0.27	0.32
Total impact of whithin effect	4.53	4.12	3.54	3.10
Overall growth of labour productivity	1.97	2.57	2.43	2.28

Thailand	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	0.10	0.35	0.35	0.35
Mining and quarrying	0.48	0.30	0.29	0.23
Manufacturing	1.00	0.89	0.89	0.79
Electricity, gas and water supply	0.07	0.17	0.17	0.15
Construction	0.27	-0.04	-0.05	-0.01
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	0.19	-0.05	-0.03	0.18
Transport, storage and communications	0.17	0.19	0.22	0.25
Financial intermediation, real estate, renting and business activities	0.10	-0.08	0.03	0.05
Community, social and personal services	0.92	0.55	0.41	0.36
Total impact of whithin effect	3.30	2.28	2.27	2.35
Overall growth of labour productivity	2.97	3.58	3.25	3.42

Vietnam	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	0.54	0.61	0.76	0.79
Mining and quarrying	0.04	1.03	0.59	0.59
Manufacturing	0.11	0.28	0.27	0.38
Electricity, gas and water supply	0.02	0.10	0.07	0.12
Construction	0.05	0.15	0.10	0.11
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	0.17	0.10	0.20	0.29
Transport, storage and communications	0.04	0.06	0.10	0.11
Financial intermediation, real estate, renting and business activities	0.15	0.29	-0.13	-0.02
Community, social and personal services	0.14	0.28	0.22	0.29
Total impact of whithin effect	1.26	2.91	2.17	2.66
Overall growth of labour productivity	1.98	3.68	3.70	3.90

Table 2. Sectoral contribution of the shift effect on the overall productivity growth, %

China	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	-0.69	-0.57	-0.49	-0.48
Mining and quarrying	-0.01	-0.02	0.01	-0.06
Manufacturing	0.31	0.13	0.19	0.23
Electricity, gas and water supply	0.01	0.02	0.00	0.00
Construction	0.41	0.29	0.25	0.22
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	0.51	0.44	0.36	0.37
Transport, storage and communications	0.24	0.16	0.14	0.15
Financial intermediation, real estate, renting and business activities	0.21	0.24	0.23	0.27
Community, social and personal services	0.42	0.49	0.47	0.48
Total impact of shift effect	1.41	1.19	1.17	1.19
Overall growth of labour productivity	6.19	6.84	7.66	7.72

Indonesia	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	-0.26	-0.36	-0.28	-0.33
Mining and quarrying	-0.62	0.00	0.21	0.19
Manufacturing	0.08	0.32	0.18	0.24
Electricity, gas and water supply	0.09	0.06	0.05	0.05
Construction	0.12	0.27	0.27	0.29
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	0.48	0.46	0.35	0.34
Transport, storage and communications	0.04	0.10	0.10	0.05
Financial intermediation, real estate, renting and business activities	0.10	0.18	0.21	0.42
Community, social and personal services	0.44	0.30	0.21	0.21
Total impact of shift effect	0.47	1.33	1.30	1.46
Overall growth of labour productivity	1.36	1.72	2.27	2.48

Philippines	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	-0.28	-0.26	-0.23	-0.26
Mining and quarrying	0.04	0.00	0.02	0.02
Manufacturing	-0.14	-0.16	-0.20	-0.17
Electricity, gas and water supply	0.07	0.08	0.03	0.00
Construction	0.25	0.20	0.13	0.15
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	0.42	0.30	0.26	0.24
Transport, storage and communications	0.08	0.11	0.10	0.08
Financial intermediation, real estate, renting and business activities	0.07	0.29	0.39	0.52
Community, social and personal services	0.15	0.14	0.13	0.17
Total impact of shift effect	0.65	0.71	0.63	0.75
Overall growth of labour productivity	-0.60	-0.02	0.68	1.48

Malaysia	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	-0.45	-0.65	-0.55	-0.49
Mining and quarrying	-2.14	-1.14	-0.57	-0.36
Manufacturing	0.22	0.30	-0.04	-0.02
Electricity, gas and water supply	0.00	-0.01	0.00	0.00
Construction	0.00	0.08	0.07	0.05
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	0.14	0.11	0.20	0.22
Transport, storage and communications	0.06	0.05	0.07	0.05
Financial intermediation, real estate, renting and business activities	0.01	0.10	0.19	0.20
Community, social and personal services	0.08	0.07	0.07	0.02
Total impact of shift effect	-2.09	-1.09	-0.57	-0.33
Overall growth of labour productivity	1.97	2.57	2.43	2.28

Thailand	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	-0.04	-0.20	-0.19	-0.20
Mining and quarrying	0.00	0.04	-0.01	0.03
Manufacturing	0.20	0.49	0.34	0.38
Electricity, gas and water supply	0.06	0.03	0.00	0.04
Construction	0.20	0.33	0.25	0.19
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	0.77	0.98	0.74	0.61
Transport, storage and communications	0.03	0.09	0.06	0.08
Financial intermediation, real estate, renting and business activities	0.29	0.56	0.43	0.48
Community, social and personal services	-0.09	0.19	0.22	0.26
Total impact of shift effect	1.41	2.51	1.84	1.86
Overall growth of labour productivity	2.97	3.58	3.25	3.42

Vietnam	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	-0.06	-0.16	-0.32	-0.37
Mining and quarrying	0.42	0.12	0.22	0.06
Manufacturing	-0.06	-0.03	0.16	0.23
Electricity, gas and water supply	0.01	-0.01	0.07	0.07
Construction	-0.04	0.00	0.13	0.14
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	0.09	0.31	0.29	0.34
Transport, storage and communications	0.01	0.03	0.01	0.03
Financial intermediation, real estate, renting and business activities	0.12	0.32	0.75	0.66
Community, social and personal services	0.22	0.23	0.30	0.32
Total impact of shift effect	0.70	0.81	1.62	1.48
Overall growth of labour productivity	1.98	3.68	3.70	3.90

Table 3. sectoral contribution of the cross effect on the overall productivity growth, %

China	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	-0.04	-0.04	-0.03	-0.04
Mining and quarrying	0.00	0.00	-0.01	-0.01
Manufacturing	0.02	0.01	0.01	0.01
Electricity, gas and water supply	0.00	0.00	0.00	0.00
Construction	-0.01	0.00	0.00	0.00
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	0.03	0.02	0.01	0.02
Transport, storage and communications	0.00	0.00	0.00	0.00
Financial intermediation, real estate, renting and business activities	0.01	0.01	0.01	0.01
Community, social and personal services	0.00	0.01	0.02	0.02
Total impact of cross effect	0.01	0.01	0.03	0.04
Overall growth of labour productivity	6.19	6.84	7.66	7.72

Indonesia	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	-0.05	-0.05	-0.04	-0.04
Mining and quarrying	-0.20	-0.25	-0.34	-0.28
Manufacturing	-0.15	-0.11	-0.09	-0.08
Electricity, gas and water supply	-0.08	-0.06	-0.06	-0.05
Construction	-0.13	-0.06	-0.04	-0.04
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	-0.04	-0.02	-0.03	-0.02
Transport, storage and communications	-0.04	-0.02	-0.02	-0.02
Financial intermediation, real estate, renting and business activities	-0.67	-0.34	-0.28	-0.27
Community, social and personal services	-0.27	-0.15	-0.14	-0.11
Total impact of cross effect	-1.64	-1.06	-1.03	-0.92
Overall growth of labour productivity	1.36	1.72	2.27	2.48

Philippines	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	-0.01	-0.01	-0.01	-0.01
Mining and quarrying	-0.04	-0.03	-0.02	-0.02
Manufacturing	-0.03	-0.04	-0.03	-0.03
Electricity, gas and water supply	-0.08	-0.05	-0.05	-0.05
Construction	-0.02	-0.02	-0.01	-0.01
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	-0.04	-0.02	-0.01	-0.01
Transport, storage and communications	-0.02	-0.01	-0.01	-0.01
Financial intermediation, real estate, renting and business activities	-0.15	-0.10	-0.08	-0.08
Community, social and personal services	0.00	0.00	0.00	-0.01
Total impact of cross effect	-0.38	-0.27	-0.23	-0.22
Overall growth of labour productivity	-0.60	-0.02	0.68	1.48

Malaysia	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	-0.02	-0.04	-0.04	-0.05
Mining and quarrying	-0.43	-0.40	-0.43	-0.37
Manufacturing	-0.01	0.00	-0.01	-0.01
Electricity, gas and water supply	-0.01	-0.02	-0.03	-0.02
Construction	0.01	0.01	0.01	0.00
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	0.00	-0.01	-0.01	-0.01
Transport, storage and communications	0.00	0.00	0.00	0.00
Financial intermediation, real estate, renting and business activities	-0.01	0.00	-0.01	-0.01
Community, social and personal services	0.00	0.00	-0.01	-0.01
Total impact of cross effect	-0.47	-0.46	-0.54	-0.49
Overall growth of labour productivity	1.97	2.57	2.43	2.28

Thailand	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	-0.08	-0.07	-0.05	-0.04
Mining and quarrying	-0.31	-0.18	-0.14	-0.13
Manufacturing	-0.26	-0.17	-0.12	-0.12
Electricity, gas and water supply	-0.05	-0.06	-0.05	-0.06
Construction	-0.21	-0.15	-0.10	-0.08
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	-0.30	-0.23	-0.16	-0.13
Transport, storage and communications	-0.03	-0.02	-0.02	-0.03
Financial intermediation, real estate, renting and business activities	-0.17	-0.14	-0.10	-0.09
Community, social and personal services	-0.33	-0.20	-0.14	-0.11
Total impact of cross effect	-1.73	-1.21	-0.86	-0.79
Overall growth of labour productivity	2.97	3.58	3.25	3.42

Vietnam	1980-89	1980-99	1980-2009	1980-2017
Agriculture, hunting, forestry and fishing	0.00	0.00	-0.01	-0.03
Mining and quarrying	0.01	-0.04	-0.03	-0.04
Manufacturing	-0.01	0.00	0.00	0.00
Electricity, gas and water supply	0.00	0.00	0.00	0.00
Construction	0.00	0.00	0.00	-0.01
Wholesale and retail trade, repair of vehicles and household goods, hotels and restaurants	0.00	0.00	0.00	-0.03
Transport, storage and communications	0.00	0.00	0.00	0.00
Financial intermediation, real estate, renting and business activities	0.00	0.00	-0.05	-0.09
Community, social and personal services	0.01	0.00	0.00	-0.04
Total impact of cross effect	0.01	-0.04	-0.09	-0.24
Overall growth of labour productivity	1.98	3.68	3.70	3.90

Source: Author's calculation based on Asian Productivity Organization (APO), *the APO Productivity Database 2019 Version 1.*