Policy Research Working Paper 9463

From Farms to Factories and Firms

Structural Transformation and Labor Productivity Growth in Malaysia

Amanina Abdur Rahman
Achim Schmillen

WORLD BANK GROUP
Social Protection and Jobs Global Practice
November 2020

Policy Research Working Paper 9463

Abstract

This study aims to provide a quantitative and integrated analysis of long-term structural transformation and labor productivity growth in Malaysia. Using data from the Department of Statistics Malaysia from 1987 to 2018 and decompositions that take account of the static and dynamic efficiency gains from labor reallocation, it documents that Malaysia has undergone structural transformation from an agriculture-driven to a services-driven economy. However, in contrast to common perceptions, the country's impressive growth in output per capita over the past three decades can largely be attributed not to its structural transformation but instead to sustained growth in within-sector labor productivity. At 3 percent, the contribution of between-sector reallocation of labor to growth in output per capita in Malaysia has been relatively low. Accordingly, together with efforts to spur the more productive reallocation of labor across sectors and positively affect the employment rate, the main policy challenge for Malaysia going forward will be to achieve sustainable labor productivity growth within various sectors.

This paper is a product of the Social Protection and Jobs Global Practice. It is part of a larger effort by the World Bank to provide open access to its research and make a contribution to development policy discussions around the world. Policy Research Working Papers are also posted on the Web at http://www.worldbank.org/prwp. The authors may be contacted at aabdurrahman@worldbank.org and aschmillen@worldbank.org.

From Farms to Factories and Firms
–
Structural Transformation and Labor Productivity Growth in Malaysia

Amanina Abdur Rahman
World Bank
aabdurrahman@worldbank.org

Achim Schmillen
World Bank
aschmillen@worldbank.org

JEL-Classification O47, J24, O12

Keywords: Structural transformation, sources of growth, premature deindustrialization, growth decomposition

The authors thank Firas Raad and Philip O'Keefe for guidance and Pedro M. G. Martins, Dino Merotto and Norman V. Loayza for helpful comments and discussions. Alyssa Farha Jasmin provided outstanding research assistance. Findings, interpretations and conclusions expressed in the paper are entirely those of the authors and do not necessarily represent the views of the World Bank, its affiliated organizations, its Executive Directors or the governments these represent. The authors may be contacted at aschmillen@worldbank.org and aabdurrahman@worldbank.org.

From Farms to Factories and Firms
–
Structural Transformation and Labor Productivity Growth in Malaysia

1. Introduction

Since independence in 1957, Malaysia has undergone a profound development process that has radically improved nutrition, health care, and social service provision. During the last decades, Malaysia has also achieved an increasingly low mortality rate, a decline in fertility rates, and increases in life expectancy. As a result of generally favorable economic and demographic developments and in spite of more recent challenges like the COVID-19 crisis, Malaysia has also seen relatively high levels of economic growth. Among the 88 countries for which comparable data on GDP per capita in both 1960 and 2019 are available in the World Bank's World Development Indicators, Malaysia recorded the seventh highest growth rate in the intervening years (in local currency units). These relatively high levels of economic growth have propelled it to becoming the upper-middle income country at the cusp of high-income status that it is today (World Bank forthcoming).

During the last decades, Malaysia has also gone through a rapid and sustained structural transformation, defined by the reallocation of economic activity across sectors such as agriculture, manufacturing, and services. Within only two generations, the South-East Asian country moved from an agriculture-centric economy to one with an important manufacturing base and then one dominated by services firms. In 1957, agriculture accounted for 58 percent of employment (World Bank 2019a). Since then, its share of employment has declined to 10.6 percent in 2018, releasing labor first to the manufacturing sector and then increasingly to the services sector. Similarly, the share of agriculture in value-added was 32.6 percent in 1970 and has since declined to 7.4 percent in 2018. As Malaysia pursues further development toward becoming a high-income and developed nation but faces a slowdown in both structural change and productivity growth, questions have been raised whether the reallocation of production factors can be a driver of the country's future economic growth.[1]

Against this backdrop, this study analyzes the process of structural transformation in Malaysia between the years 1987 and 2018 (the time horizon for which granular comparable data are available). It describes the patterns of output, employment, and labor productivity in each of the three decades. In addition, it decomposes the growth of output per capita into contributions from within- and between-sector labor productivity growth, employment growth, and changes in the demographic structure at both the aggregate and the sectoral level and investigates the contributions of static and dynamic reallocation of labor to overall labor productivity growth. These decompositions provide insight into the medium-term drivers of Malaysia's economic growth, including the factors underlying the relative stagnation of growth in output per capita since the early 2000s.[2]

The study confirms that Malaysia has undergone a very rapid structural transformation from an agriculture-centric to a services-driven economy. This transformation has included both a period of rapid industrialization and a period of relative deindustrialization. From the mid-1980s through the early 2000s Malaysia's manufacturing sector grew at a fast pace, both in the terms of the share of employment and the share of output. Since then, while the manufacturing sector's output has continued to grow in absolute terms, its growth has been at a slower pace and its share of overall output has stagnated. Coupled with a declining share of the

[1] In this paper, structural change refers to labor reallocation to more productive sectors, while structural transformation refers to the overarching process of the reallocation of resources across the broad sectors of agriculture, manufacturing, and services over time.
[2] In addition to the factors analyzed here, international trade can also influence the reallocation of resources across sectors and be an important component of economic growth (Matsuyama 2009; Herrendorf et al. 2014). However, it is beyond the scope of this study. It is also beyond the scope of this study to investigate whether the apparent decline in productivity growth in Malaysia can be partly explained by the difficulties in measuring productivity rather than an actual decline in productivity, as discussed in the context of the United States by Byrne, Oliner and Sichel 2013; Brynjolfsson and McAfee 2014; Feldstein 2015; Mokyr 2015; and Syverson 2017.

manufacturing sector among Malaysia's overall exports and lower inflows of foreign direct investment (FDI) into the sector since the early 2000s, this has led some observers to characterize Malaysia as experiencing relative deindustrialization (Tan 2014).

In contrast to common perception, this study finds that Malaysia's impressive growth in output per capita over the last three decades can largely be attributed not to structural change but instead to sustained growth in within-sector labor productivity. This is true over the entire observation period from 1987 to 2018 and all relevant sub-periods. During the time of most rapid growth from 1987 to 1997, labor productivity grew by an annual average of 9.1 percent in business services, 8.4 percent in trade services, and 6.1 percent in manufacturing. In contrast, structural change contributed a relatively small share of overall growth in output per capita, with the most sizeable contribution during the period of rapid industrialization from the mid-1980s to the early 2000s when labor was reallocated from agriculture to the manufacturing sector. Similarly, the relative deindustrialization of Malaysia since the early 2000s has led to productivity-reducing structural change, that is, a negative contribution of structural change to growth in output per capita. But again, the main reason underlying the slowdown in aggregate economic growth has been a slowdown in within-sector labor productivity growth. Excluding the mining sector, annual average within-sector productivity growth was 4.8 percent from 1987 to 1997, 2.4 percent from 1997 to 2007, and 2.1 percent from 2007 to 2018.

Accordingly, the main policy challenge for Malaysia going forward will be to reverse, halt or at least moderate the decline in productivity growth within sectors. The country's incipient convergence to high-income status will make sustaining high rates of economic growth more and more challenging; World Bank (forthcoming) projects that by 2050 annual GDP growth will have fallen to 2.4 percent. Nevertheless, there are promising policy areas to at least moderate the decline in economic growth. These include overcoming skills gaps, maintaining the high quality of infrastructure, building innovation capacity, addressing distortions in output markets, improving management quality, and fostering the reallocation of production factors within sectors (World Bank 2016; Chuah et al. 2018; World Bank 2020). Though gains from sources of growth other than within-sector productivity are likely to be more limited, productivity-enhancing policies should nevertheless be combined with efforts to spur the more productive reallocation of labor across sectors. Finally, it will also be important to positively affect the employment rate by further increasing labor force participation especially among women, and better using the productive potential of older persons in the face of a rapidly accelerating aging process.

In terms of methodology, this study follows Martins (2018) and uses the Shapley decomposition method to decompose growth in output per capita into within-sector labor productivity growth, between-sector labor productivity growth, employment growth, and changes in the demographic structure. This study also utilizes the canonical decomposition method in World Bank (2019) that decomposes between-sector labor productivity growth into changes that can be attributed to the static and dynamic reallocation of labor. Regarding data, the study utilizes detailed output, employment, and population data collected and published by the Department of Statistics Malaysia (DOSM). Both output and employment data are compiled at the one-digit sectoral level. All sectoral data have been standardized to match Malaysia's national accounts sector classification.

Based on this approach, the study provides one of the first quantitative and integrated analyses of structural transformation and labor productivity growth in Malaysia. In the process, it highlights detailed patterns of output and employment growth as Malaysia has shifted from being an agriculture-, to a manufacturing-, and subsequently service-based economy, as well as the underlying sources of these shifts. The resulting findings provide insights that are of relevance for how Malaysia can restart its productivity growth engine. In addition, they hold important lessons both for low-income countries that aim to emulate Malaysia's successful structural transformation from an agricultural economy to one with a strong manufacturing sector and for middle-income countries that, like Malaysia, struggle to maintain high rates of labor productivity growth.

The analysis contributes to the international literature on structural transformation as one of the main potential sources of economic growth (Kuznets 1957; Chenery 1960; Chenery and Taylor 1968). The notion of structural transformation is rooted in dual-economy models (Lewis 1954; Ranis and Fei 1961) which distinguish between a traditional sector (agriculture) and a modern sector (manufacturing and services). In these models, economic growth depends largely on the rate at which production factors such as capital but in particular also labor can be reallocated from the traditional to the modern sector (McMillan, Rodrik and Sepúlveda 2017). In other words, dual-economy models highlight that there are productivity gaps between sectors, and that the reallocation of production factors can be an importance source of economic growth (Lewis 1954).

Kuznets (1973) describes structural transformation as one of the six characteristic features of the process of economic growth, where in a first phase of structural transformation production factors are reallocated from the agricultural sector to the manufacturing and services sectors. In a second phase, resources are then reallocated from the manufacturing to the services sector. While this stylized process may have been observed in the early industrialization process of today's developed nations, today's developing countries have not necessarily all followed the same trajectory (Kucera and Roncolato 2016). For example, Bah (2011) analyzes the relationship between GDP per capita and the output shares of the services sector and finds that developing countries in Africa, Asia, and Latin America follow heterogenous paths of structural transformation, even within each region.

Differences in the process of structural transformation between early industrializing developed nations and developing countries are also reflected in the notion of premature deindustrialization. Premature deindustrialization, or the decline of output and employment shares of manufacturing at lower levels of GDP per capita than seen in early industrializers, has been posed as a cause for concern, both in Malaysia (Rasiah 2011b; Tan 2014) and worldwide (Rodrik 2016), due to the apparent importance of the manufacturing sector in the economic development of early industrializers. One of the main bases for this premise is Kaldor's (1966) stylized fact that manufacturing is the engine of growth, based on the growth trajectory of early industrializing developed nations. More specifically, Kaldor documented positive correlations between the growth of manufacturing output and average GDP growth, the growth of manufacturing output and productivity, and the growth of manufacturing output and of the overall productivity of the economy.

The positive correlations documented by Kaldor are reinforced by more recent evidence that manufacturing sector growth presents an opportunity for productivity-enhancing structural change as this sector can potentially absorb a large amount of unskilled labor from the typically less productive agriculture sector (Nayyar, Cruz and Zhu 2018). Rodrik (2011) finds that labor productivity in the manufacturing sector shows a tendency toward unconditional and almost automatic convergence; the further away a manufacturing sub-sector is from the labor productivity frontier, the more rapid the growth in its productivity, regardless of the policies or institutions in a country. Subsequently, he suggests that the key to economic growth is for resources to flow into these "convergence industries", while recognizing the challenges in supporting specific sub-sectors and directing structural change toward them.

Indeed, as the discussion of premature deindustrialization suggests, it has apparently become more difficult for economies to follow a manufacturing-led growth strategy. This difficulty has been attributed to two factors (Felipe, Mehta and Rhee 2019). *First*, the internationalization of supply chains and strong unconditional convergence in the labor productivity in different countries' manufacturing sectors have increased competition from lower-income economies to perform manufacturing activities, making it more difficult to sustain manufacturing activity in higher wage economies. *Second*, technological change and the efficiencies that are derived from globalized mass production might have become labor displacing. Both factors might be interrelated as increased international competition may create incentives to adopt labor-displacing technologies, particularly in emerging economies with comparatively high wage levels.

If developing countries can no longer rely on structural transformation toward the manufacturing sector as the engine of growth, what are alternative options? Some recent studies argue that in contrast to the earlier literature's stance, the services sector does present significant opportunities for productivity and economic growth (Maroto-Sánchez and Cuadrado-Roura 2009; Lee and McKibbin 2014; di Meglio et al. 2015). Similarly, Nayyar, Cruz and Zhu (2018) suggest that the productivity-enhancing role of the manufacturing sector that led to the development of early industrializers is not unique to the sector. More specifically, the authors find that crucial features of manufacturing growth that make it an important source of productivity growth – that is, the production of tradable goods, the scope for "learning-by-doing" through global integration, and the facilitation of technology diffusion – are also shared by the services sector. However, the authors argue that any given service subsector is unlikely to provide simultaneous opportunities for both productivity growth and job creation for unskilled labor. In addition, they posit that the development of some services subsectors requires a robust manufacturing base, as intermediate demand for many services is derived from manufacturing. These findings, as well as those by other studies on productivity growth in services, suggest that the services sector can be a particularly strong driver of productivity growth if linkages to the manufacturing sector are maintained and strengthened.

In addition to the large international literature on structural transformation, there has been a smaller but significant literature more specifically on Malaysia. This literature has largely focused on the country's rapid industrialization and subsequent relative deindustrialization process (Jomo and Edwards 1993; Jomo 1994; Rasiah 2011a), as well as on concerns of premature (Tan 2014) or even negative (Rasiah 2011b) deindustrialization. A related literature has documented that Malaysia's productivity growth engine has stalled after the year 2000 and argued that restarting it will be key for Malaysia's economic development toward a high-income economy (Khazanah Research Institute 2017; World Bank 2018c).

This rest of this paper is organized as follows. Section 2 presents the study's research methodology and data. Section 3 illustrates the patterns of growth in output, employment, and output per capita across sectors in Malaysia from 1987 to 2018. The results of the decomposition of output per capita into contributions from within- and between-sector labor productivity growth, employment growth, and changes in the demographic structure are presented in Section 4. Section 5 discusses implications for policy and research and concludes.

2. Methodology and Data

2.1. Shapley and Canonical Decomposition

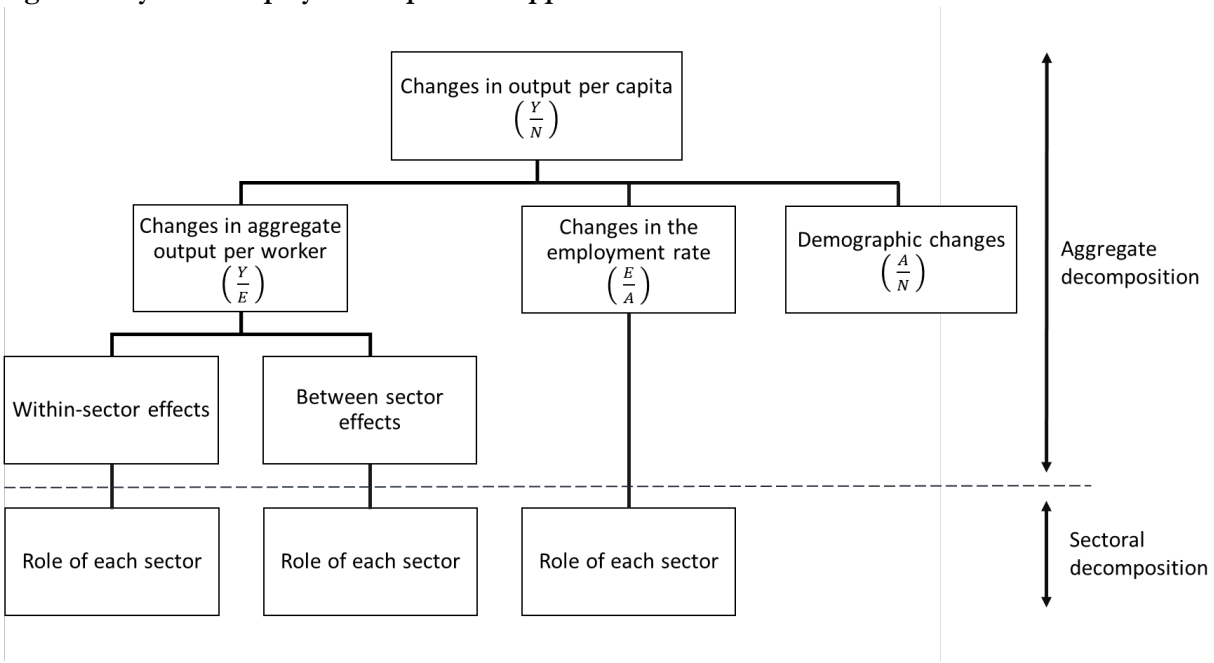
This study follows World Bank (2012) and Martins (2018) and first and foremost utilizes the Shapley decomposition method (Shorrocks 2013) to decompose growth in output per capita into within-sector labor productivity growth, between-sector labor productivity growth, employment growth, and changes in the demographic structure.[3] The Shapley decomposition is a simple additive method that links changes in a variable like output per capita to changes in a particular component of this variable, taking into account both the relative size of the component and the magnitude of the change.

As visualized in Figure 1, in practical terms growth in output per capita is decomposed in several consecutive steps. *First*, growth in output per capita is decomposed into changes in the aggregate output per worker, changes in the aggregate employment rate and changes in the share of the working age population among the entire population. *Second*, changes in the aggregate employment rate are further decomposed into changes in the employment rate by sector. *Third*, changes in the aggregate output per worker are decomposed into changes linked to variations in output per worker within sectors (within-sector productivity growth) and changes linked

[3] For reasons of data availability, this study uses output (or value-added) instead of GDP. In contrast to GDP, output does not include taxes and subsidies; differences between GDP and output are usually very small. The sum of sectoral outputs from DOSM is used to compute aggregate output.

to the sectoral reallocation of workers (between-sector productivity growth). Within-sector labor productivity growth can be positively affected by factors such as a higher level of skills, complementary capital, technological advancement, better management practices, and resource reallocations across firms within the same sector. Between-sector labor productivity can be improved through labor reallocation to more productive sectors in the process of "structural change."

Figure 1: Stylized Shapley decomposition approach



Source: Authors based on World Bank (2012) and Martins (2018)

Formally, output per capita can be decomposed as follows:

$$\frac{Y}{N} = \frac{Y}{E} \cdot \frac{E}{A} \cdot \frac{A}{N}$$

or

$$y = w \cdot e \cdot a$$

where Y is aggregate output, N is aggregate population, E is aggregate employment, and A is the working-age population. Alternatively, y is output per capita, w is output per worker, e is employment as a share of the working age population and a is the share of the working age population among the total population.

Accordingly, growth in output per capita can first be decomposed into growth associated with changes in output per worker, growth associated with changes in employment rates, and growth associated with changes in the working age population as a share of the total population. Shapley decompositions have the advantage of being additive; the total change in output per capita will be the sum of the growth attributed to each of its components, w, e, and a. Denoting $\bar{w}$, $\bar{e}$, and $\bar{a}$ as the fraction of growth linked to each component, the output per capita growth rate of an economy can be expressed as:

$$\frac{\Delta y}{y} = \bar{w}\frac{\Delta y}{y} + \bar{e}\frac{\Delta y}{y} + \bar{a}\frac{\Delta y}{y}$$

Next, output per worker can be decomposed into within-sector and between-sector effects. The starting point is

$$w = \sum_{i=1}^{n} w_i s_i$$

where w_i denotes output per worker in sector i, s_i represents the share of employment in sector i among aggregate employment, and n represents the total number of sectors. Thus, the change in output per worker can be decomposed into within-sector and between-sector effects as follows:

$$\Delta w = \sum_{i=1}^{n} \Delta w_i \left(\frac{s_{i,t=0} + s_{i,t=1}}{2} \right) + \sum_{i=1}^{n} \Delta s_i \left(\frac{w_{i,t=0} + w_{i,t=1}}{2} \right)$$

Finally, the aggregate change in employment as a share of the working age population can be expressed as the sum of sectoral employment changes:

$$\Delta e = \sum_{i=1}^{n} \Delta e_i$$

In addition to the Shapley decomposition approach, this study also relies on an alternative decomposition method of labor productivity growth – referred to as the canonical method in World Bank (2019) – that decomposes between-sector effects into changes that can be attributed to "static reallocation" and "dynamic reallocation" (see de Vries, Timmer and de Vries 2015). A positive static reallocation effect means that workers move to sectors with higher productivity growth, while a positive dynamic reallocation effect means that workers move to sectors which continue to have positive productivity growth in spite of this movement. Conversely, if the movement of workers from lower to higher productivity sectors brings down the average productivity in the receiving sector, the dynamic reallocation effect will be negative. The changes in labor productivity as per the canonical decomposition equation are decomposed as follows:

$$\Delta w = \underbrace{\sum_{i=1}^{n} \left(w_{t1}^{i} - w_{t0}^{i}\right) * \theta_{to}^{i}}_{\text{(Within-sector effects)}} + \underbrace{\sum_{i=1}^{n} \left(\theta_{t1}^{i} - \theta_{to}^{i}\right) * w_{t0}^{i}}_{\text{(Static reallocation)}} + \underbrace{\sum_{i=1}^{n} \left(w_{t1}^{i} - w_{t0}^{i}\right) * \left(\theta_{t1}^{i} - \theta_{t0}^{i}\right)}_{\text{(Dynamic reallocation)}}$$

where w_{t0}^{i} denotes the output per worker in sector i in year $t0$, w_{t1}^{i} the output per worker in sector i in year $t1$, θ_{to}^{i} the employment share of sector i in year $t0$, and θ_{t1}^{i} the employment share of sector i in year $t1$.[4] In addition to this aggregate decomposition, the canonical method again also allows a more detailed sectoral decomposition.

2.2. Data from the Department of Statistics Malaysia

This study utilizes output, employment, and population data from DOSM to analyze patterns of economic growth and decompose growth in output per capita. While population data is only measured in the aggregate, both output and employment are measured at the sectoral level. Sectoral output data for the period from 1987 to 2018 is published by DOSM in the form of a consistent time series, as detailed in Table 1. This time series'

[4] The canonical method is implemented using the World Bank JobsStructure Tool, which allows the input of data from 1990 onwards (see World Bank 2019).

classification of sectors follows Malaysia's national accounts; all output figures have been adjusted to reflect 2015 prices.

As compared to output, the consistent classification of sectoral employment data requires slightly more effort. The relevant classification has undergone several revisions during the observation period. Employment data from 1987 to 2000 published by DOSM are based on the (updated) Malaysia Standard Industrial Classification (MSIC) 1972, data from 2001 to 2009 are based on MSIC 2000, and data from 2010 to 2018 are based on MSIC 2008. In general, MSIC very closely follows the United Nation's International Standard Industrial Classification of All Economic Activities (ISIC) and its various revisions. For the purposes of this study, all relevant data are standardized to match the national accounts sectoral classification, as shown in Table 2. This standardization is straightforward and uncontroversial on the one-digit sectoral level but more complicated for a more granular disaggregation of the employment data. Therefore, this study focuses on the one-digit level and distinguishes between eight sectors: agriculture; mining; manufacturing; construction; trade; transport; business; and other (which includes utilities, government services and other services).

Table 1: Description of sectors based on Malaysia's national accounts

Sector	Full description of sector in national accounts
Agriculture	Agriculture, livestock, forestry and fishing
Mining	Mining and quarrying
Manufacturing	Manufacturing
Construction	Construction
Trade	Wholesale and retail trade, accommodation, food and beverage
Transport	Transport, storage, information and communication
Business	Finance, insurance, real estate and business services
Other	Utilities; government services; other services

Table 2: Categorization of sectors based on MSIC (Updated) 1972, MSIC 2000 and MSIC 2008

Sector	MSIC (Updated) 1972 (1987-2000)	MSIC 2000 (2001-2009)	MSIC 2008 (2010-2018)
Agriculture	Agriculture, forestry, livestock and fishing	Agriculture, hunting and forestry; fishing	Agriculture, forestry and fishing
Mining	Mining and quarrying	Mining and quarrying	Mining and quarrying
Manufacturing	Manufacturing	Manufacturing	Manufacturing
Construction	Construction	Construction	Construction
Trade	Wholesale and retail trade, restaurants and hotels	Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods; hotels and restaurants	Wholesale and retail trade; repair of motor vehicles and motorcycles; accommodation and food service activities
Transport	Transport, storage and communications	Transport, storage and communications	Transportation and storage; Information and communication
Business	Finance, insurance, real estate and business services	Financial intermediation; Real estate, renting and business activities	Financial and insurance/takaful activities; Real estate activities; Professional, scientific and technical activities
Other	Electricity, gas and water; community, social and personal services	Various other including electricity, gas and water supply; compulsory social security; other community, social and personal service activities	Various other including Electricity, gas, steam and air conditioning supply; compulsory social security; other service activities

Unless otherwise specified, the mining sector is excluded from the subsequent analysis of patterns and sources of economic growth. More specifically, it is excluded from all calculations of labor productivity in Section 3.3 and the decomposition of aggregate and sectoral economic growth in Section 4. This is because Malaysia's mining sector is primarily composed of the oil and gas sector. Thus, it is a very capital-intensive sector with levels of output per worker that far exceed those of other sectors. In 2018, output per worker for the mining sector was almost six times of that for the whole economy. Moreover, output the of the mining sector is highly cyclical as it reacts to global fluctuations in commodity prices. As inputs into the sector are much less cyclical, its labor productivity appears to fluctuate widely – but this largely reflects the global fluctuations in commodity prices, rather than meaningful changes in production processes.

3. Patterns of Economic Growth

3.1. Output Growth

As discussed above, Shapley decompositions can be used to decompose growth in output per capita into growth associated with changes in employment rates, growth associated with changes in the working age population as a share of the total population, and growth associated with changes in output per worker. Before embarking on this formal decomposition exercise, this section describes patterns associated with the variables underlying the decomposition: output, overall and working age population, employment, and output per worker. The section starts with an analysis how output per capita has grown over time and varied across sectors.

In the three decades between 1987 and 2018, Malaysia's output increased by 443.5 percent or by more than five times, from RM 247,552 million to RM 1,345,531 million (see Table 3). Output growth was highest in the business services, trade services, and transport services sectors, with output in all three sectors growing more than ten-fold. The manufacturing sector also grew very strongly, with output expanding more than eight times in the same period. Aside from the highly cyclical mining sector, the agriculture sector experienced the lowest growth in the period, with agricultural output increasing by "only" 79 percent.

Table 3: Output and share of output by sector, 1987-2018

	Output (constant 2015 million MYR)				Share of output by sector (%)			
	1987	**1997**	**2007**	**2018**	**1987**	**1997**	**2007**	**2018**
Agriculture	55,577.35	61,844.18	80,504.44	99,470.00	22.5	11.4	9.9	7.4
Mining	62,204.54	86,940.49	106,519.60	103,135.00	25.1	16.0	13.1	7.7
Manufacturing	34,708.84	127,068.34	201,910.72	304,847.00	14.0	23.4	24.8	22.7
Construction	9,664.19	32,655.21	27,104.38	66,218.00	3.9	6.0	3.3	4.9
Trade	23,399.82	79,119.31	130,862.42	272,258.00	9.5	14.6	16.1	20.2
Transport	12,755.54	35,755.24	62,113.34	129,312.00	5.2	6.6	7.6	9.6
Business	11,846.30	45,653.54	83,219.30	152,796.00	4.8	8.4	10.2	11.4
Other	37,395.41	72,969.55	120,809.51	217,495.00	15.1	13.5	14.9	16.2
Aggregate	*247,551.99*	*542,005.85*	*813,043.69*	*1,345,531.00*	*100.0*	*100.0*	*100.0*	*100.0*

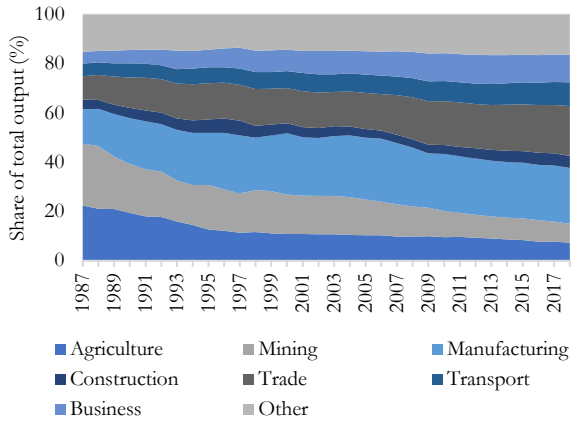
Source: Authors' calculations based on data from DOSM

It is evident from Table 3 as well as Figure 2 that in the three decades from 1978 to 2018 the structure of Malaysia's economy changed dramatically. During this time period, the country was transformed from an economy still largely based on agriculture to a services-driven economy. From 1987 to 2018, the share of agriculture in aggregate output fell from 22.5 percent to 7.4 percent. In the same period, the share of manufacturing increased from 14 percent to 22.7 percent while share of trade services more than doubled, from

9.5 percent to 20.2 percent. Overall, the entire services sector encompassing trade services, transport services, business services, and other services grew from 34.5 percent to 57.4 percent of aggregate output.

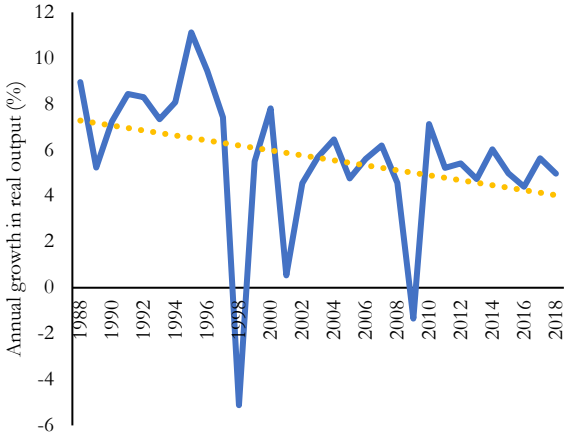
If one divides the period of 1987 to 2018 into three subperiods of about ten years each, one can show that real output growth was highest in the period between 1987 and 1997, with annual growth averaging around 8.2 percent (see Table 4). In the period from 1997 to 2007 and from 2007 to 2018, average annual growth in real output fell to 4.2 percent and 4.7 percent, respectively. Within these two periods, there were three disruptions in the Malaysian economy, caused by the Asian Financial Crisis in 1997 to 1998, the burst of the United States technology bubble in 2001 to 2002, and the Global Financial Crisis in 2007 to 2008. Figure 3 shows that these disruptions had significant but temporary impacts on growth in aggregate output. When the periods of crises are excluded, the average annual growth in real output for the three periods between 1987 and 1997, 1997 and 2007, and 2007 and 2018 were 8.2 percent, 6.2 percent, and 5.2 percent, respectively. These growth rates are higher than those that include the periods of crises. Nevertheless, the growth rates of the period between 1986 and 1997 were not again achieved thereafter.

Figure 2: Sectoral share of total output, 1987-2018



Source: Authors' calculations based on data from DOSM

Figure 3: Annual growth in real total output (%), 1987-2018



Source: Authors' calculations based on data from DOSM

Table 4: Average annual growth in output by sector, 1987-2018

	Average annual growth in output (%)				Average annual growth in output (excluding crisis years)♠ (%)			
	1987-1997	**1997-2007**	**2007-2018**	***1987-2018***	**1987-1997**	**1997-2007**	**2007-2018**	***1987-2018***
Agriculture	1.1	2.7	2.0	*1.9*	1.2	4.1	1.9	*2.1*
Mining	3.8	2.1	-0.2	*1.8*	4.0	1.0	0.8	*2.1*
Manufacturing	13.9	5.1	3.9	*7.5*	14.3	8.7	4.9	*9.6*
Construction	13.1	-1.5	8.5	*6.8*	13.3	1.3	9.0	*9.0*
Trade	13.0	5.3	6.9	*8.3*	13.6	8.9	6.9	*10.1*
Transport	10.9	5.7	6.9	*7.8*	10.8	7.8	7.4	*8.9*
Business	14.6	6.2	5.7	*8.8*	14.2	7.9	5.2	*9.5*
Other	6.9	5.2	5.5	*5.9*	7.1	5.8	5.7	*6.3*
Aggregate	*8.2*	*4.2*	*4.7*	*5.7*	*8.2*	*6.2*	*5.2*	*6.7*

Source: Authors' calculations based on data from DOSM

Note: ♠The crisis years excluded are 1997-1999, 2001-2003, and 2008-2010.

3.2. Demographic Change and Employment Growth

Both changes in the aggregate employment rate and changes in the share of the working age population among the entire population are fundamental components of output per capita. To contribute to an understanding how these components have impacted economic growth in Malaysia from 1987 to 2018, this subsection presents an overview of how basic demographic and employment conditions have changed from decade to decade. In addition, the section paints a detailed picture of employment levels and growth both in the aggregate and across sectors as key building blocks to structural transformation and economic growth.

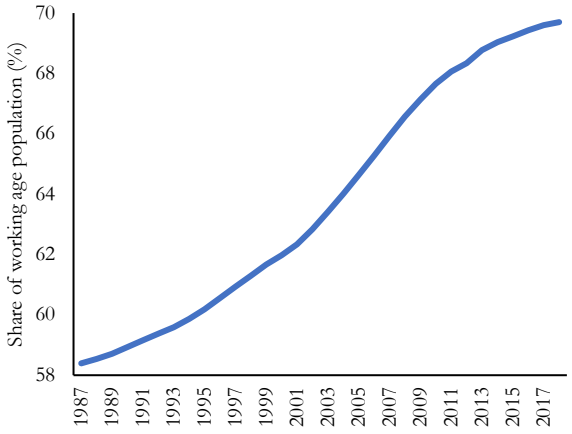
Between 1978 and 2018, Malaysia's overall population almost doubled, increasing by about 93.1 percent (see Table 5). In parallel, due to a "demographic dividend" (Bloom et al. 2003) brought about by falling birth rates and the late onset of an aging process, the share of the country's working age population – defined as those between the ages of 15 and 64 – among the overall population increased by almost 12 percentage points, from 58.4 percent in 1987 to 69.7 percent in 2018 (see Figure 4). It should be noted that the annual growth rate in the working age population decreased over time, from about 3 percent in 1987 to 1.3 percent in 2018 (see Figure 5). In fact, with much of the demographic dividend exhausted and aging gaining pace, the share of the working age population among the overall population is projected to soon start to decline.

Table 5: Demographics and employment

	1987	1997	2007	2018
Total population ('000)	16,774	21,769	27,058	32,382
Working age population (15-64 years) ('000)	9,795	13,267	17,839	22,570
Share of working age population (%)	58.4	60.9	65.9	69.7
Employment as a share of working age population (%)	61.1	64.6	59.1	65.5

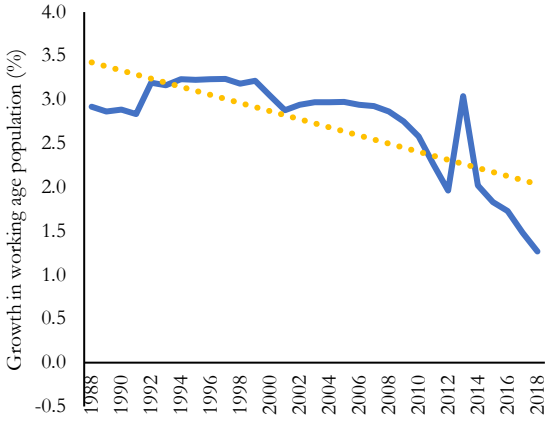
Source: Authors' calculations based on data from DOSM

Figure 4: Share of working age population among overall population, 1987-2018



Source: Authors' calculations based on data from DOSM

Figure 5: Annual growth in working age population (%), 1987-2018



Source: Authors' calculations based on data from DOSM

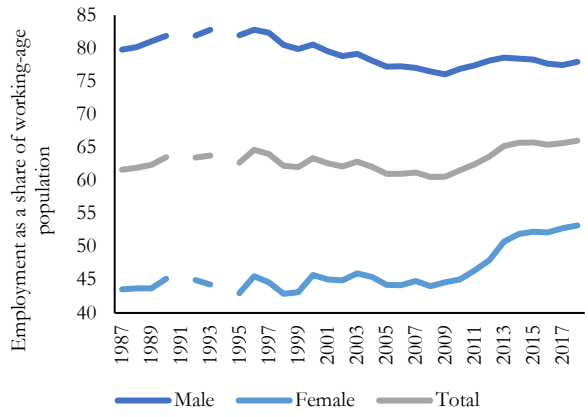
The share of the working age population that is in employment – subsequently referred to as the employment rate – also increased between 1987 and 2018.[5] However, this overall trend hides a more complicated pattern with an increase in the employment rate between 1987 and 1996, a subsequent period of decline between 1996

[5] The standard definition of the employment rate refers to employment as a share of the labor force, where the labor force includes those who are employed and unemployed within the working age population, and excludes those who are not actively looking for jobs.

and 2008, and a certain rebound thereafter. The decline between 1996 and 2008 can be attributed to a fall in the employment rate among men, which fell from 82.4 percent to 77 percent between 1997 and 2007 (see Figure 6). This decline was gradual, and did not exceed two percentage points from one year to the next. After 2007, the employment rate among men again increased slightly, reaching a level of 77.9 percent in 2018. The employment rate among women shows a very different pattern. Between, 1987 and 1997, it remained more or less constant, averaging 44.6 percent. More recently, it has increased significantly, reaching 53.2 percent in 2018.

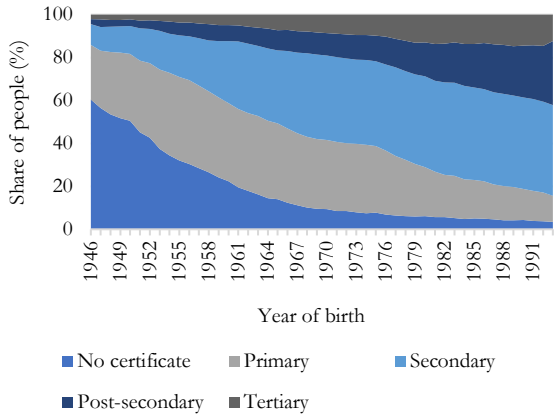
One plausible reason for the temporary decline in the employment rate among men between 1996 and 2008 is educational upgrading. Figure 7 shows that Malaysians have acquired increasingly higher levels of educational attainment, which requires more years of schooling and therefore reduces the employment rate. While both men and women underwent educational upgrading between 1987 and 2018, women face other more binding constraints in entering the labor market and obtaining employment, some of which have been addressed over the last ten years through the increased availability of childcare and other policy initiatives (World Bank 2019b).

Figure 6: Employment as a share of working-age population



Source: Authors' calculations based on data from DOSM
Note: Employment data for 1991 and 1994 are not available.

Figure 7: Educational attainment of workers by cohort



Source: Authors' calculations based on data from DOSM

Table 6: Employment and share of employment by sector, 1987-2018

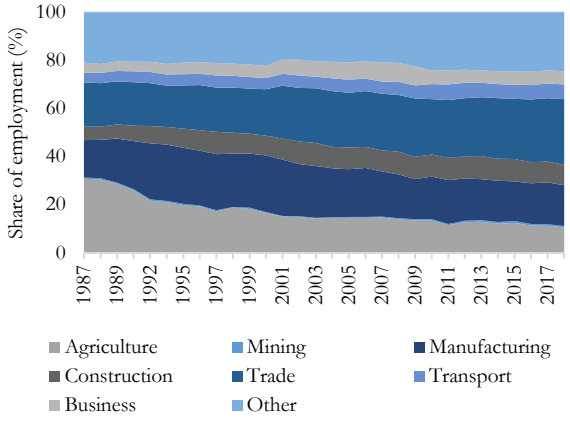
	Employment by sector ('000)				Share of employment (%)			
	1987	**1997**	**2007**	**2018**	**1987**	**1997**	**2007**	**2018**
Agriculture	1,846.40	1,481.30	1,558.20	1,570.30	30.9	17.3	14.8	10.6
Mining	33.00	38.50	39.40	90.80	0.6	0.4	0.4	0.6
Manufacturing	928.90	2,002.50	1,977.30	2,499.90	15.5	23.4	18.8	16.9
Construction	336.30	793.00	922.50	1,257.80	5.6	9.3	8.8	8.5
Trade	1,091.70	1,577.90	2,472.80	4,018.00	18.2	18.4	23.5	27.2
Transport	252.00	423.30	538.20	914.30	4.2	4.9	5.1	6.2
Business	241.60	447.20	840.30	803.50	4.0	5.2	8.0	5.4
Other	1,253.90	1,805.40	2,187.70	3,619.40	21.0	21.1	20.8	24.5
Aggregate	*5,983.80*	*8,569.10*	*10,536.40*	*14,774.00*	*100.0*	*100.0*	*100.0*	*100.0*

Source: Authors' calculations based on data from DOSM

Similar to the developments with regard to output, between 1987 and 2018 the share of employment in agriculture declined while the share of employment in the manufacturing and services sectors increased (see

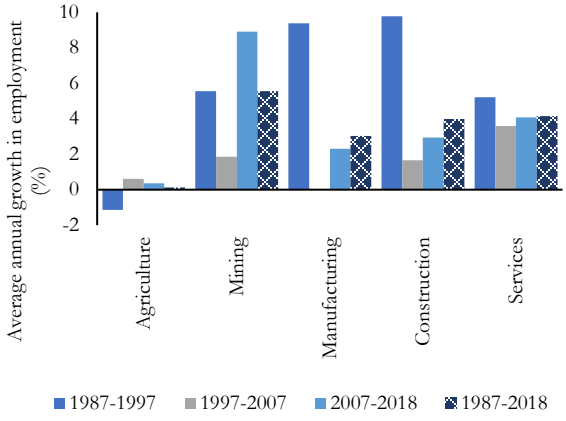
Table 6 and Figure 8). In 1987, 30.9 percent of aggregate employment was in agriculture. In the same year, 21 percent and 18.2 percent of employment was in other services and trade services, respectively. The services sector as a whole accounted for 47.4 percent of employment. By 2018, the structure of employment in Malaysia had changed dramatically. The share of employment in agriculture had fallen by more than 20 percentage points, to 10.6 percent. In contrast, at 63.3 percent the services sector accounted for a much larger share of aggregate employment. The largest relative gain in employment happened in trade services and other services. In addition to services, the share of employment in the manufacturing sector among aggregate employment also increased, though a comparison between its share in 1987 with that in 2018 hides a more complicated picture. In fact, the share grew from 15.5 percent in 1987 to 23.4 percent in 1997, equivalent to an average annual growth rate in manufacturing employment of 9.4 percent. However, employment growth in the manufacturing sector slowed down after 1997, and the share of employment in manufacturing declined to 18.8 percent in 2007 and 16.9 percent in 2018 – only 1.4 percentage points higher than where it had stood in 1987.

Figure 8: Sectoral share of employment, 1987-2018



Source: Authors' calculations based on data from DOSM

Figure 9: Average annual growth in share of employment (%), 1987-2018



Source: Authors' calculations based on data from DOSM

Table 7: Average annual growth in employment by sector, 1987-2018

	Average annual growth in employment (%)				Average annual growth in employment (excluding crisis years) * (%)			
	1987-1997	**1997-2007**	**2007-2018**	***1987-2018***	**1987-1997**	**1997-2007**	**2007-2018**	***1987-2018***
Agriculture	-1.1	0.6	0.4	*0.1*	1.1	1.2	0.4	*0.7*
Mining	5.5	1.9	8.9	*5.6*	0.8	1.0	5.2	*3.3*
Manufacturing	9.4	0.0	2.3	*3.0*	9.6	0.4	1.4	*4.1*
Construction	9.8	1.7	2.9	*4.0*	6.5	0.6	1.9	*3.1*
Trade	4.5	4.7	4.5	*4.6*	5.3	3.6	4.8	*4.7*
Transport	6.9	2.5	5.1	*4.6*	6.6	3.0	2.5	*4.1*
Business	6.6	6.8	0.0	*3.9*	5.6	6.5	3.4	*4.5*
Other	5.2	2.1	4.8	*3.9*	5.2	3.2	3.2	*3.7*
Aggregate	*4.7*	*2.1*	*3.1*	*3.1*	*5.0*	*2.3*	*2.7*	*3.3*

Source: Authors' calculations based on data from DOSM

Note: *The excluded years are 1997-1999, 2001-2003, and 2008-2010

Among the different periods from 1987 to 2018 considered by this study, the average annual growth in employment was the highest in the period between 1987 and 1997, both in the aggregate and for all sectors –

except for the agriculture and the mining sector (see Table 7 and Figure 9). In this period, employment growth was highest for the construction and the manufacturing sectors, with average annual growth rates of 9.8 percent and 9.4 percent, respectively. After 1997, employment growth was relatively modest. In the period between 1997 and 2007, aggregate employment growth was 2.1 percent and the services sector experienced the highest employment growth, averaging 3.6 percent per year. This contrasted with the manufacturing sector, which experienced stagnating employment. In the following period between 2007 and 2018, the services sector continued to experience a relatively high rate of employment growth, averaging 4.1 percent per year. In contrast, employment in the manufacturing sector grew at a relatively more modest rate, with an average growth rate of 2.3 percent per year. Overall employment growth amounted to 3.1 percent per year

3.3. Labor Productivity Growth

In addition to growth associated with changes in employment rates and changes in the working age population as a share of the total population, growth associated with changes in output per worker is a third fundamental component of growth in output per capita. Thus, this subsection focuses on how output per workers has evolved in Malaysia both in the aggregate and across sectors. Besides, the section looks at the relationship between structural change and labor productivity growth. For this purpose, it assesses whether there has been a positive correlation between sectors' initial productivity and subsequent changes in their employment shares.

Between 1987 and 2018, Malaysia's aggregate output per worker – that is, labor productivity – more than doubled in real terms, from RM 41,370 to RM 91,074 (see Table 8). At an average annual rate of 4.8 percent (excluding the mining sector), the overall growth rate in output per worker was highest in the period from 1987 to 1997 (see Table 9). After 1997, output per worker continued to grow, but at a much slower pace. The growth rate in output per worker was 2.4 percent for the period from 1997to 2007, and then declined further to 2.1 percent for the period from 2007 to 2018. For the entire period from 1987 to 2018, the average annual growth rate in output per worker was 2.8 percent. When the years of economic crisis caused by the Asian Financial Crisis, the burst of the United States technology bubble, and the Global Financial Crisis are excluded, the average annual growth rate in output per worker for the period from 1987 to 2018 was significantly higher, at 3.8 percent. However, even if the crises years are excluded the trend decline in the labor productivity growth rate is still apparent.

Table 8: Output per worker, 1987-2018

	Output per worker (constant 2015 MYR)			
	1987	**1997**	**2007**	**2018**
Agriculture	30,100.38	41,749.93	51,665.02	63,344.58
Mining	1,884,986.04	2,258,194.59	2,703,543.11	1,135,848.02
Manufacturing	37,365.53	63,454.85	102,114.36	121,943.68
Construction	28,736.80	41,179.33	29,381.44	52,645.89
Trade	21,434.30	50,142.16	52,920.75	67,759.58
Transport	50,617.23	84,467.84	115,409.41	141,432.79
Business	49,032.70	102,087.52	99,035.22	190,163.04
Other	29,823.28	40,417.39	55,222.15	60,091.45
Aggregate	*41,370.36*	*63,251.20*	*77,165.23*	*91,074.25*
Aggregate excluding mining	*31,146.60*	*53,345.30*	*67,307.20*	*84,613.40*

Source: Authors' calculations based on data from DOSM

Figures 10 and 11 show that there are large labor productivity gaps between sectors in Malaysia. In 2018, the productivity gap between the most productive sector (business services) and the least productive sector

(construction) was more than three-fold. In the same year, the manufacturing sector was 80 percent more productive than the trade services sector, and the business services sector was 55.9 percent more productive than the manufacturing sector. Excluding the mining sector, the sectors with the consistently highest labor productivity are the business services, transport services, and manufacturing sectors. Figure 11 shows that these are also the only three sectors with labor productivity higher than that of the overall economy. Due to the large productivity gaps between sectors, at least in principle structural change toward more productive sectors can greatly improve the aggregate productivity of the Malaysian economy – but only if structural change indeed strengthens the relative importance of more productive sectors.

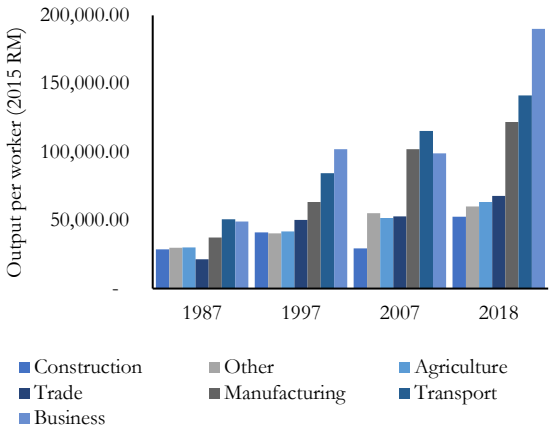
Table 9: Average annual growth in output per worker, 1987-2018

	Average annual growth in output per worker (%)				Average annual growth in output per worker (excluding crisis years) (%)			
	1987-1997	1997-2007	2007-2018	*1987-2018*	1987-1997	1997-2007	2007-2018	*1987-2018*
Agriculture	2.9	2.3	2.2	*2.4*	1.4	3.0	2.6	*2.4*
Mining	-4.8	3.3	-6.6	*-2.5*	-4.3	3.0	-4.2	*-2.2*
Manufacturing	6.1	5.1	1.7	*3.9*	6.3	8.4	2.8	*5.3*
Construction	1.5	-3.1	5.6	*1.5*	1.8	0.7	7.0	*3.8*
Trade	8.4	0.7	2.3	*3.1*	8.6	5.3	1.9	*4.7*
Transport	3.5	3.3	2.1	*2.8*	3.0	4.8	4.6	*4.2*
Business	9.1	-0.1	6.7	*4.7*	8.9	1.5	2.8	*4.1*
Other	1.2	3.3	0.9	*1.8*	1.2	2.6	2.7	*2.3*
Aggregate	*2.9*	*2.0*	*1.5*	*2.0*	*2.4*	*3.8*	*2.4*	*2.8*
Aggregate excluding mining	*4.8*	*2.4*	*2.1*	*2.8*	*4.5*	*4.7*	*2.8*	*3.8*

Source: Authors' calculations based on data from DOSM

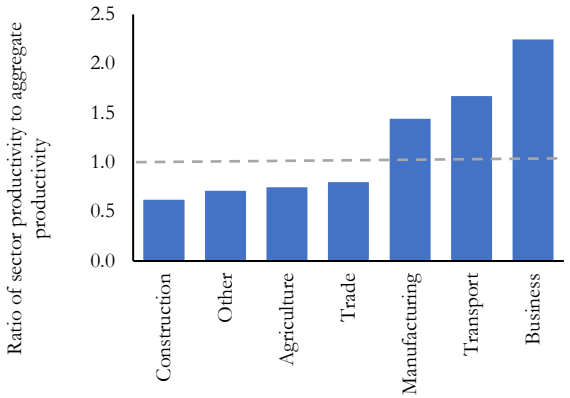
Note: The excluded years are 1997-1999, 2001-2003, and 2008-2010.

Figure 10: Output per worker by sector, 1987-2018



Source: Authors' calculations based on data from DOSM

Figure 11: Ratio of sectoral productivity to aggregate productivity, 2018



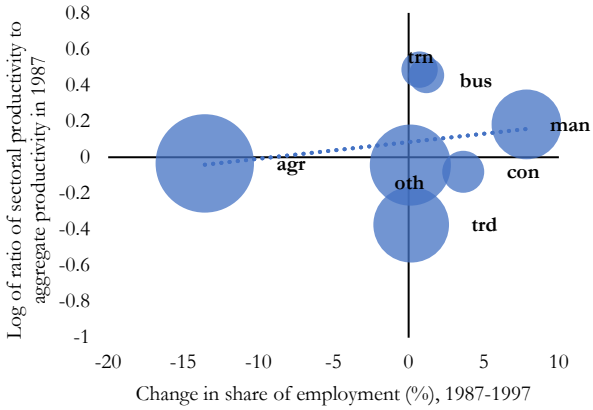
Source: Authors' calculations based on data from DOSM

Note: A value higher than 1 indicates that a sector is more productive than the economy as a whole, vice versa.

Between 1987 and 1997 and between 1997 and 2007, the correlation between initial labor productivity and subsequent labor reallocation was positive (see Figures 12 and 13). However, this correlation was negative

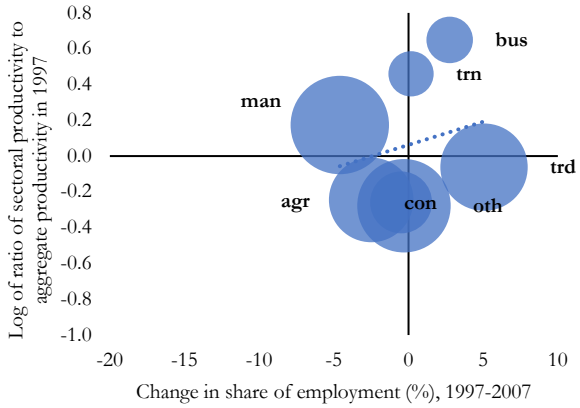
between 2007 and 2018 (see Figure 14). This means that in both 1987 and 1997 sectors that had a relatively high labor productivity subsequently increased their share of overall employment. In 2007, the opposite was the case and relatively unproductive sectors increased their employment share in the ensuing ten years. Also, despite the overall positive correlation between initial labor productivity and subsequent labor reallocation for the periods from 1987 to 1997 and from 1997 to 2007, the employment share of manufacturing as a prominent sector with a relatively high level of labor productivity declined by about 4.6 percentage points between 1997 and 2007. In parallel, the share of employment in the trade services sector, which had a below average level of labor productivity in 1997, increased by about 5.1 percentage points in the ensuing ten years.

Figure 12: Relationship between initial productivity and changes in employment share, 1987-1997



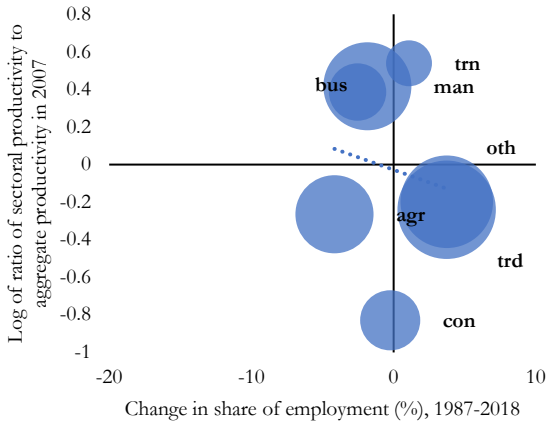
Source: Authors' calculations based on data from DOSM
Note: Sectors depicted are agriculture, business services, construction, manufacturing, trade services, transport services, and other services.

Figure 13: Relationship between initial productivity and changes in employment share, 1997-2007



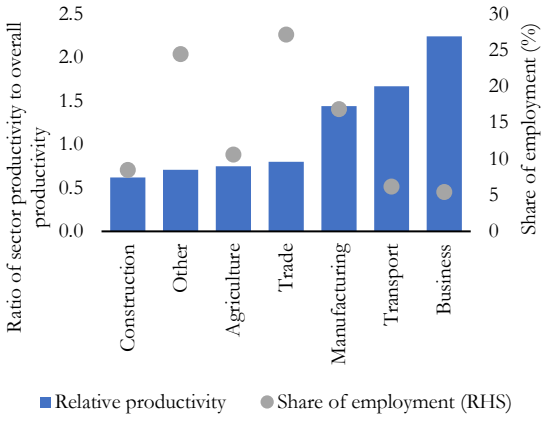
Source: Authors' calculations based on data from DOSM
Note: Sectors depicted are agriculture, business services, construction, manufacturing, trade services, transport services, and other services.

Figure 14: Relationship between initial productivity and changes in employment share, 2007-2018



Source: Authors' calculations based on data from DOSM
Note: Sectors depicted are agriculture, business services, construction, manufacturing, trade services, transport services, and other services.

Figure 15: Relative productivity and share of employment by sector, 2018



Source: Authors' calculations based on data from DOSM

In describing the process of industrialization and relative deindustrialization in Malaysia, Tan (2014) suggests several reasons for the relative decline of the country's manufacturing sector in the early 2000s and the relative rise of other, partly less productive sectors. *First*, Malaysia's industrial policy, and particularly the state's import-substitution and privatization programs in the 1980s, had resulted in a domestic manufacturing sector that suffered from ongoing structural weaknesses related to low aggregate technology levels, minimal technology spillovers, and weak supply chains, with a dependence on imported components and a lack of a local capital-goods industry. *Second*, the growth of the manufacturing sector in Malaysia was due to large FDI inflows between 1970 and 1992, particularly into the electrical and electronics (E&E) subsector. After 1992, FDI flows into Malaysia shifted from E&E into petroleum products and basic metals. Starting in the late 1990s, there was also increasing global competition for FDI from other low- and middle-income countries such as China, Brazil, India, and Thailand. *Third*, partly influenced by political interests, inflows of portfolio investments into Malaysia, which began to surpass FDI inflows in volume in the 1990s and the early 2000s, generally favored construction, wholesale and retail trade, hotels and restaurants, and finance, insurance, real estate and business services instead of manufacturing.

In Figures 12 to 14, the overall correlation between initial labor productivity and subsequent changes in employment from 1987 to 2018 is not depicted. However, it is available upon request. In fact, this correlation is negative, but its magnitude is small. This suggests that over the long term there is no clear correlation between productivity and employment in Malaysia, something which is also true in the cross section – as illustrated in Figure 15 for the year 2018.

4. Sources of Economic Growth

4.1. Aggregate Decomposition of Economic Growth

Building on the description of patterns of economic growth of Section 3, this section implements the Shapley decompositions described in Section 2.1. It begins with a decomposition of aggregate growth in output per capita into growth associated with changes in output per worker within and between sectors, growth associated with changes in employment rates, and growth associated with changes in the demographic structure. Subsequently, it turns to a more detailed sectoral decomposition of economic growth.

Excluding the mining sector, in the three decades from 1987 to 2018, Malaysia's output per capita grew by 247.2 percent, equivalent to an annual average growth rate of 2.8 percent. As is evident from Table 10, aggregate growth in Malaysia's output per capita can largely be attributed to within-sector labor productivity growth. Within-sector labor productivity growth accounted for about 75.9 percent of overall growth in output per capita over the entire 30-year period, while between-sector labor productivity growth – or structural change – accounted for only 3 percent. About 5.9 percent of overall growth could be attributed to changes in the employment rate, while changes in the demographic structure of the economy accounted for 15.1 percent. This means that growth in Malaysia's output per capita has been largely due to improvements in labor productivity within sectors, rather than the movement of workers to more productive sectors, increases in the employment rate, or improvements in the demographic structure of the country.

Table 10: Aggregate decomposition of growth in output per capita, 1987-2018

Period	Growth in output per capita (%)	Share of contribution from (%)			
		Labor productivity growth		Changes in the employment rate	Changes in the demographic structure
		Within-sector	Between-sector		
1987-1997	89.2	77.2	6.8	9.1	6.8
1997-2007	24.9	103.2	1.5	-40.2	35.5
2007-2018	46.9	67.1	-7.8	26.1	14.5

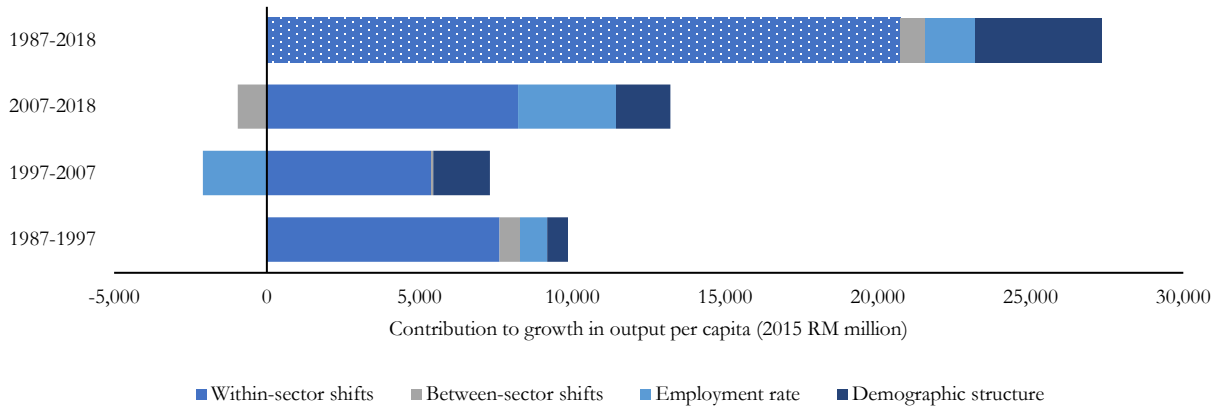
1987-2018	*247.2*	*75.9*	*3.0*	*5.9*	*15.1*

Source: Authors' calculations based on data from DOSM

A more detailed analysis of the three sub-periods from 1987 to 1997, 1997 to 2007, and 2007 to 2018 shows that the growth in output per capita for all three sub-periods can to a large extent be attributed to within-sector productivity growth. Over all three sub-periods, within-sector productivity growth consistently contributed more than 60 percent of overall growth in output per capita. The contribution of within-sector labor productivity to growth in output per capita was the highest in the decade from 1997 to 2007, when it contributed 103.2 percent of growth. Thich means that over this sub-period all other components combined had a negative effect on the growth in output per capita. This was due to a large negative contribution to the growth in output per capita from the change in the employment rate discussed above. The change in the demographic structure had a significant positive and between-sector labor productivity growth a small positive contribution.[6]

In the decade from 1987 to 1997, Malaysia benefited the most from the reallocation of labor, both as a share of this component among all components of growth in output per capita and relative to its share in other sub-periods (see Figure 16). During the decade from 1987 to 1997, structural change contributed RM 672.3 million or 6.8 percent of overall growth in output per capita. Thus, between 1987 and 1997 a significant amount of labor moved from relatively less productive to relatively more productive sectors. During the other sub-periods, the contribution of structural change to growth in output per capita. was smaller both in absolute terms and relative to other components. In the decade from 1997 to 2007, between-sector shifts only contributed 1.5 percent of growth in output per capita while between 2007 to 2018 its contribution was in fact negative. This means that between 2007 and 2018 labor on average shifted to less productive sectors. These findings are consistent with the evidence of Section 3.3 that over the entire observation period the reallocation of labor was largely uncorrelated with initial labor productivity and that this correlation was negative for the period from 2007 to 2018, resulting in a limited impact of structural change on the growth in output per capita.

Figure 16: Contribution of different components to growth in output per capita, 1987-2018



Source: Authors' calculations based on data from DOSM

The contributions to output per capita of changes in the employment rate and the demographic structure vary significantly between the three sub-periods. In the decade from 1987 to 1997, the employment rate contributed

[6] The relative contributions of the different components of output per capita growth can only be directly compared within the same sub-period, while their absolute contributions to output per capita growth will depend on the growth in this variable in each sub-period. For example, within-sector labor productivity growth induced average annual output per capita to grow by 5.1 percent between 1987 and 1997, compared to 2.4 percent between 1997 and 2007. Nevertheless, labor productivity growth accounted for a larger share of output per capita growth between 1997 and 2007 than between 1987 and 1997.

9.1 percent of overall growth in output per capita. From 1997 to 2007, it had a negative contribution of -40.2 percent of overall output per capita growth, while from 2007 it 2018 it had a positive contribution of 26.1 percent. The varying contribution of changes in the employment rate to output per capita can to a large extent to be attributed to changes in male and female labor force participation rates in the different sub-periods, as discussed in Section 3.2.

Between 1987 to 2018, Malaysia benefited from a significant demographic dividend. After within-sector productivity growth, demographic change was the largest contributor to the growth in aggregate output per capita, contributing 6.8 percent, 35.5 percent and 15.6 percent of growth in output per capita from 1987 to 1997, 1997 to 2007, and 2007 to 2018, respectively. It should be noted that even though the share of the contribution of demographic change to overall growth in aggregate output per capita was by far highest between 1997 and 2007, the absolute contribution of this component in terms of 2015 RM was only slightly higher between 1997 and 2007 than between 2007 to 2018 (see Figure 16 and also Footnote 7). As mentioned above, the growth in the share of the working age population has also been declining and is expected to become negative soon. Thus, as Malaysia becomes an aging and eventually an aged society (World Bank 2016), changes in the demographic structure are unlikely to continue to contribute to growth in output per capita.[7]

Malaysia is not the only country with a relatively high contribution of within-sector productivity effects to overall labor productivity growth. Table 11 compares the estimates of the contributions of within- and between-sector effects to the overall growth in labor productivity for Malaysia from this study with broadly comparable estimates by McMillan et al. (2014), Timmer et al. (2014) and Martins (2019) for various different regions of the world. While the precise methodology and data sources of the various studies differ, the findings for a large number of regions provide a useful comparison point. Table 11 shows that, across the various regions, overall growth in labor productivity can largely be attributed to within-sector labor productivity growth. Across almost all regions, this growth contributes over half of overall growth in labor productivity (the only exception is Martin's (2019) estimate for Latin America according to which between-sector effects account for 54 percent of overall productivity growth). In contrast, the contribution of between-sector shifts or structural change to growth in labor productivity is relatively small almost everywhere, and negative in the cases of Africa, Latin America and high-income countries according to McMillan et al. (2014) and Latin America according to Timmer et al. (2014). Nevertheless, the contribution of between-sector effects to overall labor productivity growth in Malaysia appears particularly low compared to the regional averages computed in the three comparator studies, particularly after 1997.

[7] Outputs not depicted here but available upon request show that the patterns observed in Table 10 are the same when the periods of the Asian Financial Crisis, the burst of the United States technology bubble and the Global Financial Crisis are excluded. More specifically, when the sub-periods 1987 to 1996, 2000 to 2007, and 2011 to 2018 are analyzed, the direction and the relative magnitudes of the contributions from within-sector productivity effects, between-sector productivity effects, changes in the employment rate, and changes in the demographic structure to output per capita are similar to those presented in Table 10. When the mining sector is included in the analysis, the direction and relative magnitudes of the contributions in the aggregate decomposition also largely remain the same. One exception is for the contribution of between-sector productivity growth to output per capita growth for the sub-period between 2007 and 2018, which is 8 percent under this specification, compared to -7.8 percent under the baseline specification of Table 10. This is because employment in the mining sector increased rapidly in the sub-period (see Table 7), following increasing commodity prices.

Table 11: Decomposition of labor productivity, comparison with other studies

Authors	Period	Region	Annual growth in output per worker (%)	Share of contribution to labor productivity growth from (%):	
				Within-sector	Between-sector
This study	1987-1997	Malaysia	4.8	92	8
	1997-2007		2.4	99	1
	2007-2018		2.1	113	-13
	1987-2018		*2.8*	*96*	*4*
Martins (2019)	1991-2013	Africa	1.0	54	46
		Asia	4.8	77	23
		Latin America	0.7	46	54
		Other	1.3	80	20
McMillan et al. (2014)	1990-2005	Africa	0.9	248	-148
		Asia	3.9	86	15
		Latin America	1.4	166	-65
		High income	1.5	105	-6
Timmer et al. (2014)	1990-2010	Africa	1.8	94	6
		Asia	3.6	85	15
		Latin America	0.9	113	-13

Source: Authors' calculations based on data from DOSM, McMillan et al. (2014), Timmer et al. (2014) and Martins (2019)
Note: This study and Timmer et al. (2014) use the average annual growth of output per worker, while McMillan et al. (2014) and Martins (2019) use the compound annual growth rate of output per worker. Annual growth in output per worker reported for this study excludes the mining sector, consistent with the findings of the decomposition that are reported above.

4.2. Sectoral Decomposition of Economic Growth

Building on the aggregate decomposition of economic growth, this subsection implements a series of more detailed Shapley decompositions that decompose the growth in Malaysia's output per capita from 1987 to 2018 into the contributions from each of the seven sectors of the one-digit national account classification. In addition, the subsection discusses how these contributions relate to within-sector productivity growth, between-sector labor reallocation, changes in sectoral employment as a share of the working age population, and demographic change. Finally, it takes a closer look at the effects of between-sector shifts on output per worker in each of the seven sectors.

Table 12 decomposes the growth in output per capita from 1987 to 2018 into the contributions from each of the seven sectors and how these relate to the different components of growth. For the sake of conciseness, the contribution of changes in the demographic structure to growth in output per capita is omitted from the table. Overall, the manufacturing and trade services sectors were the largest contributors to the growth of output per capita between 1987 and 2018. Both sectors contributed 23 percent to aggregate growth. The contribution of the manufacturing sector can almost entirely be attributed to improvements in within-sector productivity while for trade services changes in the employment share also played an important role.

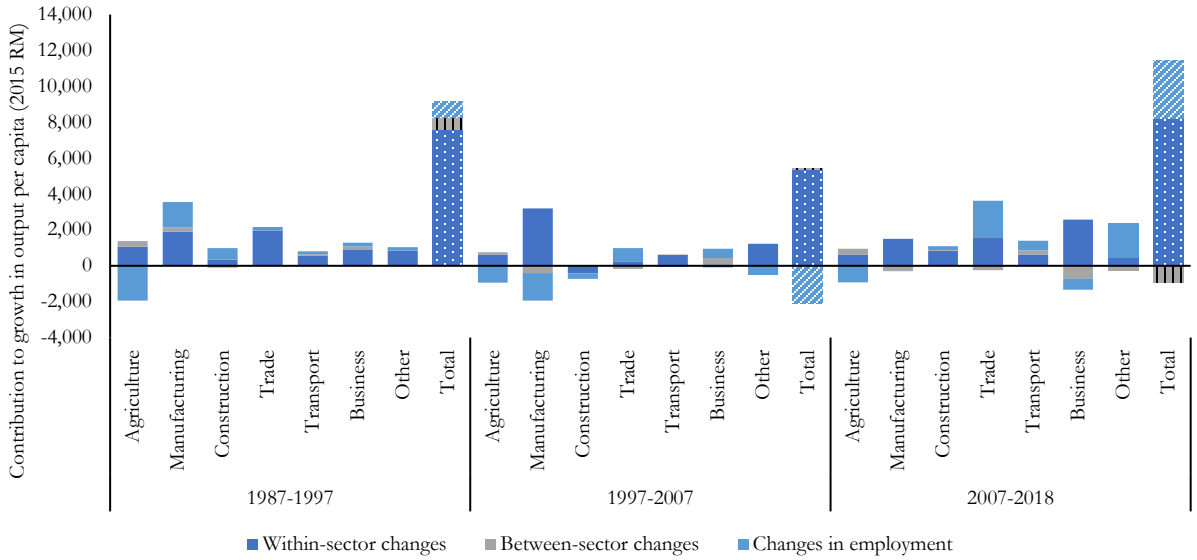
Table 12: Sectoral decomposition of growth in output per capita, 1987-2018

Sector	Growth in output per capita (1987-2018) (2015 RM)	Share of contribution in growth of output per capita (1987-2018) (%) from:			Total sector contribution to output per capita (%)
		Within-sector productivity	Between-sector shifts	Changes in employment share	
Agriculture	-757.17	10.2	3.3	-16.4	-2.8
Manufacturing	6,288.49	20.4	0.5	2.2	23.0
Construction	1,287.19	2.5	-0.7	2.9	4.7
Trade	6,287.73	15.6	-1.8	9.2	23.0
Transport	2,777.60	7.0	1.1	2.0	10.2
Business	3,475.03	9.9	1.3	1.5	12.7
Other	3,819.22	10.2	-0.7	4.4	14.0
Total	*23,178.11*	*75.9*	*3.0*	*5.9*	*84.9*

Source: Authors' calculations based on data from DOSM
Note: Total contribution does not add up to 100 percent due to the omission of the contribution of changes in the demographic structure to the growth in output per capita.

Figure 17 repeats the sectoral decomposition of growth in output per capita of Table 11 for the three sub-periods from 1987 to 1997, 1997 to 2007, and 2007 to 2018. It shows that the manufacturing sector was the largest contributor to the growth of output per capita between 1987 and 1997 and between 1997 and 2007 while the trade services sector had the largest contribution between 2007 and 2017. In fact, growth in output per worker in the manufacturing sector was highest in the period from 1987 to 1997 and fell in the subsequent periods. With regard to the components of sectoral contributions to output growth, in the period from 1987 to 1997, the contributions of employment in the manufacturing sector as a share of the working age population and between-sector shifts were both positive. However, after 1997 the contribution of the manufacturing sector to growth in output per capita could be fully be attributed to improvements in within-sector productivity, with between-sector shifts and changes in employment contributing negatively to output per capita growth.

Figure 17: Decomposition of growth in output per capita by sector (2015 RM), 1987-2018



Source: Authors' calculations based on data from DOSM

The contribution of the services sector on growth in output per capita can mostly be attributed to improvements in within-sector productivity. Further, Figure 17 shows that increases in employment in Malaysia largely correspond to increases in employment in the services sector, particularly in the period from 2007 to 2018. As has already been mentioned, while the manufacturing and services sectors were sources of growth between 1987 and 2018, the agricultural sector had a negative contribution to the growth in output per capita. Even though output per worker in this sector increased over time, it remained relatively less productive than the economy as a whole. As a result, the declining share of employment in agriculture had a positive growth effect amounting to 3.3 percent of overall growth in output per worker according to Table 12.

For all three sub-periods, Table 13 lists the average output per worker at the beginning and end of each sub-period, the change in the employment share of the seven sectors, and the effect of between-sector shifts on output per worker by sector. The table once again shows that labor in Malaysia is not necessarily reallocated to sectors with the highest levels of productivity. For example, the share of employment in manufacturing declined both between 1997 and 2007 and between 2007 and 2018, despite the sector's high level of average output per worker. In contrast, the share of employment in trade services increased in both periods, even though the sector had lower-than-aggregate average output per worker. As a result, changes in the share of employment in *both* the manufacturing and the trade services sectors had negative effects on output per worker between 1997 and 2007 and between 2007 and 2018.

Table 13: Average output per worker, change in employment share and effect of between-sector shift on output per worker by sector, 1987-2018

		1987-1997	
Sector	**Average output per worker in 1987 and 1997 (RM)**	**Change in employment share 1987-1997 (%)**	**Effect of between-sector shift on output per worker (RM)**
Agriculture	35,925.16	-13.6	863.61
Manufacturing	50,410.19*	7.8	642.10
Construction	34,958.07	3.6	-265.61
Trade	35,788.23	0.2	-9.78
Transport	67,542.54*	0.7	184.01
Business	75,560.11*	1.2	393.89
Other	35,120.33	0.1	-6.60
Aggregate	*42,245.85*	*0.0*	*1,801.61*
		1997-2007	
Sector	**Average output per worker in 1997 and 2007 (RM)**	**Change in employment share 1997-2007 (%)**	**Effect of between-sector shift on output per worker (RM)**
Agriculture	46,707.48	-2.5	343.23
Manufacturing	82,784.60*	-4.6	-1,041.51
Construction	35,280.39	-0.5	127.16
Trade	51,531.45	5.1	-445.04
Transport	99,938.62*	0.2	65.38
Business	100,561.37*	2.8	1,111.63
Other	47,819.77	-0.3	40.35
Aggregate	*60,326.15*	*0.0*	*201.21*
		2007-2018	
Sector	**Average output per worker in 2007 and 2018 (RM)**	**Change in employment share 2007-2008 (%)**	**Effect of between-sector shift on output per worker (RM)**

Agriculture	57,504.80	-4.2	765.85
Manufacturing	112,029.02*	-1.8	-653.29
Construction	41,013.66	-0.2	77.57
Trade	60,340.16	3.7	-594.72
Transport	128,421.10*	1.1	576.89
Business	144,599.13*	-2.5	-1,738.55
Other	57,656.80	3.7	-697.14
Aggregate	*75,960.34*	*0.0*	*-2,263.38*

Source: Authors' calculations based on data from DOSM

Note: Asterisks represent values that are larger than the aggregate output per worker for the period.

Similar to the findings of the aggregate decomposition, the sectoral decomposition's findings for Malaysia are also broadly consistent with the patterns of structural transformation that have been documented for other countries. For example, Merotto (2020) finds that improvements in within-sector labor productivity in the services sector are generally the main drivers of growth in output per capita in upper-middle income countries with above average per capita income growth, followed by within-sector labor productivity improvements in the manufacturing sector.

4.3. Dynamic Reallocation and Economic Growth

Table 14 uses the canonical method introduced in Section 2.1 to decompose the growth of labor productivity into within-sector effects, static reallocation and dynamic reallocation for the period from 1990 to 2018 as well as three sub-periods. The table shows that the contribution of dynamic reallocation to labor productivity has been substantially higher than the contribution of static reallocation. This can largely be attributed to the substantial contribution of dynamic reallocation to productivity growth in the sub-period 1990 to 1997. During this sub-period, dynamic reallocation contributed 5.5 percent of overall labor productivity growth. In contrast, dynamic reallocation had a negative contribution of 3.9 percent of growth in overall output per worker for the sub-period 1997 to 2007, and a contribution of 0.9 percent for the sub-period 2007 to 2018.

Table 14: Contribution of components of changes in labor productivity growth, 1990-2018

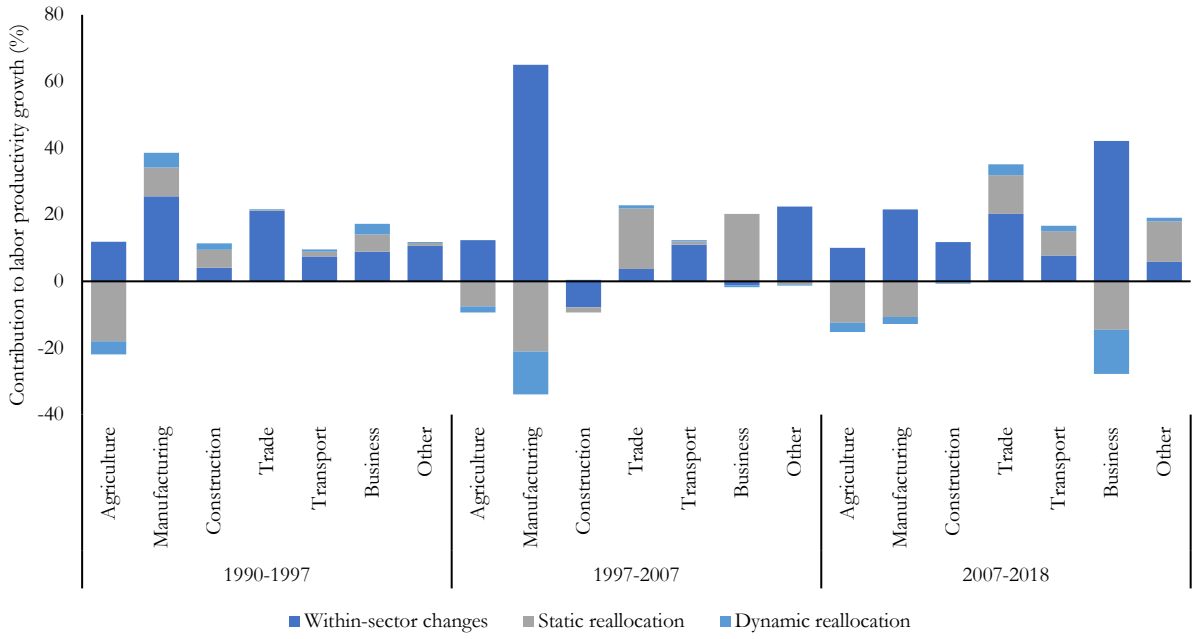
	Share of contribution from (%)			
	1990-1997	**1997-2007**	**2007-2018**	***1990-2018***
Within-sector effects	92.2	102.3	97.3	*94.1*
Static reallocation	2.3	1.5	1.8	*0.7*
Dynamic reallocation	5.5	-3.9	0.9	*5.2*
Total contribution	*100.0*	*100.0*	*100.0*	*100.0*

Source: Authors' calculations based on data from DOSM

A more detailed sectoral decomposition based on the canonical method shows that the negative contribution of dynamic reallocation to labor productivity growth for the sub-period from 1997 to 2007 can be attributed to the movement of labor into the manufacturing sector, which as discussed above started to experience relatively lower levels of productivity growth in the early 2000s (see Figure 18). In fact, both the static and the dynamic reallocation components of the manufacturing sector contributed negatively to labor productivity growth during the sub-period from 1997 to 2007. In contrast, increasing employment in the services sector, particularly the trade and business services sector, led to positive contributions of labor reallocation to productivity growth during the same sub-period. In the following sub-period from 2007 to 2018, the same patterns continued to hold for the manufacturing sector. At the same time, the fall in the employment share of

the business services sector – the sector with the highest level of output per worker for the period – led to a negative contribution of both static and dynamic reallocation to growth in output per capita.

Figure 18: Components of labor productivity growth by sector (2015 RM), 1990-2018



While due to the different methodological approaches there are some differences between the findings in Table 14 and Figure 18, as well as those presented in Sections 4.1 and 4.2, at least three main findings hold. *First*, within-sector labor productivity has been the largest contributor to overall labor productivity growth. *Second*, Malaysia benefited most from labor reallocation in the period before 1997, after which the contribution of labor reallocation has been relatively low, or even negative. *Third*, at least after 1997 labor reallocation associated with the manufacturing sector contributed to negative labor productivity growth.

5. Discussion and Conclusion

Since independence in 1957, Malaysia has been transformed from an agriculture-driven economy to one dominated by services. This process of structural transformation has included both periods of industrialization and relative deindustrialization. Against this backdrop, this study analyzed the process of structural transformation in Malaysia by documenting the evolution of output per capita, employment, and output per worker – or labor productivity – between 1987 and 2018 and in three sub-periods, 1987 to 1997, 1997 to 2007, and 2007 to 2018. In addition, the study decomposed output per capita at both the aggregate and the sectoral level using a series of Shapley decompositions and investigated the contributions of static and dynamic reallocation of labor to overall labor productivity growth.

Some of this study's main findings include: *First*, Malaysia experienced its most rapid and substantive growth, driven by the manufacturing sector, in the period from 1987 to 1997. Since then, the speed of growth in output per capita has declined, even when periods of crises are excluded. *Second*, growth after 1997 has been driven by the services sector. *Third*, Malaysia's growth in output per capita can largely be attributed to changes in within-sector labor productivity, both on aggregate and at a sectoral level, rather than structural change. *Fourth*, the reallocation of labor between sectors has had a relatively small impact on growth in labor productivity and output per capita. Aside from the reallocation of labor from agriculture to other sectors, there has only been very limited reallocation of labor toward the more productive sectors of the economy.

These findings are consistent with the literature's observation that Malaysia underwent a rapid process of industrialization followed by relative deindustrialization (Rasiah 2011b; Tan 2014). In the period from 1987 to 1997, Malaysia pursued industrial policies that led to a rapid expansion of the manufacturing sector but might have also resulted in a domestic manufacturing sector that suffered from ongoing structural weaknesses (see Jomo and Edwards 1993; Menon 2008; Rasiah 2011a and Tan 2014 for detailed discussion of Malaysia's industrialization experience, including the relevant national policies). Since then, Malaysia's economic policies have been less successful in moving the country toward manufacturing-led growth, leading to a relative deindustrialization. Rasiah (2011b) attributes this deindustrialization to the lack of effective institutional change, partly due to ethnicity-based policies. Similarly, Tan (2014) suggests that ethnicity-based policies have contributed to premature deindustrialization in Malaysia.

Whatever the causes of Malaysia's industrialization and ensuing relative deindustrialization, this study highlights the importance of understanding that these processes were to an overwhelming extent driven not by structural change but by within-sector productivity growth. While an international benchmarking of this study's findings with broadly comparable estimates by McMillan et al. (2014), Timmer et al. (2014) and Martins (2019) for various different regions of the world shows that the dominance of within-sector productivity growth as a driver of overall economic growth is a common pattern across the world, at 3 percent, the contribution of between-sector reallocation of labor to growth in output per capita in Malaysia has been particularly low.

This study's findings shed light on the welfare and policy implications of Malaysia's experience of relative and potentially premature deindustrialization. The relevant literature prominently documents that the share of manufacturing in Malaysia's aggregate employment and output began to decline in the early 2000s and has since stagnated, while growth in output per worker in both the manufacturing sector and the economy as a whole has declined over time. Rasiah (2011b) argues that Malaysia experienced premature deindustrialization and suggests that the slowdown of economic activity and productivity, as well as the slowdown in trade performance are signs of negative deindustrialization. In contrast, Tan (2014) suggests that while the deindustrialization of Malaysia has been premature, it has not been negative as unemployment has not increased and living standards have continued to improve.

Without making an argument whether Malaysia's relative deindustrialization has been negative or not, this study documents that this deindustrialization has gone hand in hand with a decline in the reallocation of labor toward the most productive sectors, especially during the period from 2007 to 2018 when labor tended to be reallocated to less productive sectors. That said, structural change was never Malaysia's prime driver of growth – not even during the country's rapid industrialization from 1987 to 1997. At the same time, the productivity gaps between sectors in Malaysia remain large, with the productivity of the most productive sector in 2018 (business services) more than three times that of the least productive sector (construction).

Accordingly, the main challenge for Malaysia going forward will be to reverse, halt or at least moderate the decline in within-sector productivity growth in manufacturing and to enable the increasingly important services sector to generate sustainable within-sector productivity growth. In this context, World Bank (2020, p. 3) argues "that overcoming skills gaps, maintaining high quality of infrastructure, building innovation capacity, and addressing distortions in output markets are all important policies that could serve to accelerate productivity growth." In addition, World Bank (2020) contends that beyond implementing strategies that are largely about the quality of factors of production such as capital, land and labor, raising productivity growth will necessitate a fresh look at the way these factors are put together and organized, and thus at management practices. In addition, Chuah et al. (2018) find that in the period between 2000 and 2010, allocative efficiency within relatively narrowly defined sectors in Malaysia worsened. Conversely, reallocating resources to more productive firms within sectors can potentially lead to a significant increase in economic growth but will require a conducive policy environment – for instance with regard to competition and financial market policies – that ensures that product markets remain contestable with low barriers to entry.

Though gains from drivers of growth other than within-sector labor productivity growth may be more limited, productivity-enhancing policies should nevertheless be combined with policies to positively affect the employment rate and to facilitate the productive reallocation of labor across sectors. Regarding the employment rate, renewed efforts are needed to further increase labor force participation especially among women, and to better use the productive potential of older persons in the face of a rapidly accelerating aging process.

Finally, significant productivity gaps between sectors show that there is still potential for growth-enhancing structural change and the reallocation of labor toward the most productive sectors, such as the business services and transport services sectors. In fact, McMillan et al. (2017) suggest that rapid and sustained economic growth requires a high level of investment in fundamentals that contribute to both within-sector productivity growth and structural change. In this context, human and physical capital will play a particularly important role. Martins (2019) finds that the pace of structural change is significantly shaped by human and physical capital, suggesting that investments in education and physical infrastructure can accelerate structural change and economic growth. While Malaysia has made great strides in improving physical infrastructure and providing near-universal access to primary and secondary school, there are concerns regarding learning outcomes. Better-quality basic education could help Malaysia catch up with high-income countries and standout regional peers, and a more dynamic and demand-driven higher education and workforce development system could help the country adjust to the changing nature of work (see World Bank 2018a and World Bank 2018b).

References

Bah, E. M. (2011). Structural Transformation Paths Across Countries. Emerging Markets Finance & Trade, 47, 5–19.

Bloom, D.E., Canning, D. and Sevilla, J. (2003). The Demographic Dividend: A New Perspective on the Economic Consequences of Population Change. Santa Monica: RAND Corporation.

Byrne, D. M., Oliner, S. D. and Sichel, D. E. (2015). How Fast Are Semiconductor Prices Falling? NBER Working Paper 21074.

Caselli, F. and Coleman, W. J. (2001). The U.S. Structural Transformation and Regional Convergence: A Reinterpretation. Journal of Political Economy, 109, 584–616.

Chuah, L. L., Loayza, N. V. and Nguyen, H. (2018). Resource Misallocation and Productivity Gaps in Malaysia. World Bank Policy Research Working Paper #8368.

di Meglio, G., Gallego, J., Maroto, A. and Savona, M. (2015). Services in Developing Economies: A New Chance for Catching-Up? University of Sussex Science Policy Research Unit Working Paper 2015-32.

Feldstein, M (2015). The U.S. Underestimates Growth. Wall Street Journal, May 18.

Felipe, J., Mehta, A. and Rhee, C. (2019). Manufacturing matters…but it's the jobs that count. Cambridge Journal of Economics, 43, 139–168.

Herrendorf, B. and Schoellman, T. (2018). Wages, Human Capital, and Barriers to Structural Transformation. American Economic Journal: Macroeconomics, 10, 1–23.

Jomo, K. S. and Edwards, C. (1993). Malaysian industrialisation in historical perspective, in Jomo K. S. (ed.), Industrializing Malaysia: Policy, performance, Prospects. London: Routledge.

Jomo, K. S. (1994). Manufacturing growth and employment, in Jomo K. S. (ed.), Malaysia's Economy in the Nineties. Petaling Jaya: Pelanduk Publications.

Kaldor, N. (1966). Causes of the Slow Rate of Economic Growth of the United Kingdom. Cambridge: Cambridge University Press.

Kaldor, N. (1967). Strategic Factors in Economic Development, New York State School of Industrial and Labour Relations. New York: Cornell University.

Khazanah Research Institute (2017). Productivity in Progress: Labour productivity in Malaysia over the last three decades. Kuala Lumpur: Khazanah Research Institute.

Kucera, D. and Roncolato, L. (2016). The manufacturing-services dynamic in economic development. International Labour Review, 155, 171–199.

Kuznets, S. (1973). Modern Economic Growth: Findings and Reflections. The American Economic Review, 63, 247–258.

Lee, J.-W. and McKibbin, W. J. (2014). Service Sector Productivity and Economic Growth in Asia. Asian Development Bank Institute Working Paper Series No. 490.

Lewis, W. A. (1954). Economic Development with Unlimited Supplies of Labor. Manchester School of Economic and Social Studies, 22, 566–593.

Maroto-Sánchez, A. and Cuadrado-Roura, J. R. (2009). Is growth of services an obstacle to productivity growth? A comparative analysis. Structural Change and Economic Dynamics, 20, 254–265.

Martins, P. M. G. (2018). Structural change in Ethiopia. Development Policy Review, 36, O183–O200.

Martins, P. M. G. (2019). Structural change: Pace, patterns and determinants. Review of Development Economics, 23, 1–32.

Matsuyama, K. (2009). Structural Change in an Interdependent World: A Global View of Manufacturing Decline. Journal of the European Economic Association, 7, 478–86.

McMillan, M., Rodrik, D. and Verduzco-Gallo, I. (2014). Globalization, Structural Change, and Productivity Growth, with an Update on Africa.

McMillan, M., Rodrik, D. and Sepúlveda, C. (2017). Structural Change, Fundamentals, and Growth: A Framework and Case Studies. World Bank Policy Research Working Paper #8041.

Merotto, D. (2020). #4 Labor Productivity Grows Faster in Developing Countries When Labor Moves from Agriculture into Waged Jobs. Jobs and Structural Change Blog Series, The Jobs Group, World Bank Group. Accessed from: https://www.jobsanddevelopment.org/labor-productivity-grows-faster-in-developing-countries-when-labor-moves-from-agriculture-into-waged-jobs/

Mokyr, J. (2014). Secular Stagnation? Not in Your Life, in Teulings, C. and Baldwin, R. (eds), Secular Stagnation: Facts, Causes, and Cures. London: CEPR Press.

Nayyar, G., Cruz, M. and Zhu, L. (2018). Does Premature Deindustrialization Matter? The Role of Manufacturing versus Services in Development. World Bank Policy Research Working Paper #8596.

Ranis, G. and Fei, J. C. (1961). A Theory of Economic Development. American Economic Review, 51, 533–558.

Rasiah, R. (2011a). Industrial policy and industrialization, in Rasiah, R. (ed.), Malaysian Economy: Unfolding Growth and Social Change. Kuala Lumpur: Oxford University Press.

Rasiah, R. (2011b). Is Malaysia Facing Negative Deindustrialization? Pacific Affairs, 84, 715–736.

Rodrik, D. (2011). The Future of Economic Convergence. NBER Working Paper 17400.

Rodrik, D. (2016). Premature deindustrialization. Journal of Economic Growth, 21, 1–33.

Shorrocks, A. (2013). Decomposition procedures for distributional analysis: A unified framework based on the Shapley value. The Journal of Economic Inequality, 11, 99–126.

Syverson, C. (2017). Challenges to Mismeasurement Explanations for the US Productivity Slowdown. Journal Economic Perspectives, 31, 165–186.

Tan, J. (2014). Running out of steam? Manufacturing in Malaysia. Cambridge Journal of Economics, 38, 153–180.

Timmer, M. P., de Vries, G. and de Vries, K. (2014). Patterns of Structural Change in Developing Countries. GGDC Research Memorandum 149. Groningen: Groningen Growth and Development Centre.

World Bank (2012). Job Generation and Growth Decomposition Tool: Understanding the Sectoral Pattern of Growth and its Employment and Productivity Intensity. Washington, DC: World Bank.

World Bank (2016). Live Long and Prosper: Aging in East Asia and Pacific. Washington, DC: World Bank.

World Bank (2018a). World Development Report 2019: The Changing Nature of Work. Washington, DC: World Bank.

World Bank (2018b). Malaysia Economic Monitor: Realizing Human Potential. Washington, DC: World Bank.

World Bank (2018c). Productivity Unplugged: The Challenges of Malaysia's Transition into a High-Income Country. Washington, DC: World Bank.

World Bank (2019a). Agricultural Transformation and Inclusive Growth: The Malaysian Experience. Washington, DC: World Bank.

World Bank (2019b). Breaking Barriers: Toward Better Economic Opportunities for Women in Malaysia. Washington, DC: World Bank.

World Bank (2019c). JobsStructure Tool. Washington, DC: World Bank.

World Bank (2020). Management Practices in Malaysia – The Good, the Bad and the Ugly. Washington, DC: World Bank.

World Bank (forthcoming). Aiming High: Navigating the Next Stage of Malaysia's Development. Washington, DC: World Bank.