ADBI Working Paper Series

WHAT EXPLAINS THE INCREASE IN THE LABOR INCOME SHARE IN MALAYSIA?

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No. 894
November 2018

Asian Development Bank Institute

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Suggested citation:

Ng, A., Tan, T. T., and Tan, Z. G. 2018. What Explains the Increase in the Labor Income Share in Malaysia?. ADBI Working Paper 894. Tokyo: Asian Development Bank Institute. Available: https://www.adb.org/publications/what-explains-increase-labor-income-share-malaysia

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This paper benefited from the insightful comments from Ravi Kanbur and Jomo Kwame Sundaram. All errors remain the authors' own. The views expressed are those of the authors and strictly do not reflect the views of the Khazanah Research Institute, its management, or its Board of Trustees.

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Abstract

Labor income shares have been falling in many advanced and emerging economies within the last few decades, partly as a result of a combination of impacts from technology and increased global integration. This in turn is associated with the relatively slow growth of wages, especially for medium-skilled workers, and the worsening of the income inequality in these economies. In contrast, Malaysia's labor income share has been increasing since 2005, together with a reduction in income inequality. We investigate this development by exploring the differences in trends of the labor income shares across different economic sectors and firm sizes and identifying factors that could explain the increase in the labor income share in Malaysia. We find that the increase is mainly due to the growing importance of more traditional service subsectors and SMEs in the economy. This in turn is associated with greater reliance on low-skilled foreign workers during this period. These findings have important policy implications for Malaysia, including the potential trade-off between driving labor productivity and fostering inclusiveness. This contrarian trend offers insights that could be relevant to the experiences of, and policy choices available to, other emerging economies facing deindustrialization.

Keywords: labor income share, foreign workers, technology, deindustrialization

JEL Classification: E25, J30, J61, O3

Contents

1. INTRODUCTION

One of the defining developments in the global economy over the past few decades has been the declining share of national income that accrues to labor.[1] True for most advanced economies and many emerging economies, the explanation for this development is the decoupling of productivity growth and growth in real wages, especially for medium-skilled workers, and is associated with the worsening of income inequality in these economies. Research has found this development to have been due in large part to the combination of impacts from technology and the consequences of increased global integration (Dao et al. 2017; IMF 2017).

In contrast to the global trend, Malaysia's labor income share has been increasing since the official statistics became available in 2005, together with a reduction in income inequality. This paper attempts to provide an explanation for this situation in Malaysia. Overall, we find that the increase is mainly a result of the growing importance of the more traditional service subsectors and SMEs in the economy. This in turn is associated with greater reliance on low-skilled foreign workers and the lower degree of technology adoption in Malaysia during this period. These findings have important policy implications for Malaysia in the future, including a potential trade-off between driving productivity and fostering inclusiveness. This contrarian trend also offers interesting insights that could be relevant to the experiences of, and policy choices available to, other emerging economies facing deindustrialization.

The next part of the paper outlines the overall development in the share of labor income in Malaysia since 2005. Section 3 investigates the data in greater depth, using shift-share analysis to ascertain whether the change is attributable to changes within each economic sector or changes in the relative shares of different economic sectors in the overall Malaysian economy. We repeat the shift-share analysis for different firm sizes. In section 4, we conduct panel regression estimation to identify the underlying factors that could explain the increase in the labor income share in Malaysia. Section 5 concludes.

2. LABOR INCOME SHARE IN MALAYSIA

2.1 Trends since 2005

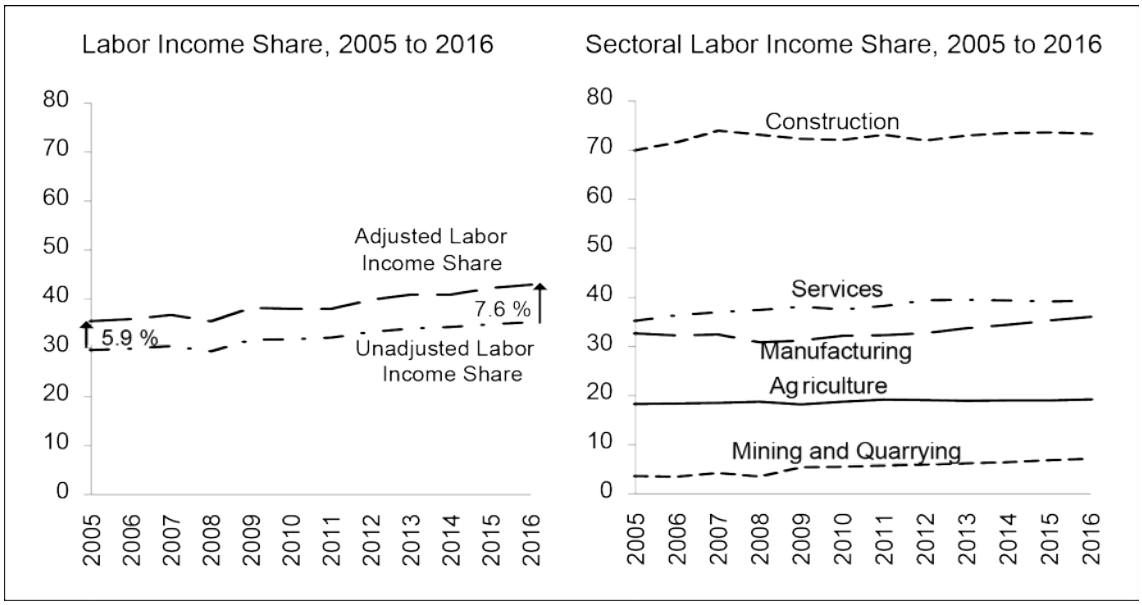
The Department of Statistics, Malaysia (DOSM) has published the nominal gross domestic product by income (GDPI) each year since 2005. The income-based approach decomposes the GDP by measuring the total income that production activity generates for owners of capital, for labor, and for the government. The compensation of employees (CoE) component is the income that it generates for labor, which includes wages and salaries and contributions to employment-related social insurance schemes. The labor income share (LIS) is the proportion of CoE within the total GDP, measuring the share of income for labor in the total income generated. For this paper, the primary source of data is the DOSM's GDPI. Appendix 1 provides further details of the data sources.

[1] As, for example, Dao et al. (2017) and the IMF (2017) documented.

The LIS calculated from CoE in the GDPI excludes income that own account workers earn. As the Bank Negara Malaysia (2014, 23–28) discussed, it is possible to adjust this by estimating the LIS from own account workers, based on Gollin's (2002) work. Figure 1a shows that the unadjusted LIS increased from 29.5% in 2005 to 35.3% in 2016 (a 5.71 percentage point increase), while the adjusted LIS, which includes income for own account workers, increased from 35.4% in 2005 to 42.9% in 2016 (a 7.45 percentage point increase).

Figure 1a also shows that the LIS in all 5 major economic sectors increased between 2005 and 2016.[2] Notably, the service sector—which is by far the largest sector in terms of employment—experienced an increase in the LIS of 4.12 percentage points in this period, the largest increase in the LIS across the 5 major sectors. This corresponded to the increase in the share of employment in the service sector from 56.2% of the overall economy in 2005 to 62.2% in 2016. With the exception of mining and quarrying, in which the share of employment in the total economy remained below 1.0%, all other major economic sectors experienced a decline in the employment share (Figure 1b). The second-largest major sector in terms of employment, manufacturing, witnessed its share declining from 19.8% in 2005 to 16.9% in 2016.

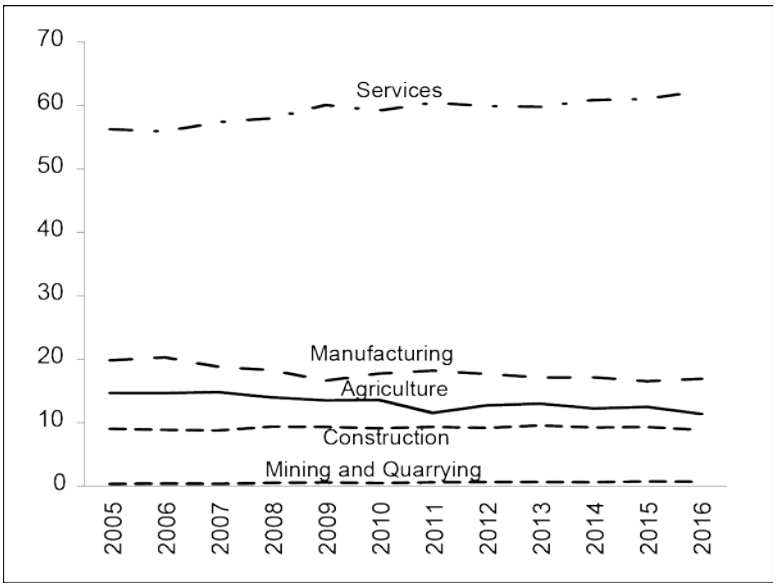
Figure 1a: National and Sectoral Labor Income Share, 2005 to 2016
(%)



Source: DOSM (various years), authors' calculations.

[2] As the employment numbers for own account workers for each sector are not available, we do calculate the LIS adjustment for own account workers.

Figure 1b: Share of Total Employment by Sector, 2005 to 2016
(%)



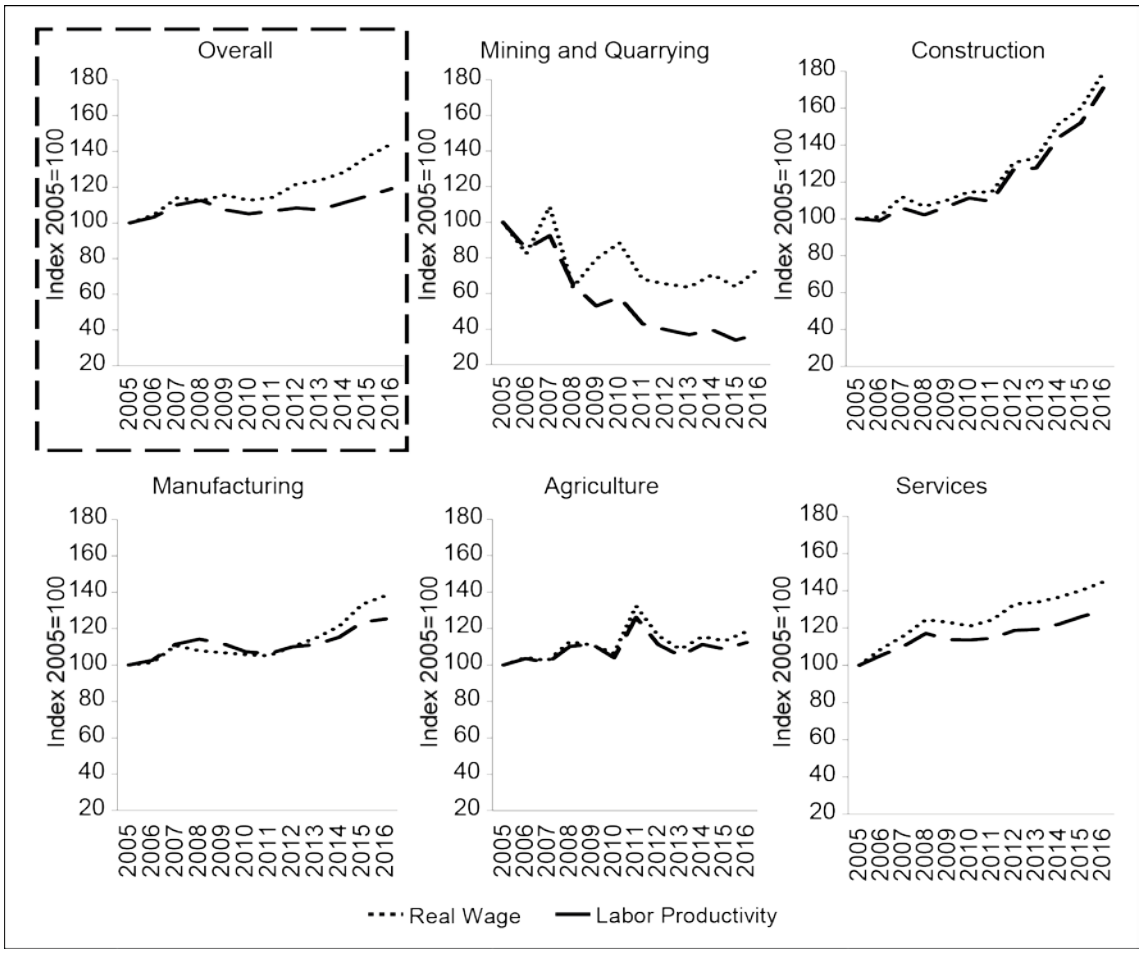
Source: DOSM (various years), authors' calculations.

A corollary of the increase in the LIS is the positive divergence between the real wage per worker and the labor productivity. This is necessarily true according to the definition of the LIS. An increase in the LIS implies that more of the national income, in real terms, accrues to labor than with a change in the value-added per worker. Figure 2 shows that the increase in the overall LIS is parallel to the greater increase in the real wage compared with labor productivity. Overall, the real wage per worker increased by 44.2% from 2005 to 2016, but labor productivity increased only by 19.1%. By sector, this is clearly visible in the service sector, in which the real wage per worker increased by 44.7% while labor productivity increased only by 29.5%. Similarly, for the manufacturing sector, the real wage per worker increased by 38.2% compared with labor productivity, which increased by 25.3%. While the real wage per worker and labor productivity for the mining and quarrying sector decreased, the former fell less than the latter.

In terms of labor skill levels, the largest change in the LIS between 2010 and 2016 is attributable to workers in the semi-skilled category. Figure 3 shows the estimated breakdown of the LIS (unadjusted for own account workers) by workers of different skill levels.[3] The LIS for high-skilled workers decreased from 17.2% in 2010 to 15.9% in 2011 before increasing to 18.0% in 2016. The LIS of semi-skilled workers increased from 12.7% in 2010 to 15.4% in 2013 but subsequently decreased to 14.9% in 2016. The LIS of low-skilled workers increased from 1.8% in 2010 to 2.5% in 2015 before falling to 2.4% in 2016. In absolute terms, the LIS for semi-skilled workers increased the most by 2.16 percentage points, while the LIS for low-skilled workers increased the least by 0.62 percentage points.

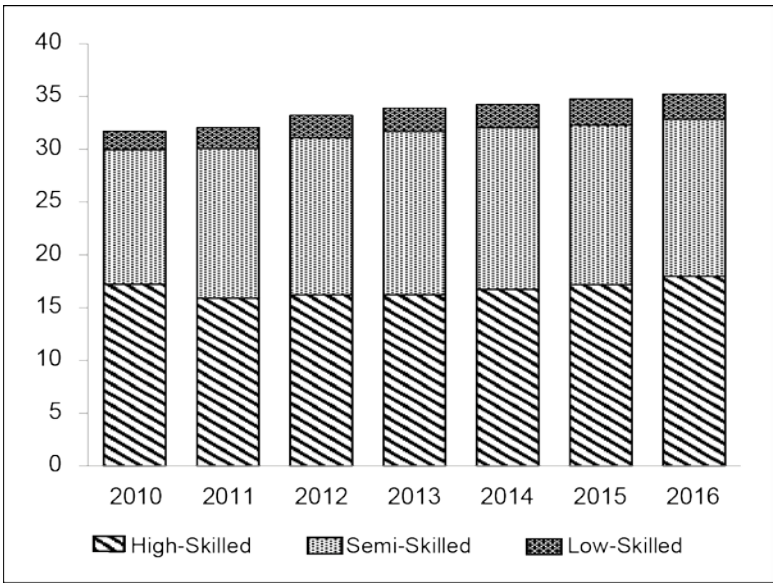
[3] We estimate the compensation of employees by skill level by estimating the compensation of employees from the mean wages and population of workers of different skill levels. We estimate the LIS by dividing the estimated compensation of employees by the nominal GDP. Appendix 2 provides details of the categories of worker by skill level.

Figure 2: Real Wage per Worker and Labor Productivity, 2005 to 2016



Source: DOSM (various years), authors' calculations.

Figure 3: Labor Income Share by Skill Level, 2010 to 2016
(%)

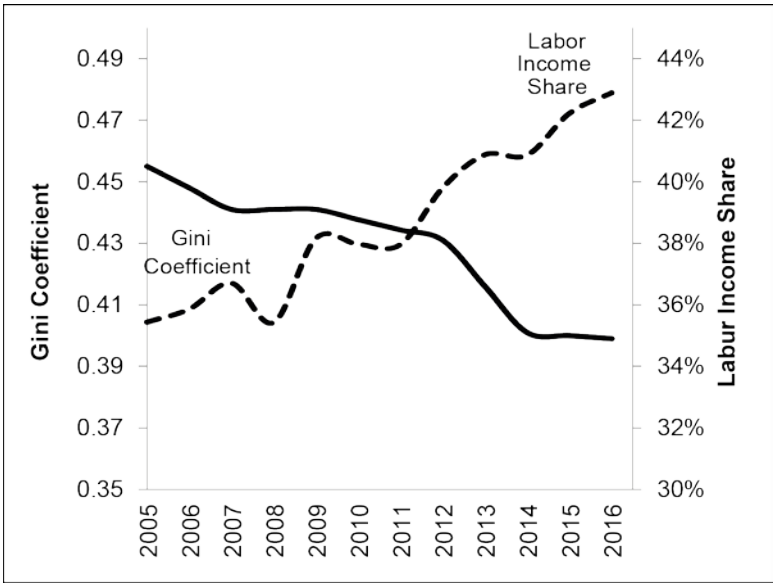


Source: DOSM (various years), authors' calculations.

2.2 Co-Movement with Income Inequality

The increase in the LIS has corresponded to the decrease in income inequality in Malaysia. Figure 4 shows that the Gini coefficient decreased from 0.455 in 2005 to 0.399 in 2016. We should note that it is not necessary for an increase in the LIS to correspond to a decrease in income inequality but that, generally, income for labor is more equally shared across different income classes than income for owners of capital. Globally, research has found using the Gini coefficient that the trend of a lower LIS correlates strongly with higher income inequality (IMF 2017). As shown here, the reverse trend has been true for Malaysia—an increase in the LIS corresponding to a reduction in income inequality.

Figure 4: Gini Coefficient and Labor Income Share, 2005 to 2016



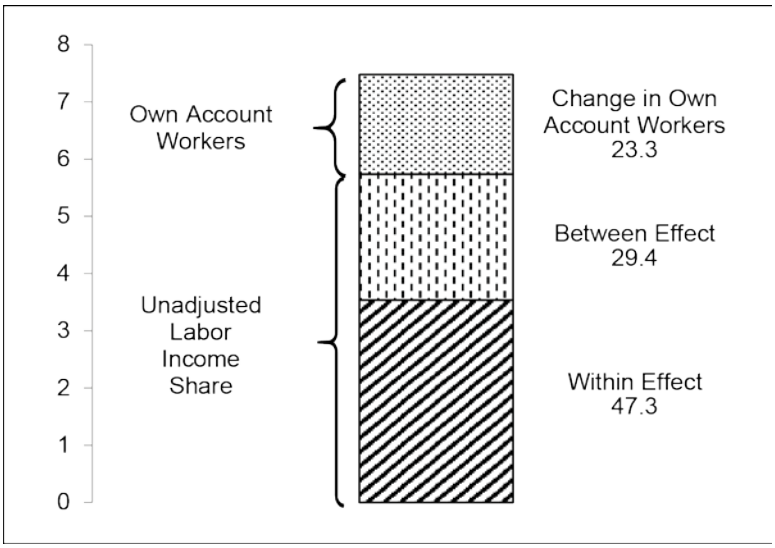
Source: DOSM (various years), authors' calculations.

3. SHIFT-SHARE ANALYSIS

3.1 By Economic Sectors

To analyze the nature of the increase in the LIS further, we conduct a shift-share analysis to determine whether we can explain the change internally within the economic sectors via wage structure changes or via resource reallocation between sectors by the form of GDP share changes. We measure the former using the within effect and the latter using the between effect. We perform shift-share analysis of the unadjusted LIS in the five major economic sectors as well as at a more granular level in various manufacturing subsectors and service subsectors. We add the change in own account workers' LIS to the shift-share analysis of the unadjusted LIS to adjust for own account workers' LIS change for the overall economy. Appendix 2 contains the methodology of the shift-share analysis of the unadjusted LIS.

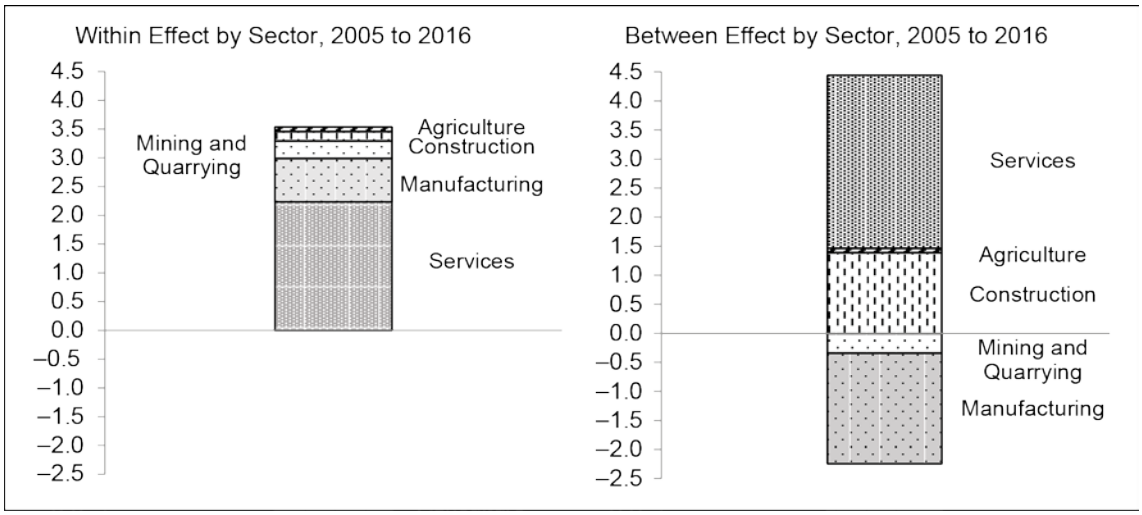
Figure 5: Shift-Share Analysis, 2005 to 2016
(%)



Source: DOSM (various years).

The combined shift-share analysis (Figure 5) shows that nearly half of the change in the LIS is due to change in the within effect, while another 29.4% is due to the between effect. Changes in own account workers' LIS contributed 23.3% to the overall change in the LIS.

Figure 6: Labor Income Share Shift-Share Analysis by Sector, 2005 to 2016
(%)



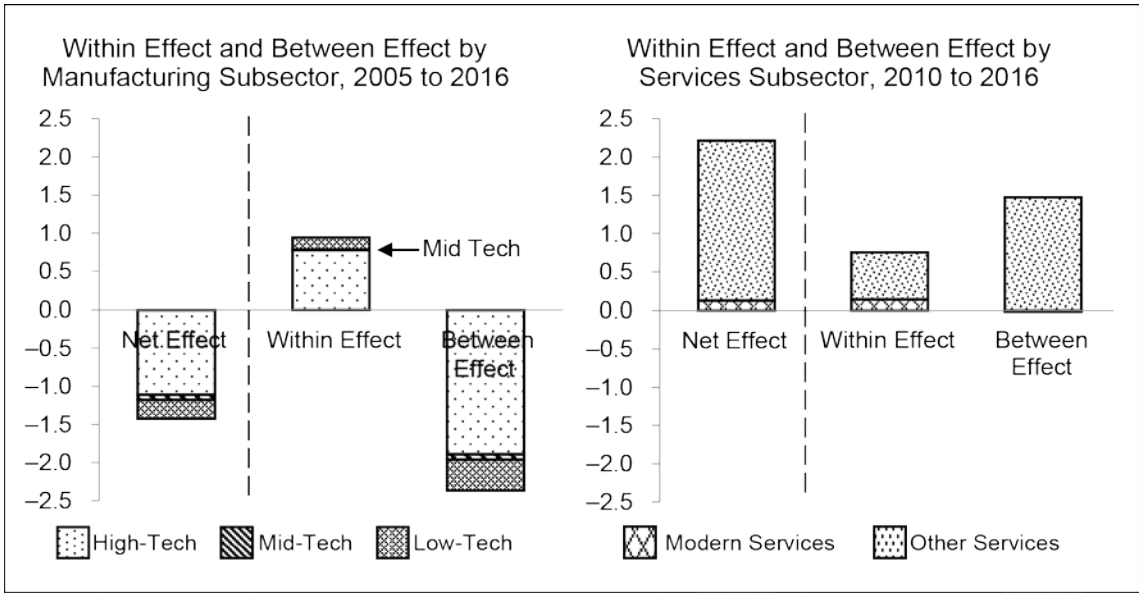
Source: DOSM (various years), authors' calculations.

Decomposing the within effect by the 5 major sectors, all 5 sectors contributed positively to the overall within effect (Figure 6), cumulatively contributing a total of 3.54 percentage points. The service sector contributed the most to the within effect, with 2.24 percentage points. The manufacturing sector follows, contributing 0.75 percentage points. Decomposing the between effect by sector, the service sector again contributed the most, with 2.98 percentage points. For the between effect, both the manufacturing

and the mining and quarrying sectors contributed negatively to the overall change in LIS, as the shares in the GDP of these sectors declined between 2005 and 2016.

We also undertake shift-share analysis of the manufacturing and service sectors divided into smaller subsectors (Figure 7). Unlike the previous analysis, due to the data limitation, we perform this analysis for the period 2010 to 2016. We divide the manufacturing sector into high-tech, mid-tech, and low-tech subsectors based on the R&D intensity of the subsectors relative to value-added and gross production. Similarly, we divide the service sector into modern services and other services, based on labor productivity. Appendix 3 provides the details of these subsectors.

Figure 7: Labor Income Share Shift-Share Analysis by Manufacturing and Services Subsector
(%)



Source: DOSM (various years), authors' calculations.

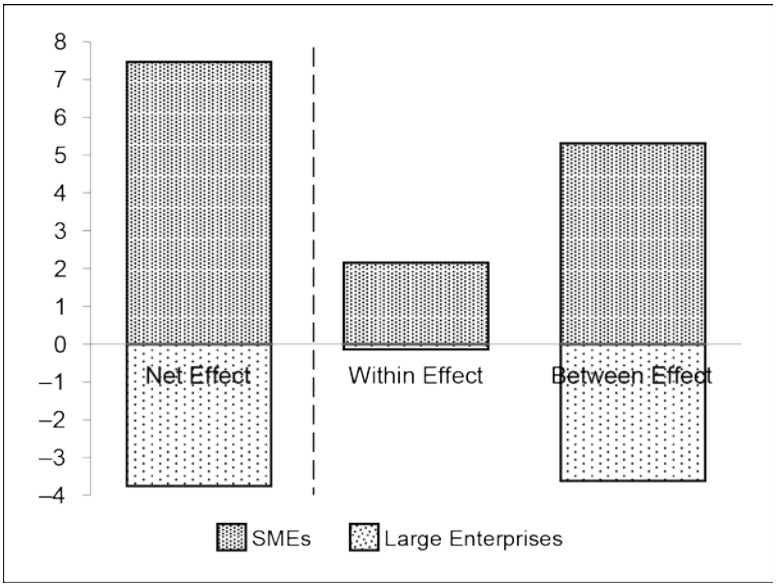
All three manufacturing subsectors contributed positively to the manufacturing sector within effect but negatively to the between effect from 2005 to 2016. All three subsectors cumulatively contributed 0.94 percentage points to the within effect and –2.37 percentage points to the between effect. The high-tech manufacturing subsector contributed the most to the within effect, with 0.78 percentage points; however, it also contributed most negatively to the between effect, with –1.89 percentage points. Like other economic sectors, high-tech manufacturing experienced an increase in the LIS, but this is offset by its shrinking importance in the Malaysian economy.

For the service subsectors, both modern services and other services contributed positively to the service sector within effect, while only other services contributed positively to the between effect. Both service subsectors cumulatively contributed 0.75 percentage points to the within effect and 1.46 percentage points to the between effect. Other services contributed 0.61 percentage points to the within effect and 1.48 percentage points to the between effect.

3.2 By Firm Sizes

We also conduct shift-share analysis for the LIS by firm size between 2010 and 2015, which we categorize into small and medium enterprises (SMEs) and large enterprises.[4] SMEs contributed an overall positive net within and between effect, with 7.47 percentage points, while large enterprises made a net negative contribution of –3.76 percentage points (Figure 8). SMEs contributed positively to the within effect, with 2.16 percentage points, while large enterprises contributed a small negative effect. SMEs also contributed positively to the between effect, with 5.31 percentage points, while large enterprises contributed negatively, with –3.62 percentage points.

Figure 8: Labor Income Share Shift-Share Analysis by Firm Size, 2010 to 2016
(%)



Source: DOSM (various years), authors' calculations.

3.3 Summary Findings of the Shift-Share Analysis

Overall, the shift-share analysis shows that the increase in the LIS in Malaysia is evident across most economic sectors and is not exclusively due to changes in the relative shares of the different economic sectors in the overall GDP. All the major economic sectors, including some other finer subsectors in the manufacturing and service sectors, experienced an increase in the LIS.

[4] Readers should be cautious regarding the analysis in this part due to the DOSM's change in the definition of SMEs. The definition of enterprises in the SME category changed in 2013. SME data derived from the 2011 census categorize SMEs in the manufacturing sector as enterprises with either fewer than 150 employees or less than RM25 million annual sales turnover. For other sectors, SMEs are enterprises with fewer than 50 employees or less than RM5 million annual sales turnover. For 2015, SME data derived from the 2015 census categorize SMEs in the manufacturing sector as enterprises with fewer than 200 employees or less than RM50 million annual turnover. For other sectors, SMEs are enterprises with fewer than 75 employees or less than RM20 million annual turnover.

Most notably, the service sector is the main contributor to the increase in the LIS – with combined within and between effects of more than 5.22 percentage points for the period 2005 to 2016 or more than 90% of the entire increase in the overall LIS unadjusted for own account workers for Malaysia during the period. Within the service sector, this change in turn is attributable to the increased importance of the more traditional service subsectors with lower labor productivity. The shift-share analysis of firm sizes could also reflect this; it attributes the entire change in the LIS to both the within and the between effects of SMEs, with large enterprises contributing negatively to the overall LIS. It is telling that almost 90% of all the SMEs in Malaysia are in the service sectors, mainly in the more traditional subsectors.

4. FACTORS AFFECTING THE LABOR INCOME SHARE IN MALAYSIA

The findings of the shift-share analysis suggest that broad-based underlying macro-economic factors, rather than sector-specific factors, could largely have driven the increase in the LIS. In this section, we proceed to focus on understanding the within effect underlying the increase in the LIS by identifying the potential factors leading to this change.

The literature has identified various important determinants, two of which researchers have commonly recognized as being crucial:

a) *Technological advancement* has affected the LIS by reducing the relative cost of capital, thereby incentivizing firms to substitute capital for labor in their production structure. The displacement of labor in this context is more pronounced where existing jobs experience greater exposure to routinization. Empirically, these mechanisms are the major contributor to the decline in the LIS in advanced economies, given their significant reliance on capital goods and greater initial exposure to routinization.[5]

b) *Trade and financial integration*, particularly participation in global value chains (GVCs), has decreased the LIS in both advanced and emerging and developing economies as a whole. In capital-intensive advanced economies, global integration enables firms to offshore more labor-intensive tasks to labor-intensive emerging economies, hence lowering the LIS in their production. In the recipient emerging economies, these tasks are nonetheless relatively more capital intensive than their existing tasks. Increased GVC participation therefore induces an increase in capital intensity—and a corresponding decrease in the LIS—in the receiving economies.[6]

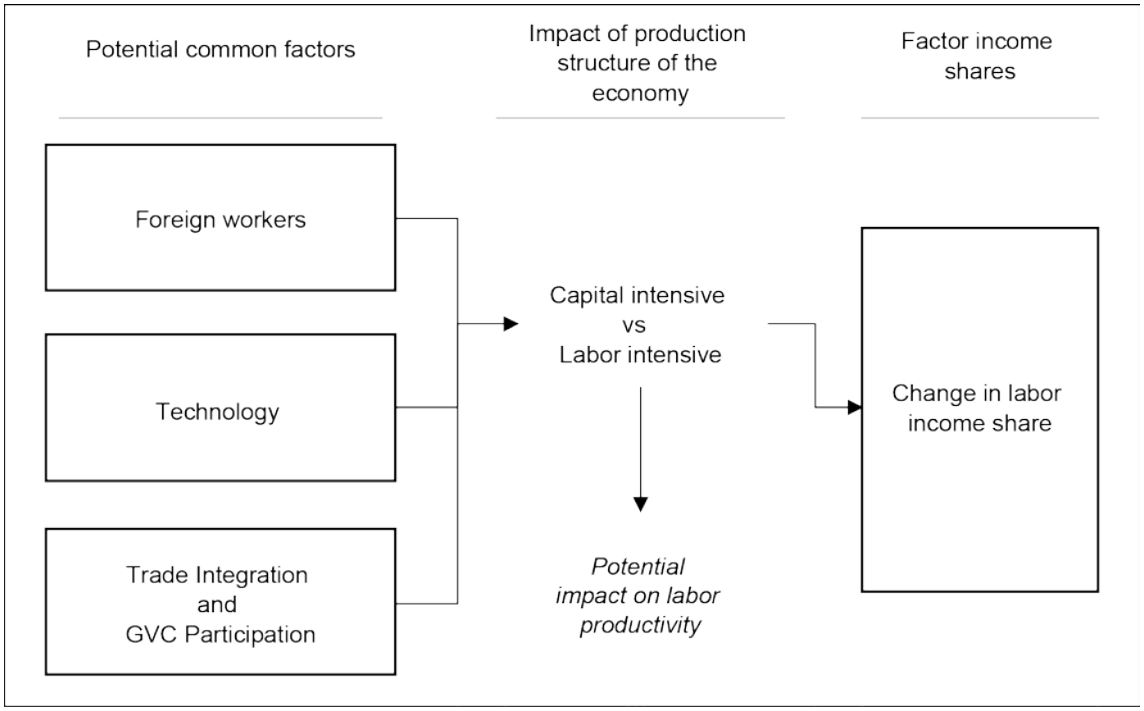
Essentially, the mechanisms at play reflect the channels through which different economies influence firms' choice of production structure, contributing to their respective LIS trend. In Malaysia, we argue that another important factor could also play a role in influencing this mechanism—the reliance on foreign workers in the workforce. The availability of low-cost foreign workers in the country could reduce the relative cost of labor below what it would otherwise have been without immigration and

[5] See, among others, Krusell (1998) for the link between information and communication technology and the price of investment goods and Autor and Dorn (2013) and Goos, Manning, and Salomons (2014) for the role of technology in the displacement of labor.

[6] See, among others, Feenstra and Hanson (1997), IMF (2017), and Elsby, Hobijn, and Şahin (2013) for detailed explanations of the mechanisms at play in emerging and developing economies.

encourage firms to employ a labor-intensive production structure, thus increasing the LIS.[7] Figure 9 summarizes and illustrates these channels and the mechanism.

Figure 9: The Mechanism through Different Factors that Affect the Labor Income Share



4.1 Model Specification

We perform a panel regression estimation to identify the key determinants of the LIS in Malaysia, using GDPI statistics and other information across 20 sectors[8] (N = 20) over the course of seven years (2010–2016; T = 7).

The dependent variable in our estimation model is the change in the LIS, whilst the explanatory variables consist of measures of the potential determinants, including changes in foreign workers' intensity as well as machine and equipment intensity (as a proxy for technological adoption).[9] Given the data limitation, there are no measures relating directly to trade or GVC participation in the model. However, we could account for the effects of trade intensity in two ways: first, we include a capital intensity variable in the model to capture said effects partially, since the variation in capital intensity across sectors mainly reflects the impact of GVC participation; second, we include a sector fixed effect—which accounts for time-invariant sector-specific heterogeneity—that could potentially control for the factor to the extent that sectors' GVC participation remains stable across time. Besides, we include changes in labor productivity as an

[7] For a more complete treatment of the assumption of the underlying production function behind the discussion throughout this section, refer to Appendix 4.

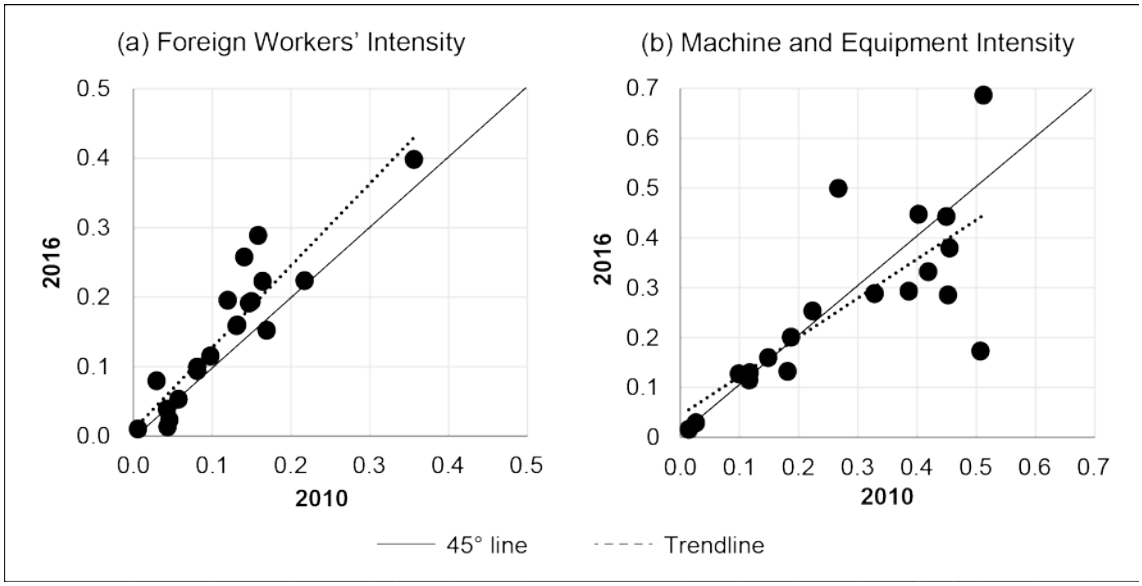
[8] Appendix 3 contains detailed information on the full list of 21 sectors according to the Malaysia Standard Industrial Classification (MSIC) 2008 version 1.0. For the purpose of econometric analysis, we exclude the mining and quarrying sector due to its outlying labor productivity statistics, which we can attribute to the resource-based nature of the sector.

[9] Appendix 1 provides detailed explanations for these various intensities.

additional independent variable. Appendix 5 outlines further details of the estimation, including the model specification and specification tests.

Figure 10 provides a cursory overview of the trends in the determinants that we use in the model across sectors. From 2010 to 2016, foreign workers' intensity clearly increased. Machine and equipment intensity, on the other hand, generally declined within the same period of time.

Figure 10: Trends in Potential Determinants of the Labor Income Share in Malaysia, 2010–2016



Source: DOSM (various years), authors' calculations.

4.2 Results

Table 1 presents the results of our baseline regressions, with Panel A being our main focus, whilst Panel B serves as a robustness check. In particular, we find the following:

- *As expected, the change in foreign workers' intensity is strongly positively correlated with LIS change*. In almost every specification of the model, sectors that displayed a greater increase in foreign workers' intensity experienced a more pronounced increase in the LIS. By way of explanation, this is consistent with the findings of the World Bank (2015), in which foreign workers benefited semi-skilled Malaysians the most in the labor market. As section 2.1 elaborated, the biggest increase in the LIS can be traced to the increase in those who are in the semi-skilled category.
- *The changes in machines and equipment as well as capital intensity exhibit negative coefficients, but the correlations are statistically insignificant.* The negative correlation implies that the downward trend in technological adoption that we observe could play a role in explaining Malaysia's upward LIS trend, although this trend is not statistically significant.
- *The change in labor productivity is negatively correlated with the change in the LIS.* As shown in specifications (4) and (5), sectors that experienced a decline in their labor productivity tend to witness a rise in their labor income share.

In summary, the results from the panel estimation suggest that the economic sectors that shifted to greater reliance on low-skilled foreign workers and experienced a decline in labor productivity witnessed increases in the LIS in Malaysia between 2010 and 2016.

Table 1: Regression Results

Explanatory Variables	(1)	(2)	(3)	(4)	(5)
	Panel A: Excluding the Mining and Quarrying Sector				
Log Foreign Workers' Intensity	0.055** (0.024)	0.056** (0.024)	0.056** (0.025)	0.043** (0.019)	0.043** (0.020)
Log Machine and Equipment Intensity		–0.030 (0.046)	–0.039 (0.049)		–0.020 (0.033)
Log Capital Intensity			–0.320 (0.365)		–0.195 (0.268)
Log Labor Productivity				–0.452*** (0.123)	–0.449*** (0.122)
Constant	0.009*** (0.001)	0.008*** (0.001)	0.020 (0.013)	0.018*** (0.002)	0.025** (0.010)
Sector Fixed Effect	Yes	Yes	Yes	Yes	Yes
Observations	120	120	120	120	120
Overall R^2	0.094	0.093	0.077	0.336	0.322
	Panel B: Including All Sectors				
Log Foreign Workers' Intensity	0.052** (0.023)	0.052** (0.023)	0.053** (0.024)	0.038* (0.019)	0.040* (0.020)
Log Machine and Equipment Intensity		–0.033 (0.047)	–0.040 (0.046)		–0.034 (0.036)
Log Capital Intensity			–0.336 (0.324)		0.312 (0.263)
Log Labor Productivity				–0.373*** (0.123)	–0.371*** (0.121)
Constant	0.011*** (0.000)	0.010*** (0.001)	0.023* (0.012)	0.017*** (0.002)	0.028** (0.010)
Sector Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	126	126	126	126	126
Overall R^2	0.083	0.082	0.056	0.298	0.267

Notes:

1. The dependent variable for all the specifications is *the change in the log labor income share*.
2. Standard errors appear in parentheses. They are heteroskedasticity robust and clustered by sector.
3. All the variables, including the dependent variable, that is, the labor income share, are first differenced.
4. * denotes statistical significance at the 10% level, ** at the 5% level, and *** at the 1% level.

5. CONCLUSION: POLICY DISCUSSION

To recap, we find that the increase in the LIS in Malaysia since 2005 was common to all the major economic sectors, with each of them experiencing increases in the LIS to various degrees. The service sector is the main contributor to the overall increase in the LIS, due to both the increase in the LIS within the service sector itself and the growing share of the service sector in the overall economy. Within the service sector, this in turn is a result of the growing share of the more traditional service subsectors rather than the modern service subsectors. Relatedly, in terms of firm sizes, the

increase in the LIS is due entirely to the SMEs experiencing an increasing LIS as well as the growing share of SMEs in the economy. Most SMEs in the Malaysian economy are in the more traditional service subsectors. In terms of the underlying factors, the increase in the LIS in Malaysia is associated with greater reliance on low-skilled foreign workers in the period investigated. More broadly, it is in fact not inconsistent to consider the overall increase in the LIS as an outcome of the deindustrialization of the Malaysian economy that has taken place since the early 2000s.[10]

From the increase in the LIS and the declining income inequality, it appears that, over the last decade, the growth in the Malaysian economy has become more inclusive in nature. Structurally, however, an accompanying transition has occurred away from a more capital-intensive to a more labor-intensive model—a structure that is skewed toward medium- and low-skilled workers with lower labor productivity, more traditional service subsectors rather than high-tech manufacturing, and smaller firms rather than larger enterprises.

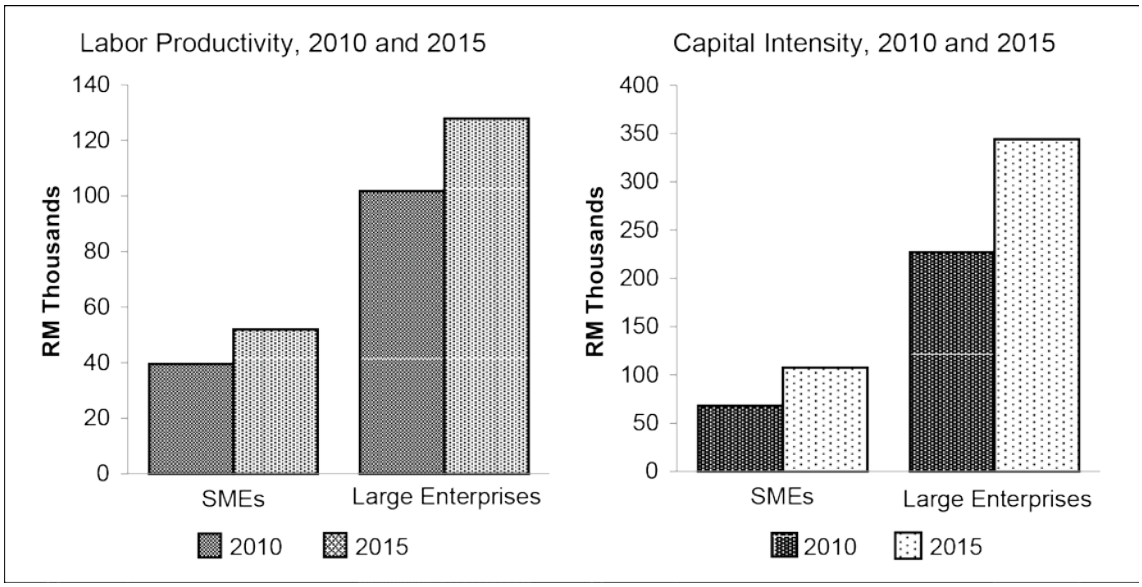
This raises a number of important policy implications. Firstly, our findings call for more careful consideration of the use of the LIS as a macroeconomic goal. In the *Eleventh Malaysia Plan* (Economic Planning Unit (EPU) 2015), the Malaysian government explicitly targeted a higher level of the LIS by the year 2020 for Malaysia to be on par with other middle- and high-income countries.[11] It is necessary to understand the changes in the LIS alongside the broader structural changes that are occurring in the Malaysian economy. Within the current context, the increase in the LIS, while a decline in income inequality accompanies it, is tied to growth- and productivity-reducing structural change for Malaysia in the longer term. If the overarching objective is for Malaysia to become a more advanced economy, the use of the LIS as a target is clearly not a very meaningful one in this case.

Secondly, our paper highlights that policies enabling Malaysia to move toward an economy that is simultaneously productivity driven and inclusive are potentially fraught with multiple inter-linked trade-offs that could be self-defeating. For example, looking specifically at the SMEs, our results show that the increase in the LIS in recent years is attributable to SMEs—they created significant job opportunities, employing 65% of all workers in Malaysia in 2016. At the same time, SMEs lag significantly behind large enterprises in terms of productivity and investment (Figure 11). As such, policies to raise the importance of SMEs in the economy, without a significant effort to modernize them, could have an adverse impact on the aggregate productivity and future growth potential of the overall economy.

[10] As KRI (2017) discussed.

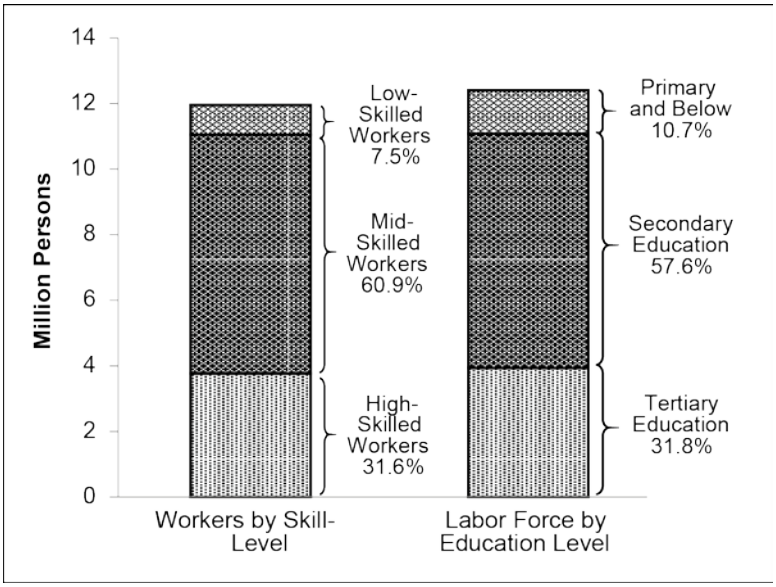
[11] Specifically, under the objective of “reducing wage gap to improve equity,” “the Government aims to increase the compensation of employees to GDP from 33.6% in 2013 to 40% in 2020, to be on the same level as other middle- and high-income countries” (EPU 2015, 5–16).

Figure 11: Labor Productivity and Capital Intensity by Firm Size, 2010 and 2015



Source: DOSM (various years), authors' calculations.

Figure 12: Employment by Skill and Labor Force by Education Level of Malaysians, 2016



Source: DOSM (2017).

Lastly, our results provide further evidence that Malaysia is currently deindustrializing negatively,[12] with the decline in the share of the manufacturing sector, especially in the high-tech subsector, being replaced by the more traditional service subsector rather than higher value-added modern services. This is arguably one of the most pressing economic issues for Malaysia in the long term. A comprehensive policy discussion with regard to the negative deindustrialization of Malaysia is beyond the scope of this paper, but our findings offer two important directions for policies to investigate:

[12] For example, as Rasiah (2011) and Menon and Ng (2015) highlighted.

- *Reliance on low-skilled foreign workers.* Our findings suggest that, beyond labor market outcomes, the increase in dependence on low-skilled foreign workers in Malaysia has important structural implications for the economy too. While not necessarily implying causality, the close empirical association between the increased reliance on foreign workers and the more general shift to labor-intensive, lower-productivity sectors warrants closer scrutiny.
- *Increased importance of SMEs to the Malaysian economy.* The structural change in the Malaysian economy is evident not just in the shift across economic sectors but also in the change toward smaller firms. As discussed above, Malaysian SMEs currently operate mainly in lower value-added services and lag behind larger enterprises in terms of productivity. This does not always have to be the case. Across many advanced economies, SMEs are not only a main source of employment but are also often the driving force behind radical innovations, which are important for economic growth and contribute more broadly to value creation by adopting innovation generated elsewhere and adapting it to different contexts (OECD 2010). A promising path that Malaysia can take advantage of to modernize its SMEs is through the use of modern technologies. Recent advances in digital technologies have significantly expanded the potential for SMEs to accelerate innovation, enhance productivity, and access larger markets (OECD 2017).

In conclusion, unlike most countries in the world, Malaysia has been experiencing an increase in the LIS. We find that this experience is consistent with the deindustrialization of the Malaysian economy, which is linked to a transition away from a more capital-intensive to a more labor-intensive structure—with greater reliance on low-skilled foreign workers and lower labor productivity growth. This contrarian trend offers salient insights that could be relevant to the experiences of, and policy choices available to, other emerging economies facing deindustrialization.

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APPENDIX 1: DATA SOURCES AND DESCRIPTIONS

The data that we use for calculating the various indicators come from various publications from the DOSM:

1. *National Accounts: Gross Domestic Product Income Approach*, 2010–2016
2. *National Accounts: Annual National Accounts Gross Domestic Product (GDP)*, 2005–2016
3. *National Accounts: Capital Stock Statistics*, 2010–2016
4. *Labour Force Survey*, 2005–2016
5. *Salaries & Wages Survey Report*, 2010–2016
6. *Economic Census Profile of Small and Medium Enterprises,* 2010 and 2015
7. *Economic Census*, 2010 and 2015
8. *Household Income Survey*, 2016

We define the various intensities that we use as:

1. Foreign workers' intensity: the ratio of the number of foreign workers to the total employed.
2. Capital intensity: the ratio of net real capital stock to the number of employments.
3. Machine and equipment intensity: the ratio of the machine and equipment component of the net capital stock to the total net capital stock.

APPENDIX 2: SHIFT-SHARE ANALYSIS

$$\underbrace{LIS_T - LIS_0}_{\text{Total}} \approx \underbrace{\sum_i (LIS_T - LIS_0) \times W_{iT}}_{\text{Within Effect}} + \underbrace{\sum_i (W_{iT} - W_{i0}) \times L_{iT}}_{\text{Between Effect}}$$

LIS = Labor income share

W = GDP share

i = Sector

T = Final year (2016)

0 = Starting year (2005 or 2010)

Source: Adapted from Abdih and Danninger (2017).

APPENDIX 3: TWENTY-ONE ECONOMIC SUBSECTORS, CATEGORIZATION OF WORKERS BY SKILL LEVEL, AND MANUFACTURING AND SERVICE SUBSECTORS

A. Twenty-One Economic Subsectors

Adapted from Malaysia Standard Industrial Classification (MSIC) 2008 version 1.0

1. Rubber, oil palm, livestock, and other agriculture
2. Forestry and logging
3. Fishing
4. Mining and quarrying
5. Food, beverages, and tobacco
6. Textiles, wearing apparel, and leather products
7. Wood products, furniture, paper products, and printing
8. Petroleum, chemical, rubber, and plastic products
9. Non-metallic mineral products, basic metal and fabricated metal products
10. Electrical, electronic, and optical products
11. Transport equipment, other manufacturing, and repair
12. Construction
13. Electricity, gas, steam, and air conditioning supply
14. Water supply, sewerage, waste management, and remediation activities
15. Wholesale and retail trade, repair of motor vehicles and motorcycles
16. Transportation and storage
17. Accommodation and food and beverage services
18. Information and communication
19. Financial and insurance/takaful activities
20. Real estate activities
21. Professional, scientific, and technical activities

B. High-, Medium-, and Low-Skilled Workers

Skill categorization is based on the DOSM and the Malaysia Standard Classification of Occupations (MASCO) 2013

High-Skilled Workers

1. Managers
2. Professionals
3. Technicians and associate professionals

Medium-Skilled Workers

1. Clerical support workers
2. Services and sales workers
3. Skilled agricultural, forestry, and fishery workers
4. Craft and related trade workers
5. Plant and machine operators and assemblers

Low-Skilled Workers

1. Elementary occupations

C Low-, Medium (Mid-), and High-Tech Manufacturing

Modified in accordance with UNIDO's classification, following the OECD technology classification based on R&D intensity relative to value added and gross production (ISIC categorization)

High-Tech

1. Electrical, electronic, and optical products
2. Transport equipment, other manufacturing, and repair

Medium (Mid-) Tech

1. Petroleum, chemical, rubber, and plastic products
2. Non-metallic mineral products, basic metal and fabricated metal products

Low-Tech

1. Food, beverages, and tobacco
2. Textiles, wearing apparel, and leather products
3. Wood products, furniture, paper products, and printing

Modern Services

Following the Asian Development Bank (2013), adapted from Eichengreen and Gupta (2009) based on labor productivity (ISIC categorization)

1. Information and communication
2. Financial and insurance activities
3. Real estate activities
4. Professional, scientific, and technical activities

APPENDIX 4: FORMAL TREATMENT OF THE RELEVANT PRODUCTION FUNCTION

This section provides a detailed explanation of some key concepts underlying the channels through which the main drivers affect the labor income share, including the production function framework and the elasticity of substitution between capital and labor. The explanation below draws from the Estrada and Valdeolivas's (2012) discussion.

The upward LIS trend observed in Malaysia—or the downward trend experienced elsewhere—signals the invalidity of unitary elasticity of substitution between capital and labor that conventional production functions, such as Cobb–Douglas, assume, as it implies a constant LIS. One way to rethink this is by considering a constant elasticity of substitution (CES) production function, which allows the elasticity of substitution between capital and labor to be different from one. In this case, should there be changes in the relative cost of either factor of production, the LIS would not be constant.

For this task, Arpaia, Pérez, and Pichelmann (2009) provided a comprehensive approach. Essentially, it considers and merges four production factors through a series of nested CES production functions, thus allowing for different elasticities of substitution among them.

Firstly, at the lower level of the production process is a CES function involving skilled labor (L_S) and capital (AK, where A denotes a capital-augmenting technological process), which produces the composite input, denoted X, for the subsequent production function specified later.

$$X = \{a(AK)^{\frac{\eta-1}{\eta}} + (1-a)(L_S)^{\frac{\eta-1}{\eta}}\}^{\frac{\eta-1}{\eta}}$$

η represents the elasticity of substitution between L_S and K. If η is lower (higher) than 1, it implies that an increase in the supply of capital would increase (decrease) the share of skilled labor compensation (on the production of X). In other words, an η that is lower than one means that the two production factors are complements; if it is higher than one, they are substitutes.

The second CES function involves the combination of the previous composite input (X) and unskilled labor (L_U) to generate value added (Y). ρ is the new elasticity of substitution in this function, which allows for different degrees of complementarity between capital and the two types of labor.

$$Y = \{\alpha(X)^{\frac{\rho-1}{\rho}} + (1-\alpha)(L_U)^{\frac{\rho-1}{\rho}}\}^{\frac{\rho-1}{\rho}}$$

Given the characterization of technology that the above CES production functions specify, we can infer that the LIS will depend, non-linearly, on four key variables, namely capital-augmenting technological progress, capital intensity, the unskilled–skilled labor ratio, and the capital–skilled labor ratio. How the LIS changes with respect to these variables depends on the degrees of substitutability between the different production factors laid out above. The remainder of this section focuses on explaining the conditions necessary to eventuate a positive impact on the LIS via these variables, which is what happens in Malaysia.

First, the condition for capital-augmenting technological progress to have a positive impact on the LIS is that composite input X and unskilled labor are substitutes. This implies that a negative shock of capital-augmenting technology increases the income share of unskilled labor. The income share of skilled labor, on the other hand, can either increase or decrease, since it is the product of the income share of the composite capital–skilled labor in the value added—which decreases under the previous condition—and the income share of skilled labor in the composite—the change of which depends on the elasticity of substitution between capital and skilled labor. When the two factors are complements, negative technological shocks will lead to a decrease in skilled labor's income share. However, if the degree of complementarity is lower than the degree of substitutability between the unskilled labor and the composite, the decrease will not be enough to outweigh the increase in the unskilled labor income share. As a result, the overall labor income share will increase.

Second, the conditions to yield a positive impact on the LIS through capital intensity are essentially similar to those in the previous case, for the same reasons. In fact, the theoretical model indicates that the two variables should enter the model with the same parameter.

Third, for the unskilled–skilled labor ratio to affect the LIS positively, again, composite X and unskilled labor must be substitutes. In this case, it means that an increase in the ratio increases the unskilled labor income share. As for skilled labor, two counteracting forces are at play: less skilled workers will be employed but with a higher skill premium due to the decrease in supply. The two scenarios combine to result in an overall increase in the labor income share.

Lastly, the capital–skilled labor ratio has an unambiguously positive relationship with the LIS. In other words, when the capital supply decreases below the supply of skilled labor, the relative demand for skilled labor will drop correspondingly, exerting downward pressure on the wage premium and, thus, the labor income share of skilled labor. This mechanism, however, has no effect on the unskilled labor income share.

These conditions are important in understanding how changes in these variables led to the increase in the LIS in Malaysia during the past decade; the econometric analysis section in the paper formally establishes the relationship between these variables, except for the capital–skilled labor ratio due to the data limitation.[1]

[1] Different indicators measure the three variables that this section outlines in the econometric model. Machine and equipment intensity acts as a proxy for capital-augmenting technological progress and foreign workers' intensity provides a proxy for the unskilled–skilled labor ratio (given that foreign workers in Malaysia generally occupy lower-skilled jobs than Malaysians), whereas the ratio of net capital stock to the number of employments, instead of the capital–output ratio that Estrada and Valdeolivas (2012) used, measures the capital intensity.

APPENDIX 5: FURTHER DETAILS OF THE ECONOMETRIC ANALYSIS

This section explains in detail the econometric analysis that this study employs. The baseline estimation equation of the regression is as below:

$$Y_{it} = \alpha_i + \delta_t + \beta_1 X'_{it} + \beta_2 C_{it} + \varepsilon_{it}$$

where

(i) i denotes the sector and t denotes the year;

(ii) Y_{it} is the dependent variable, that is, the labor income share;

(iii) X'_{it} is the vector of explanatory variables of interest, including foreign workers' intensity, machine and equipment intensity, and capital intensity;

(iv) C_{it} is the additional independent variable, namely labor productivity;

(v) α_i and δ_t are sector and year fixed effects, respectively; and

(vi) ε_{it} is the error term.

The main coefficients of interest are β_1, which capture the extent to which the corresponding variation in the potential determinants can explain the variation in the labor income share. The sector and year fixed effects essentially capture industry- and year-specific economic and social confounding factors.

Specification Tests

Because the time dimension, T, of the dataset is small, we perform the Harris–Tzavalis test[1] to test for unit roots in the panel. For most of the variables, we cannot reject the hypothesis of the presence of unit roots at level; thus, we apply first differencing to obtain stationary series. We also estimate the model using standard errors clustered by industry to address the serial correlation concern in the panel. Besides, to detect the presence of random effects, we test the model for over-identifying restrictions—a Hausman-type test that is robust to heteroskedasticity and within-group correlation. The test finds no random effects in all the specifications of the model. We also test the joint significance of year-specific effects using the F-test. For all the specifications, we cannot reject the hypothesis that the year-specific effects are jointly statistically insignificant; therefore, we do not include year-specific effects in any of them.

[1] The Harris–Tzavalis test is a unit root test that assumes that T is fixed.