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Revitalising Indonesia's Manufacturing
The Productivity Conundrum

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Abstract

In light of the continuing importance, but declining dynamism, of the manufacturing sector, this paper investigates trends in productivity at firm levels. It finds that labour productivity has been either stagnant or falling in labour-intensive manufacturing. The paper uses firm level cross-sectional and time series data and employs GMM techniques to estimate determinants of productivity. It finds that real wage is the most important variable that influences firm level productivity, followed by capital intensity. Contrary to the common perception, foreign ownership and export orientation are not found to have statistically significant influence on firm level productivity. This finding is consistent for firms of all sizes—large, medium, small and micro. This implies that Indonesia can use wages policy, as Singapore did during the late 1970s to mid-1980s, to upgrade its manufacturing to higher value-added activities.

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Keywords

manufacturing – productivity – firm size – real wage – GMM

Introduction

The manufacturing sector was the main driving force in Indonesia's transformation until the 1997 Asian financial crisis, with an average annual growth of around 9 per cent during 1970–1997, higher than the economy-wide average growth of around 6.5 per cent. However, manufacturing seems to have lost its dynamism during the post-crisis period. Its average annual growth rate declined to 4.9 per cent during 2003–2015 when the economy grew at an average annual rate of 5.6 per cent. The persistent decline in relative importance of the manufacturing sector has led a number of observers to note a case of premature de-industrialisation in post-crisis Indonesia.[1] In fact, one study identified the beginning of the decline in traditional manufacturing competitiveness even few years before the onset of the crisis.[2] The post-crisis manufacturing growth has also been labelled jobless growth as the sector experienced the steepest decline in employment-to-output elasticity relative to other economic sectors.[3]

1 See Haryo Aswicahyono, Hal Hill and Dionisius Narjoko, 'Indonesian industrialization: a latecomer adjusting to crises', in Adam Szirmai, Wim Naudé and Ludovico Alcorta (eds), *Pathways to Industrialization in the Twenty-first Century: New Challenges and Emerging Paradigms* (Oxford: Oxford University Press, 2013), pp. 193–222; Wim Naudé, 'Why Indonesia needs a more innovative industrial policy', *ASEAN Journal of Economics, Management and Accounting*, Vol. 1, No. 1 (2013), pp. 48–65; Raz Arisyi Fariza, 'In search of better industrial policy in Indonesia', *Jakarta Post* (13 August 2013); World Bank, *Indonesia Economic Quarterly: Resilience through Reforms* (Jakarta: World Bank, June 2016). Concerns on the de-industrialisation have also been featured in the popular media: among others, see *'Pertumbuhan Industri Gagal Capai Target, Gejala Deindustrialisasi?'* (The industry sector failed to reach the targeted growth, sign of deindustrialisation?), *Bisnis Indonesia* (4 February 2015); *'Deindustrialisasi Kembali Intai Indonesia'* (Deindustrialisation haunts Indonesia), *Bisnis Indonesia* (7 May 2014); *'Indef: Indonesia Terjebak Deindustrialisasi'* (Indonesia is trapped by deindustrialisation), *Koran Tempo* (7 November 2013); *'LIPI: Indonesia Menuju Deindustrialisasi'* (LIPI: Indonesia is heading towards deindustrialisation), *Kompas* (22 December 2010).

2 Shafiq Dhanani, *Indonesia: Strategy for Manufacturing Competitiveness* (Jakarta: UNIDO, 2000).

3 Haryo Aswicahyono, Hal Hill and Dionisius Narjoko, 'Indonesian industrialisation: jobless growth?' in Chris Manning and Sudarno Sumarto (eds), *Employment, Living Standards and*

Recent data on Indonesia's exports by ISIC also point to the manufacturing sector's declining relative position. In 2009, manufacturing products contributed almost 63 per cent to total exports and this figure dropped to around 59 per cent in 2012 and 2013. Meanwhile, the share of non-manufacturing exports increased from 37 per cent in 2009 to over 42 per cent in 2012.

The above developments have been summarised in the latest assessment of the World Bank in the following words:

> Indonesia's manufacturing growth experienced a structural break following the 1997/98 Asian financial crisis. Real manufacturing growth plummeted from 11 percent annually between 1990 and 1996 to 4.8 percent in the period from 2001 to 2014 … and the country experienced a 'premature deindustrialization'. Following a rapid rise in the 1990s, the share of manufacturing in total output has fallen sharply since 2005, giving way to a rapid expansion of low-end services absorbing labor released from rural activities … [T]his structural change occurred at a low level of per capita income and before industrialization reached maturity, reflecting a premature 'de-industrialization'.[4]

However, despite the reversing trend, the manufacturing sector continues to play an important role in the Indonesian economy. Furthermore, the need to revitalise the Indonesian manufacturing sector has been advocated by all quarters.[5] This is because of an overarching argument that 'manufacturing offers greater opportunities for job creation (in terms of quantity and quality), facil-

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Poverty in Contemporary Indonesia (Singapore: Institute of Southeast Asian Studies, 2011), pp. 113–133; Aswicahyono et al., 'Indonesian industrialization: a latecomer'; Mohammad Zulfan Tadjoeddin and Anis Chowdhury, 'Employment function for Indonesia: an econometric analysis at the sectoral level', *Journal of Developing Areas*, Vol. 46, No. 1 (2012), pp. 265–285; Dionisius Narjoko and Chandra Tri Putra, 'Industrialization, globalization and labour market regime in Indonesia', *Journal of the Asia Pacific Economy*, Vol. 20, No. 1 (2015), pp. 57–76; Arief Yusuf, Ahmad Komarulzaman, Raden M. Purnagunawan and Budy Resosudarmo, *Growth, Poverty, and Labour Market Rigidity in Indonesia: A General Equilibrium Investigation*, Working Paper in Economics and Development Studies (WoPEDS) No. 201304 (Bandung: Padjajaran University, 2013).

4 World Bank, *Indonesia Economic Quarterly: Resilience through Reforms*, p. 27.

5 See e.g. World Bank, *Picking up the Pace: Reviving Growth in Indonesia's Manufacturing Sector* (Jakarta: World Bank, 2012); World Bank, *Policy Note 1: Why the Manufacturing Sector Still Matters for Growth and Development in Indonesia* (Jakarta: World Bank, 2012); Asian Development Bank, *Asia's Economic Transformation: Where To, How, and How Fast?—Key Indicators for Asia and the Pacific 2013, Special Chapter* (Manila: Asian Development Bank, 2013).

itates positive structural transformation, exhibits higher labour productivity than other sectors, provides an important conduit for social upgrading and promotes opportunities to close the gender gap.'[6] The Asian Development Bank also stresses the importance of manufacturing in the context of structural transformation of the economy, as industrialisation is a step that, in general, is difficult to bypass on the path to becoming a high-income economy.[7]

In light of the above, this paper will attempt to investigate the proximate causes of the manufacturing sector's relative decline. In particular, it will look at productivity trends within the manufacturing sector by firm size and some key characteristics, such as factor intensity, ownership (foreign) and export orientation. It is possible to analyse productivity trends and investigate factors driving these trends at a disaggregated level thanks to the availability of two sources of firm level data for the manufacturing sector: the long-standing Large and Medium Manufacturing Survey (*Survei Industri Besar dan Sedang*) and the newly introduced Micro and Small Manufacturing Survey (*Survei Industri Mikro dan Kecil*). The paper is organised as follows: the next section reflects on the 'de-industrialisation' phenomenon; the third section examines the transformation or dynamism of the manufacturing sector; the fourth section discusses productivity trends within manufacturing; the fifth section presents results of econometric exercises for the determinants of firm level productivity. The final section contains concluding remarks, highlighting policy implications.

The Structural Transformation and 'De-Industrialisation' of the Indonesian Economy

During the three decades prior to the Asian financial crisis, the Indonesian economy was following the classical route of structural transformation from agriculture to manufacturing. Figure 1 depicts the transformation during 1971–1997. As can be seen, the agricultural sector's contribution to overall GDP dropped sharply from 53 per cent to only 15 per cent, while the manufacturing sector's share in overall GDP jumped from 8 per cent to 25 per cent during this period. Commensurate with this shift, the respective shares of agriculture and manufacturing in total employment also changed, albeit rather slowly—falling from 67 per cent to 44 per cent in the case of agriculture and rising from 7 per cent to 13 per cent in the case of manufacturing.

6 World Bank, *Picking up the Pace*, p. 3.

7 Asian Development Bank, *Asia's Economic Transformation*.

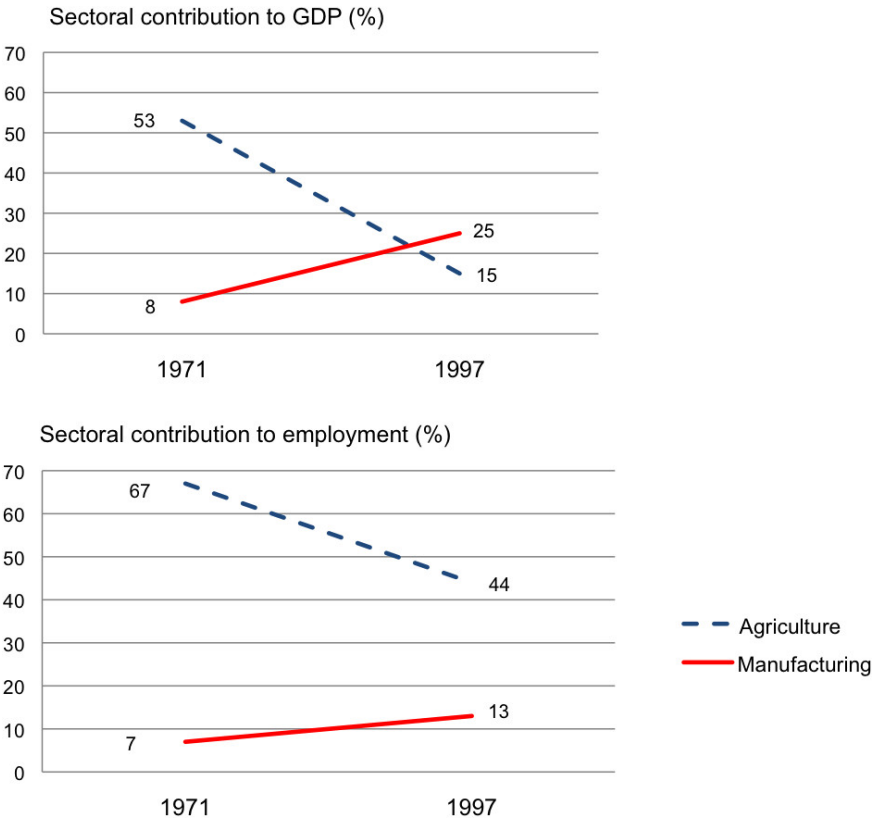

FIGURE 1 *Structural transformation, 1971 and 1997.* Note: *Statistics Indonesia (BPS) has regularly published the* National Income Account *yearly and quarterly since the mid-1970s. In addition, BPS also publishes a regional income account at provincial and district levels. The Sakernas was initiated in 1976 to cover national labour market characteristics of all working-age individuals within sampled households. However, it has been conducted on a regular basis only since 1986. It was conducted quarterly from 1986 to 1993, annually from 1994 to 2004, biannually from 2005 to 2010, and again quarterly from 2011 onwards. The August Sakernas has the largest sample size, of around 200,000 households. Furthermore the survey quality has been constantly improved.*

SOURCE: CALCULATED FROM STATISTICS INDONESIA (BPS) DATA: NATIONAL INCOME ACCOUNT AND NATIONAL LABOUR FORCE SURVEY/(SAKERNAS)

This trend of structural transformation has changed during the post-crisis period (2001–2014) when the GDP and employment shares of the agricultural sector continued to decline, as expected, but the manufacturing sector's contribution to GDP fell from 28 per cent to 25 per cent. The manufacturing sector's contribution to employment was relatively stagnant, barely increasing from 13 per cent to 14 per cent (Figure 2). Thus, Indonesia seems to be experiencing

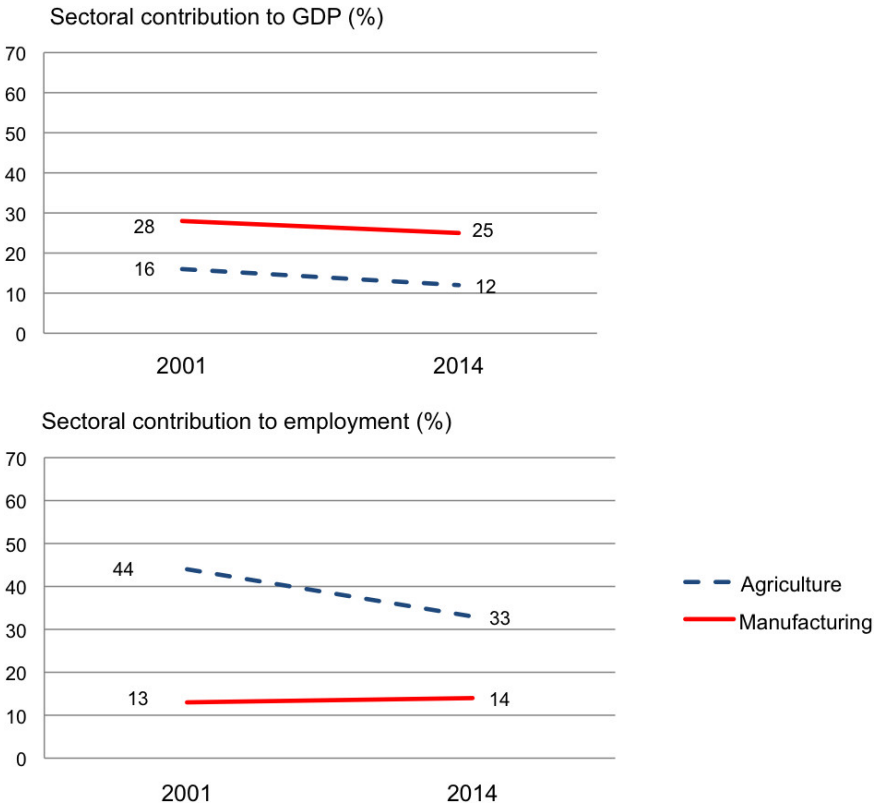

FIGURE 2 *De-industrialisation, 2001 and 2014*
SOURCE: CALCULATED FROM BPS DATA

a process of de-industrialisation. The term 'de-industrialisation' refers to the declining shares of either the manufacturing sector's GDP or employment in the overall economy.[8]

De-industrialisation is a natural process of development. Rowthorn and Ramaswamy argued that de-industrialisation in advanced economies is not a negative phenomenon but a natural consequence of further growth.[9] The main reason for de-industrialisation is the faster growth of productivity in

8 Fiona Tregenna, 'Deindustrialization and reindustrialization', in Adam Szirmai, Wim Naudé and Ludovico Alcorta (eds), *Pathways to Industrialization in the Twenty-first Century: New Challenges and Emerging Paradigms* (Oxford: Oxford University Press, 2013), pp. 76–101.

9 Robert Rowthorn and Ramana Ramaswamy, *Deindustrialization: Causes and Implications*, IMF Working Paper 97/42 (Washington, DC: International Monetary Fund, 1997).

manufacturing than in services. This is labelled positive de-industrialisation. Rowthorn and Wells defined positive de-industrialisation as:

> the normal result of sustained economic growth in a fully employed, and already highly developed, economy. It occurs because productivity growth in the manufacturing sector is so rapid that, despite increasing output, employment in this sector is reduced, either absolutely or as a share of total employment. However, this does not lead to unemployment, because new jobs are created in the service sector on a scale sufficient to absorb any workers displaced from manufacturing. Paradoxically, this kind of de-industrialization is a symptom of economic success.[10]

On the other hand, negative de-industrialisation is 'a product of economic failure and occurs when industry is in severe difficulties … labour shed from the manufacturing sector—because of falling output or rising productivity—will not be reabsorbed into the service sector. Unemployment will therefore rise.'[11]

Aswicahyono et al., however, advanced the idea that the Indonesian economy seems to be experiencing 'premature' de-industrialisation, in that the Indonesian economy passed the peak of manufacturing industry's contribution to the overall GDP at around 28 per cent, which is quite low.[12] In advanced economies, the peak of the manufacturing sector's contributions to GDP was achieved in the 1960s and the turning points were much higher, e.g. around 36 per cent in Japan and 32 per cent in the European Union; the average for industrial countries was 30 per cent.[13] More importantly, at the peak of industrialisation in advanced economies, the employment share of the manufacturing sector was more or less comparable to the sector's share of GDP. In Indonesia, employment share of the manufacturing sector is far lower than its share in GDP, indicating the failure of this sector in absorbing surplus labour from the agricultural sector, *à la* Lewis model.[14] The majority of the 9.4 percentage points decline of agriculture's employment share was absorbed by the service sector (4 percentage points), construction sector (2.2 percentage points) and

10 Robert Rowthorn and John R. Wells, *De-industrialization and Foreign Trade* (Cambridge: Cambridge University Press, 1987), p. 5.

11 Rowthorn and Wells, *De-industrialization and Foreign Trade*, p. 5.

12 Aswicahyono et al., 'Indonesian industrialization: a latecomer'.

13 Rowthorn and Ramaswamy, *Deindustrialization*.

14 Arthur Lewis, *Economic Development with Unlimited Supplies of Labour*, Manchester School of Economics and Social Studies No. 22 (1954), pp. 139–191.

trade sector (2.5 percentage points). The manufacturing sector, which is supposed to be more dynamic, did not absorb any.

Thus, Indonesia's manufacturing sector during the past decade has resonated with the negative de-industrialisation scenario.[15] A further indication of negative de-industrialisation is the manufacturing sector's slow productivity growth. During 2001–2014, the manufacturing sector's productivity growth was only 3.7 per cent, below that of agriculture and trade (4.6 per cent and 4.5 per cent respectively), and less than the overall productivity growth of the economy (4.6 per cent); see Table 1. Services and construction were two sectors with productivity growth at only 1.7 per cent and 2.1 per cent respectively, much lower than the overall productivity growth of the economy. The service sector's slow productivity growth indicates that post-crisis Indonesia has aborted the historical path of structural transformation (*à la* Chenery and Kuznets)[16] followed by advanced countries, including the newly industrialised ones, where the high productivity services sector took over the dynamism from the manufacturing sector.

Paradoxically, however, the manufacturing sector remains the most important sector in the Indonesian economy, despite apparent de-industrialisation. During 2001–2014, among the nine economic sectors, the manufacturing sector recorded the highest contribution (25.5 per cent) to the overall GDP and the main engine of growth with the largest contributor (23 per cent) to the overall GDP growth. Nevertheless, the sector's importance in terms of employment contribution was much less. As mentioned earlier, the post-crisis manufacturing growth has been labelled jobless.

Further analyses show how depressed is the manufacturing sector in post-crisis Indonesia. The following three arguments are in order. First, the manufacturing sector's contribution to regular waged employment has significantly declined—from 18.6 per cent in 2001 to 23.8 per cent in 2014—while the contribution to overall employment remained unchanged in 2014 at 13.3 per cent (Table 2). Note that regular waged employment accounts for more than 90 per cent of formal employment.

15 A similar argument is also put forward by Dominicus Savio Priyarsono, Titi Kanti Lestari and Diah Ananta Dewi, 'Industrialization and de-industrialization in Indonesia 1983–2008: a Kaldorian approach', *Journal of Indonesian Economy and Business*, Vol. 25, No. 2 (2010), pp. 143–154.

16 H.B. Chenery, 'Patterns of industrial growth', *American Economic Review*, Vol. 50, No. 4 (1960), pp. 624–654; Simon Kuznets, *Economic Growth of Nations: Total Output and Production Structure* (Cambridge, MA: Belknap Press of Harvard University Press, 1971).

TABLE 1 *Sectoral GDP, employment and productivity, 2001 and 2014*

	2001		2014		Productivity growth	Change in employment share
	% Employment	% GDP	% Employment	% GDP	(% annual)	(% point)
Agriculture	43.8	15.5	34.0	12.1	4.6	−9.8
Mining	1.0	11.7	1.3	6.7	−1.8	0.2
Manufacturing	13.3	27.7	13.3	25.5	3.7	0.0
Electricity	0.2	0.6	0.3	0.8	1.6	0.1
Construction	4.2	5.6	6.4	6.7	2.1	2.1
Trade	19.2	16.2	21.7	18.0	4.5	2.4
Transportation	4.9	4.9	4.5	10.9	22.6	−0.4
Finance	1.2	8.6	2.6	9.9	−1.0	1.4
Services	12.1	9.3	16.1	9.4	1.7	4.0
Total	100	100	100	100	4.6	0.0

SOURCE: CALCULATED FROM BPS DATA

Second, consistent with the above trend, there has been an increase in the level of casualisation of the employment in the manufacturing sector. Between 2001 and 2014, the share of casual employment in the manufacturing sector increased from 3.1 per cent to 5.1 per cent.[17]

Third, the real wages of regular employees in the manufacturing sector were under relative depression vis-à-vis other sectors. The last two columns in Table 2 present wage index across sectors by assigning the value of 100 for the average wage. The wage index of the manufacturing sector remained virtually unchanged between 2001 and 2014, after declining in 2012, while the level of wages in the sector was below the average wages of all regular employees. More disturbingly, the divergent pattern of the manufacturing wages was

17 Matsumoto and Verick also argued for the increased of casualisation of employment in the Indonesian economy, but they did not provide disaggregated analysis into the sectoral level; Makiko Matsumoto and Sher Verick, *Employment Trends in Indonesia over 1996–2009: Casualization of the Labour Market during an Era of Crises, Reforms and Recovery*, Employment Working Paper No. 99 (Geneva: International Labour Organisation, 2011). The category of casual employment was introduced for the first time in the 2001 National Labour Force Survey (Sakernas); prior to that, it was part of regular waged employment.

TABLE 2 *Regular waged employment: sectoral share and wage index, 2001–2014*

	Total employment share (%)		Regular waged employment share (%)		Wage index of regular waged employment (Indonesia = 100)	
	2001	2014	2001	2014	2001	2014
Agriculture	43.8	34.0	10.6	7.9	60	66
Mining	1.0	1.3	1.5	1.9	146	177
Manufacturing	*13.3*	*13.3*	*28.6*	*23.8*	*88*	*89*
Electricity	0.2	0.3	0.4	0.6	147	134
Construction	4.2	6.4	7.3	6.8	87	95
Trade	19.2	21.7	11.4	15.5	83	80
Transportation	4.9	4.5	5.6	5.4	115	120
Finance	1.2	2.6	3.8	5.9	161	143
Services	12.1	16.1	30.8	32.2	122	111
Total	100	100	100	100	100	100
Inter-sector wage inequality (CV)					0.348	0.345

SOURCE: CALCULATED FROM THE SAKERNAS

being observed when wages were converging across sectors, as indicated by the declining trend of the coefficient of variation of sectoral wages.

The argument for reversing the trend of negative de-industrialisation, or a case for re-industrialisation, has been widely advocated on the grounds that the manufacturing sector in Indonesia has not matured yet. The problems lie with the fact that the Indonesian manufacturing sector seems to have failed to move to a higher level and diversify into more sophisticated manufacturing activities beyond the traditional resource-based and labour-intensive industries. On a lesser note, the recent policy attention to the creative industry is also a step in the right direction.[18]

18 South Korea is an excellent example for the case of the development of creative economy after the country has been successful in catching up with the industrial development of Japan, North America and Western Europe. The newly elected Korean President laid down a vision of creating a 'Second Miracle on the Han River' through the development of a 'creative economy' in her February 2013 inaugural address; Sean Connell, 'Korea's creative economy agenda', *Asia Pacific Bulletin*, East–West Center (6 September 2013).

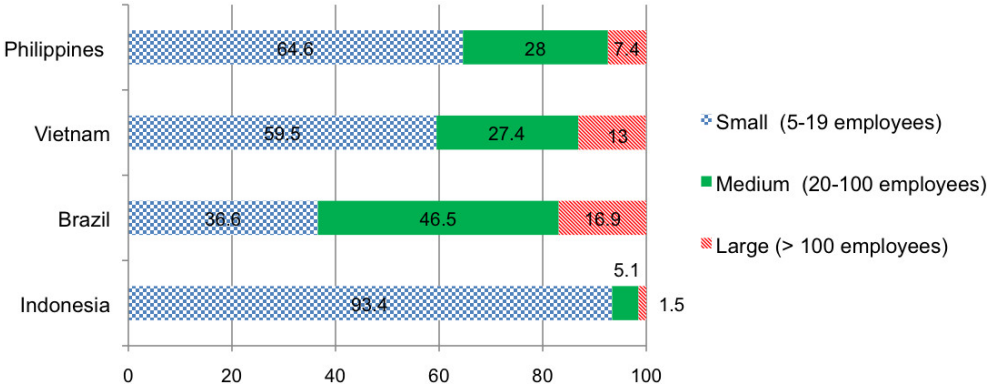

FIGURE 3 *Distribution of manufacturing firms by size, 2008*
SOURCE: WORLD BANK, ENTERPRISE SURVEY 2008, QUOTED IN WORLD BANK, *PICKING UP THE PACE: REVIVING GROWTH IN INDONESIA'S MANUFACTURING SECTOR* (JAKARTA, INDONESIA; WORLD BANK, 2012), P. 8

Transformation of Manufacturing

This section looks at the characteristics of Indonesia's manufacturing sector and its transformation. The Indonesian manufacturing sector has been characterised by a severe imbalance. It has a disproportionately large presence of small firms, relative to other developing countries (Figure 3). This phenomenon is known as the 'missing middle', with a large portion of small firms and a comparatively small number of middle-sized firms transitioning from small into large. Anas finds that the 'missing middle' situation is also observable in Indonesian manufacturing exports.[19]

Table 3 shows the relative position of large–medium (LM) and small–micro (SM) manufacturing activities. Following the Statistics Indonesia definition, large firms have 100 workers or more, medium firms have 20–99 workers, small firms have 5–19 workers and micro firms have fewer than 5 workers. As can be seen, in terms of employment SM firms dominate the manufacturing sector. They contribute 44 per cent to manufacturing output and their employment share increased from 64 per cent in 2001 to 68 per cent in 2011. The value-added share of LM firms in overall manufacturing industry stagnated at 56 per cent, while their share in manufacturing employment declined from 36 per cent to 32 per cent during 2001–2011.

19 Titik Anas, 'Missing middle in the Indonesian manufacturing exports', paper for 23rd Pacific Conference of the Regional Science Association International (RSAI), 2–4 July 2013, Bandung.

TABLE 3 *Employment and value-added shares of LM and SM firms*

	Manufacturing employment share (%)		Manufacturing value-added share (%)	
	2001	2011	2001	2011
Large–medium	36	32	56	56
Small–micro	64	68	44	44
Total	100	100	100	100

SOURCE: CALCULATED FROM BPS DATA

TABLE 4 *Manufacturing value added by sub-sectors* (%)

	2000	2010	2014
31. Food	33.8	29.1	29.8
32. Textile	13.7	9.5	9.1
33. Wood	6.1	3.5	3.1
34. Paper	6.0	5.0	4.2
35. Chemical	13.0	13.2	12.4
36. Non-metallic mineral	3.1	3.0	2.8
37. Basic metal	2.8	1.4	1.5
38. Fabricated metal	20.7	34.5	36.5
39. Other manufacturing	0.8	0.7	0.6
All manufacturing (non-oil-gas)	100	100	100

Table 4 shows that the manufacturing sector has not transformed much in recent years. For example, the share of labour-intensive food, textile, wood and paper in manufacturing value added (MVA) remained almost unchanged during 2010–2014, after significantly declining between 2000 and 2010 (from around 60 per cent to 47 per cent). Their share in MVA was around 46 per cent in 2014. On the other side of the transformation picture, the share of capital-intensive activities (chemical, non-metallic mineral, basic metal, fabricated metal) in MVA increased dramatically from 39.6 per cent in 2000 to 52.1 per cent in 2010, but has remained virtually unchanged (53.2 per cent in 2014) since then.

Thus, it seems that the manufacturing sector's transformation from labour-intensive activities to capital-intensive activities has stalled in recent years.

In order to understand the sector's dynamism, the next section examines productivity trends in manufacturing.

Productivity Trends in Manufacturing

Labour productivity is generally understood as total value added (output) per employee. In developed economies with more sophisticated available data, productivity is measured as value added per worker per hour of work.[20] In the Indonesian context, however, differences in hours of work between workers are difficult to factor in.

Labour productivity of the manufacturing sector is roughly twice that of labour productivity in the overall economy (Figure 4). But labour productivity in manufacturing remained stagnant and below mining, electricity/gas/water (EGW), finance and transport-construction sectors. Interestingly, the only sector that experienced rising productivity was the non-tradable transport-construction.

To understand manufacturing's productivity stagnation, we have disaggregated data by firm size and factor intensity. According to employment size, firms are categorised into large, medium, small and micro. There are two sources of firm level data for the manufacturing sector: the long-standing Large and Medium Manufacturing Survey (*Survei Industri Besar dan Sedang*) and the newly introduced Micro and Small Manufacturing Survey (*Survei Industri Mikro dan Kecil*). Statistics Indonesia publishes aggregate data on employment and value added disaggregated at ISIC 2 level. Furthermore, the ISIC 2 manufacturing sub-sector can be aggregated into three categories of factor intensity: labour intensive, resource intensive and capital intensive. Table 5 details the grouping of ISIC 2 sub-sectors into three categories of resource intensity following the approach of Aswicahyono, Hill and Narjoko.[21]

20 Andrew Sharpe, Jean-François Arsenault and Peter Harrison, *The Relationship between Labour Productivity and Real Wage Growth in Canada and OECD Countries*, CSLS Research Report No. 2008-8 (Ottawa: Centre for the Study of Living Standards, 2008).

21 Aswicahyono et al., 'Indonesian industrialisation: jobless growth?'

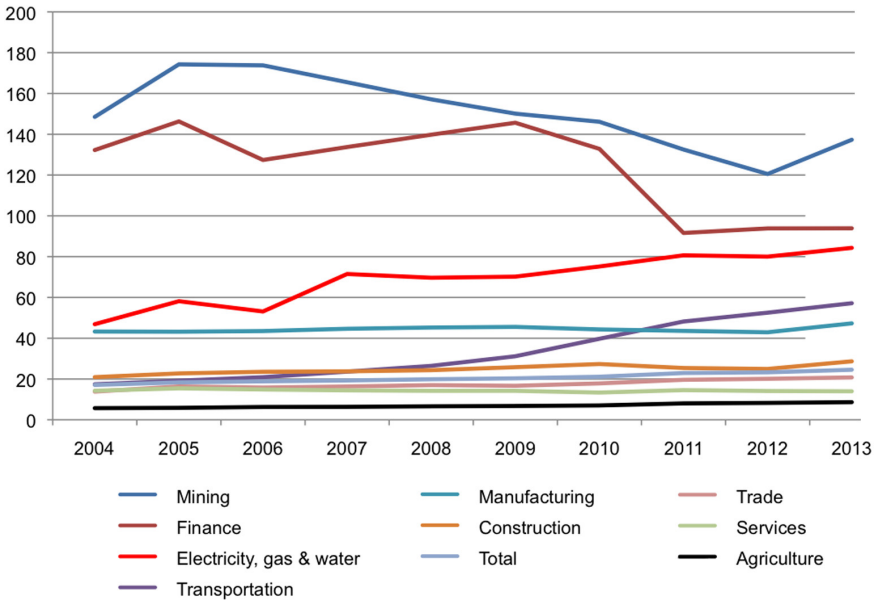

FIGURE 4 *Labour productivity* (*IDR million, 2000 constant price, GDP deflator*)
SOURCE: CALCULATED FROM BPS DATA (THE SAKERNAS AND NATIONAL ACCOUNT)

Large and Medium (LM) Firms

We begin with disaggregated productivity data for the LM firms by factor intensity. The productivity data are presented in IDR million per year in 2000 constant prices, where the nominal value is adjusted with GDP deflator of non-oil-gas manufacturing sector.

Figure 5 shows that among the labour-intensive firms productivity is the lowest and stagnating (and falling in recent years). The levels of productivity are the highest among capital-intensive firms, and rising, followed by firms belonging to resource-intensive categories.

Micro and Small Firms

Tables 6a and 6b present productivity data of micro and small firms disaggregated into the three factor-intensity categories (labour, resource and capital). One characteristic of micro and small firms relates to their informality, where significant portions of their employment are unpaid workers.

The following anomaly is noticeable in the productivity data of both micro and small firms presented in Tables 6a and 6b. The productivity levels of micro and small firms in 2011 were far lower than other years (2010, 2012 and 2014). Such a significant drop could only be explained by irregularities in the 2011

TABLE 5 *The grouping of ISIC 2 manufacturing sub-sector based on factor intensity*

ISIC 2	
	Labour intensive
13	Manufacture of textiles
14	Manufacture of wearing apparel
15	Manufacture of leather and related products
16	Manufacture of wood and of products of wood and cork, except furniture
31	Manufacture of furniture
32	Other manufacturing
33	Maintenance and repair of machinery and equipment
	Resource intensive
10	Manufacture of food products
11	Manufacture of beverages
12	Manufacture of tobacco products
17	Manufacture of paper and paper products
18	Printing and reproduction of recorded media
19	Manufacture of coke and refined petroleum products
20	Manufacture of chemicals and chemical products
21	Manufacture of basic pharmaceutical products and pharmaceutical medicine
22	Manufacture of rubber and plastics products
	Capital intensive
23	Manufacture of other non-metallic mineral products
24	Manufacture of basic metals
25	Manufacture of fabricated metal products, except machinery and equipment
26	Manufacture of computer, electronic and optical products
27	Manufacture of electrical equipment
28	Manufacture of machinery and equipment n.e.c.
29	Manufacture of motor vehicles, trailers and semi-trailers
30	Manufacture of other transport equipment

data. Nevertheless, a quick comparison between 2010 and 2014 data reveals a broad trend of increasing levels of productivity in micro and small firms across the three categories of factor intensity. It has to be noted, however, that most

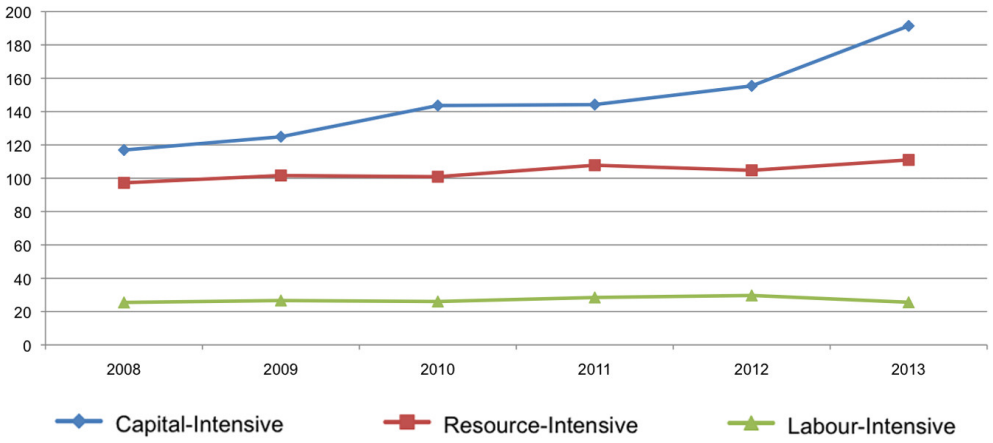

FIGURE 5 *Productivity in large–medium firms (manufacturing, IDR million, 2000 constant price, GDP deflator)*
SOURCE: CALCULATED FROM BPS DATA

TABLE 6A *Productivity: micro firms (IDR million, 2000 constant prices, GDP deflator)*

	2010	2011	2012	2013	2014
Labour intensive	4.2	1.0	3.5	4.0	5.9
Resource intensive	6.1	0.8	3.5	3.9	4.9
Capital intensive	5.8	1.5	5.6	5.6	8.3

SOURCE: CALCULATED FROM BPS DATA

TABLE 6B *Productivity: Small Firms (IDR million, 2000 constant prices, GDP deflator)*

	2010	2011	2012	2013	2014
Labour intensive	13.4	2.2	6.9	10.0	15.5
Resource intensive	9.2	1.8	9.1	10.2	11.6
Capital intensive	12.0	1.8	7.2	11.1	14.6

SOURCE: CALCULATED FROM BPS DATA

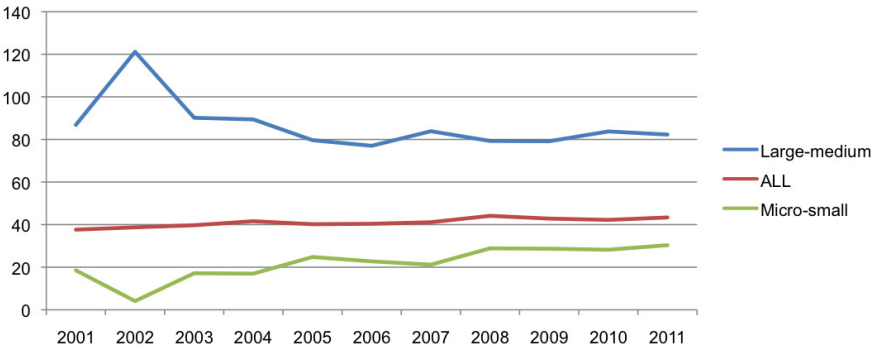

FIGURE 6A *Labour productivity (sub-sector: food, beverages and tobacco industries; IDR million/year/worker, 2000 constant prices)*

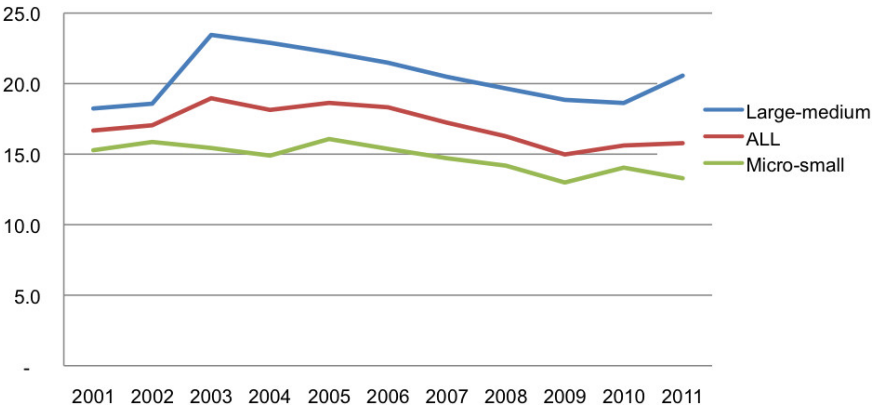

FIGURE 6B *Labour productivity (sub-sector: textile, leather products and footwear industries; IDR million/year/worker, 2000 constant prices)*

micro firms operate in the informal sector, and the majority of their workers are unpaid. Jobs in micro firms are not regular wage jobs, but are largely categorised as self-employed involving family members in running their micro firms.

The above diagnostic of firm level data indicates that the stagnating productivity in the overall manufacturing sector is due to stagnating and/or falling productivity of labour-intensive large–medium firms. Figures 6a and 6b show that labour productivity in major labour-intensive sub-sectors (food, beverages and tobacco industries, and textile, leather products and footwear industries) has been falling.

Productivity and Firms' Characteristics—An Econometric Investigation

In this section, we intend to investigate determinants of productivity, using an econometric model. Again, this section is divided into two parts: large–medium firms and small–micro firms.

Large and Medium Firms

It is hypothesised, following the efficiency wage theory, that productivity is driven by wage. That is, firms faced with the asymmetry of information regarding workers' efforts pay higher than the market clearing wage. Workers, in return, feel more loyal and devoted to the company. With a higher wage, they may also fear that they will lose their job if caught shirking and may not get another with a similarly higher pay. So they are likely to work harder. Therefore, although the firm pays more, it gets more productivity from its workers. Following this general belief, we also assume that capital intensity, export orientation and foreign ownership will have positive impacts on productivity. To remain competitive in the international market, export-oriented firms must improve their productivity. Because of access to better technology and management practices, foreign firms are likely to have higher productivity. Thus, our productivity function for large and medium firms is as follows:

$$\ln \text{PROD}_{it} = \alpha_0 + \alpha_1 \ln \text{PROD}_{it-1} + \alpha_2 \ln \text{RW}_{it} + \alpha_3 \ln \text{CAP}_{it} + \alpha_4 \text{EXPORT}_{it} + \alpha_5 \text{FOREIGN}_{it} + u_i + \epsilon_{it} \quad (1)$$

PROD represents labour productivity, RW stands for real wage, CAP denotes capital intensity per worker, EXPORT stands for percentage of exported output to total value of firm output and FOREIGN denotes percentage of foreign investment to total firm investment. The lag dependent variable is included to capture path dependence or the dynamic nature of overtime progress of wage and productivity, meaning that current realisations of the dependent variable are influenced by its past value. The remaining components in the model are the error terms: u_i represents time-invariant heterogeneity across firms and $\varepsilon_{i,t}$ is the time-variant error term. The relationship between wages and productivity is denoted by α_2 in the form of elasticity. Assuming that α_2 is positive, productivity (PROD) will increase by α_2 per cent if the real wages value (RW) increases by 1 per cent. The same is true for the variable of capital intensity (CAP).

The productivity function is estimated with dynamic panel data (DPD) regression of difference GMM (generalised method of moment) that is suitable for situations with 'small T, large N' panels, meaning few time periods and many individual firms.[22] In the GMM model, by default, the lag dependent variable is included as an independent variable in each regression. The choice of difference GMM implies that the firm-fixed effects have been controlled for. In addition to this, we also include year-fixed effects to the estimations in order to net out from the estimates the effect of common time shocks on firms' productivity.

In estimating panel data, two options are available: the static one, either fixed or random effects, and the dynamic one, which is called the generalised method of moment (GMM). The inclusion of a lagged dependent variable (lagged productivity) as one of our explanatory variables makes our model dynamic; however, the inclusion of a lagged dependent variable as a regressor may cause the problem of serial correlation. More importantly, the model may suffer from the problem of acute endogeneity between the dependent variable and the regressor (in this case between productivity and wages) since causality may run in both directions. A popular remedy for the endogeneity problem is to find instruments that correlate with the endogenous independent variables but are uncorrelated with the dependent variable. The GMM regression technique offers remedies to these problems by drawing instruments from within the dataset using lagged variables.[23] In running the GMM, the real wage (RW) variable is specified to be endogenous.

The consistency of GMM estimator depends on the validity of the assumption that the error terms do not display serial correlation and on the validity of the instruments. Two specification tests are used to deal with these problems.[24] The first is the Arellano–Bond test, which examines the hypothesis that the error terms are not serially correlated. The second is the Sargan test

22 David Roodman, *How to Do xtabond2: An Introduction to 'Difference' and 'System' GMM in Stata*, Center for Global Development Working Paper 103 (Washington, DC: Center for Global Development, December 2006).

23 See Roodman, *How to Do xtabond2* for more discussions on the application of GMM.

24 Manuel Arellano and Stephen Bond, 'Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations', *Review of Economic Studies*, Vol. 58, No. 2 (1991), pp. 277–297; Manuel Arellano and Olympia Bover, 'Another look at the instrumental variables estimation of error components models', *Journal of Econometrics*, Vol. 68, No. 1 (1995), pp. 29–51; Richard Blundell and Stephen Bond, 'Initial conditions and moment restrictions in dynamic panel data models', *Journal of Econometrics*, Vol. 87, No. 1 (1998), pp. 115–143.

of over-identifying restrictions, which tests the overall validity of the instruments. Failure to reject the null hypotheses of both tests provides support to our model specifications. Non-stationarity is not a big concern for panel data with small T (time periods).

Having foreign ownership and export orientation as independent variables could be problematic because the two could be positively related, as found by Ramstetter and Takii in pre-crisis Indonesia and Fu, Wu and Tang in China.[25] We have checked for this possibility and confirmed that foreign ownership is not a significant determinant of firm exports during the period of our analysis (2008–2013) across firm size and factor intensity using dynamic panel estimation.[26]

Our unit of analysis is manufacturing firms from the six series (2008–2013) of the Large and Medium Manufacturing Survey annually conducted by BPS–Statistics Indonesia. We construct a balance panel of manufacturing firms during the period, meaning that we exclude firms that are not present for the whole period due to entry and exit. Dealing with this, we check for the selection bias by performing a seemingly unrelated estimation (Suest) test.

Table 7 presents the robust one-step regression results for determinants of productivity in LM firms as formulated in equation (1). As can be seen, real wage exerts more influence than any other variables on productivity across the board—for both large and medium firms as well as in labour-, capital- and resource-intensive firms. Elasticities of real wage with respect to productivity are much higher and statistically significant at the 1 per cent level. Contrary to the general perception, neither export orientation nor foreign ownership is found to play a significant role. This also contrasts with the situation prior to the Asian financial crisis of the late 1990s, when productivity gains of export orientation and foreign ownership were significant. As expected, capital intensity has a positive and statistically significant effect on productivity. A point to note is that the effect of capital intensity on labour productivity in large firms is nearly twice that of medium firms.

25 Eric D. Ramstetter and Sadayuki Takii, 'Exporting and foreign ownership in Indonesian manufacturing 1990–2000', *Economics and Finance in Indonesia*, Vol. 54, No. 3 (2006), pp. 317–345; Dahai Fu, Yanrui Wu and Yihong Tang, *The Effects of Ownership Structure and Industry Characteristics on Export Performance: Evidence from Chinese Manufacturing Firms*, Discussion Paper 10.09 (Perth: University of Western Australia Business School, 2010).

26 Detailed results are available from the authors.

TABLE 7 *Determinants of labour productivity* (*difference GMM regression*)

Variable	All	Firm size		Factor intensity		
		Medium	Large	Labour	Resource	Capital
Ln productivity (lag)	0.271***	0.15***	0.309***	0.203***	0.319***	0.266***
Ln real wage	0.134***	0.121***	0.142***	0.101***	0.139***	0.236***
Ln capital intensity	0.078***	0.053**	0.094***	0.051***	0.115***	0.066*
Export orientation	−6.80E−05	6.30E−04	−4.80E−04	−3.60E−04	1.20E−04	−1.70E−04
Foreign investment	3.00E−04	−9.40E−04	7.10E−04	9.30E−04	−1.20E−03	1.80E−03
Year fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of observations	6819	2825	3994	3312	2287	1220
No. of firms	2143	1005	1394	1051	759	390
No. of instruments	29	29	29	29	29	29
AR(2), P-value	0.6760	0.2807	0.4700	0.2807	0.1558	0.8522
Sargan test, P-value	0.0012	0.0005	0.0314	0.0000	0.0840	0.2155

Notes: ***, ** and * indicate 1%, 5% and 10% levels of significance respectively. Each regression is with a constant and robust standard error.

All our regressions in Table 7 survive the Arellano–Bond test. For the Sargan test, however, only two (resource intensive and capital intensive) of the six regressions pass the test at the 5 per cent level of significance. If we rerun the other four regressions with fixed-effect estimation with the inclusion of time fixed-effects without lag dependent variable, we obtain consistent results.[27] But the coefficients of real wage from the GMM regressions tend to be smaller than the coefficients from the fixed-effects regressions.

In order to check a possible selection bias due to the exclusion of newly listed firms and those which exited the market, and the inclusion of only the firms that form a balanced panel dataset during the observation years of 2008–2013, we perform the seemingly unrelated estimation (Suest) test. OLS regressions are run for equation (1) for the whole survey sample and only for firms included in the balance panel for each observation year. The coefficients of independent variables of the two sample groups (all and selected) are then systematically compared. The Suest test is highly significant in three out of six observation years, indicating the general presence of selection bias; however, the bias is

27 Detailed results are available from the authors.

downward. The average real wage coefficient of the selected sample is 4 per cent lower than that of the overall sample.[28] That is, the estimated elasticity of wage with respect to productivity in the panel setting tends to be lower than the elasticity for the overall samples.

Small and Micro Firms

We model productivity function for micro and small firms with a different set of characteristics, which include: (a) capital ownership, measured as a percentage of business capital originating from the firm's own internal source; (b) firm age, measured by how many years the firm has been in operation; (c) cooperative membership, indicating whether a firm is a member of any cooperative association; (d) business licence type, indicating whether a firm has any type of business licence.[29] These small and micro firm characteristics are different from those for large and medium firms and are simply dictated by the differences in the design of manufacturing surveys for large–medium and micro–small firms.

The influence of ownership structure on firm performance has been investigated in various theoretical and empirical studies on firms' productivity and growth. In the case of small and medium enterprises (SMEs), the issue of ownership structure is also crucial as these firms are mostly family owned and run by a mix of family members and non-family members. Chu and Barbera and Moores show that ownership structure, in terms of both management and capital, is an important determinant of SMEs' performance.[30] In our model, the inclusion of capital represents a control on the role and contribution of SMEs' internal resources towards the firms' productivity. Another key factor of a firm's performance is how long the firm has been in operation. Patel, specifically focusing on SMEs in the UK, finds that there are substantial differences between embryonic, emerging and established firms in terms of firms' financial performance.[31] A study by Nunes et al., comparing young and old SMEs in Italy,

28 Detailed regression results and the related Suest test are available from the authors.

29 The different set of firms' characteristics is dictated by the manufacturing survey data.

30 Wenyi Chu, 'The influence of family ownership on SME performance: evidence from public firms in Taiwan', *Small Business Economics*, Vol. 33, No. 3 (2009), pp. 353–373; Francesco Barbera and Ken Moores, *The Impact of Family Involvement on the Productivity of the Firm*, Working Paper, Grand Valley State University (2011); available at: http://www.fambiz.org.au/wp-content/uploads/Impact-of-Family-Involvement-on-Productivity-Francesco-Barbera.pdf (accessed 22 February 2017).

31 Suresh H. Patel, 'Business age and characteristics of SME performance', Kingston Business School, Kingston University (2005).

also finds that firm age is a fundamental characteristic which determines firms' growth.[32] In both Patel's and Nunes et al.'s studies,[33] the hypothesis that ageing increases tangible performance of firms is supported. However, an opposite pattern is found in terms of firm innovation. Similar findings also appear in a recent study by Smith and Hendrickson for the case of SMEs in Australia.[34] In order to account for the impact of ageing, we include the firm's length of operation in our model.

Business network and collaboration has also been identified as an important factor determining micro and small enterprises' performance. Both in developed and developing countries, the cooperative is a common institution representing business network and collaboration within the SME world. Cooperatives represent an alternative model in organising and running business activities. London Economics, in a report studying the performance of cooperative members versus non-members across Europe, finds that firms with cooperative memberships generally have higher turnover and labour productivity growth as opposed to the non-member firms.[35] Villa and Bruno also emphasise the importance of SME collaboration via the cooperative model as one of SMEs' business strategies.[36] In the model, cooperative membership represents a control on the possible importance of cooperatives on firms' productivity measures.

The last variable included in the model is business licensing. Any type of business licensing represents the formalisation of micro and small firms. While

32 Paulo Macas Nunes, Marco Goncalves and Zelia Serrasqueiro, 'The influence of age on SMEs' growth determinants: empirical evidence', *Small Business Economics*, Vol. 40, No. 2 (2013), pp. 249–272.

33 Patel, 'Business age and characteristics of SME performance'; Nunes et al., 'The influence of age'.

34 Roger Smith and Luke Hendrickson, *The Effect of Age on Australian Small-to-Medium Enterprises*, Research Paper 1/2016 (Canberra: Australian Government, 2016); available at: https://industry.gov.au/Office-of-the-Chief-Economist/Research-Papers/Documents/The-effect-of-age-on-Australian-Small-to-Medium-Enterprises.pdf (accessed 22 February 2017).

35 London Economics, 'Study on the impact of co-operative groups on the competitiveness of their craft and small enterprise members', *Final Report to European Commission DG Enterprise and Industry* (2008); available at: http://www.pedz.uni-mannheim.de/daten/edz-h/gdb/08/study_impact_cooperative_groups_final_report_jan_2008_3406.pdf (accessed 22 February 2017).

36 Agostino Villa and Giulia Bruno, 'Promoting SME cooperative aggregations: main criteria and contractual models', *International Journal of Production Research*, Vol. 51, Nos 23–24 (2013), pp. 7439–7447.

it is common practice in developed countries, it is still often considered less necessary by micro and small businesses in developing countries. Mourougane, in the case of micro, small and medium enterprises in Indonesia, argues that one of the obstacles for enterprises' productivity growth is the formalisation of the firms.[37] Rand and Torm, analysing manufacturing SMEs in Vietnam, find that becoming a formal business leads to higher profits and investments and also an increase in the number of permanent workers.[38] To take account of the importance of business formalisation, we include the ownership of business licences in our estimation model.

The basic estimation model is expressed as follows:

$$\ln \text{PROD}_{it} = \phi_0 + \phi_1 \ln \text{PROD}_{it-1} + \phi_2 \ln \text{RW}_{it} + \phi_3 \ln \text{OWNCAP}_{it} + \phi_4 \text{AGE}_{it} + \alpha_5 \text{COOP}_{it} + \phi_6 \text{LIC}_{it} + u_i + \epsilon_{it} \quad (2)$$

As in the previous model, PROD represents labour productivity and RW stands for real wage. OWNCAP denotes capital ownership, measured as a percentage of business capital originating from a firm's own internal source. AGE stands for firm age, COOP is a dummy variable for firm membership in any cooperative association and LIC is a dummy variable indicating whether a firm has any type of business licence. Lag dependent variable is included to capture path dependence or the dynamic nature of overtime progress of wages and productivity, meaning that current realisations of the dependent variable are influenced by past ones.

We employ two approaches to estimate the models: pooled cross-section and pseudo panel. In the pooled cross-section setting, the productivity function can be simply estimated with OLS regression. However, the firms without wage information might constitute a self-selected sample, not a random sample. If this is the case, the OLS will be biased. Therefore, we estimate the productivity function using the Heckman method, in addition to the OLS. The Heckman selection model allows us to use information from non-wage-paying firms to improve the estimates of the parameters in the regression model. The Heckman selection model provides consistent, asymptotically efficient esti-

37 Annabelle Mourougane, *Promoting SME Development in Indonesia*, OECD Economic Department Working Papers 995: 0_1 (Paris: OECD, 2012); available at: http://www.oecd-ilibrary.org/economics/promoting-sme-development-in-indonesia_5k918xk464f7-en (accessed 23 April 2017).

38 John Rand and Nina Torm, 'The benefits of formalization: evidence from Vietnamese manufacturing SMEs', *World Development*, Vol. 40, No. 5 (2012), pp. 983–998.

mates for all parameters in the model. We use Heckman Maximum Likelihood (ML) estimation, which allows for robust estimation option.[39]

In the absence of genuine panel data on micro and small firms and the availability of repeated cross-sections data on these firms, constructing a pseudo panel is an alternative option to the pooled cross-sections approach. The pseudo-panel data approach was introduced by Deaton for the analysis of consumer demand.[40] The pseudo panels are formed by grouping observations into cohorts on the basis of invariant shared characteristics, and constructing the cohort variables as the mean values of the included observations. The cohorts are then traced over time in each of the annual surveys, forming a panel. In this study, the cohorts are formed based on number of years in operation (proxied by age and membership of cooperatives/associations) and the resource intensity of firms (labour, resource and capital).

In this study, for firms established prior to 1990 the cohorts are created using five-year bands, as there are only a few observations for this type of firm. For firms established after 1990, there are slight differences in setting up the data. For all firms set up, averaging both micro and small, with relatively large observations of firms established every year after 1990, the cohort is created using a one-year band. Thus there are 91 cohorts created for the overall data. For micro firms, for firms established during 1990–1999, with fewer than 100 observations for some years, a two-year band is employed to create the cohort. For micro firms established in 2000–2010 with more than 100 observations in each year of establishment, a one-year band is employed to create the cohort. Thus there are 78 cohorts created for micro firms. For small firms, with fewer observations compared to micro firms, a three-year band is employed to create the cohort for small firms established between 1990 and 2010. This results in 51 cohorts for small firm data.

Both pooled cross-section (Heckman) and pseudo-panel regressions approaches find a statistically significant and positive effect of real wage on productivity as presented in Tables 8a and 8b respectively. The elasticity of real wage with respect to productivity outweighs all other factors across all characteristics of small and micro firms. The Heckman model indicates that there is no sample selection problem in the overall sample (combined micro and small

39 For more detail on the Heckman selection model, see A. Colin Cameron and Pravin K. Trivedi, *Microeconometrics using Stata* (College Station, TX: Stata Press, 2010); and Jeffrey M. Wooldridge, *Econometric Analysis of Cross Section and Panel Data* (Cambridge, MA: MIT Press, 2002).

40 Angus Deaton, 'Panel data from time series of cross sections', *Journal of Econometrics*, Vol. 30 (1985), pp. 109–126.

TABLE 8A *Determinants of productivity in micro and small firms (Heckman)*

	All (micro + small)		Micro firms only		Small firms only	
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	Heckman	OLS	Heckman	OLS	Heckman
	Robust	Robust	Robust	Robust	Robust	Robust
Ln real wage	0.663***	0.657***	0.645***	0.753***	0.687***	0.663***
	(0.0264)	(0.0319)	(0.0287)	(0.0541)	(0.0332)	(0.0422)
Own capital	−0.0003	−0.0003	−0.0024**	−0.0019*	0.0014*	0.0014***
	(0.0002)	(0.0002)	(0.0003)	(0.0008)	(0.0005)	(0.0004)
Cooperative	−0.110**	−0.111***	−0.0952	−0.0732	−0.104*	−0.109**
	(0.0142)	(0.0127)	(0.0371)	(0.0501)	(0.0365)	(0.0373)
Firm age	−0.00253	−0.00255	−0.00486	−0.00434*	0.00137	0.00126
	(0.0016)	(0.0016)	(0.0023)	(0.0019)	(0.0014)	(0.0014)
Firm age (squared)	0.00003	0.00003	0.00007	0.0001	−0.00004	−0.00004*
	(0.00003)	(0.00003)	(0.00005)	(0.00006)	(0.00002)	(0.00002)
Business licence	0.101	0.109	0.0674*	−0.0714	0.138	0.164
	(0.0572)	(0.0588)	(0.0198)	(0.117)	(0.0844)	(0.0959)
Rho		0.0358		−0.658		0.132
Sigma		1.141		1.239		1.136
Lambda		0.0409		−0.815		0.150
P-Value for LR test		0.468		0.00237		0.0113
Test age and age-sq	0.3486	0.0000	0.1724	0.0000	0.2786	0.0000
Obs	40678	48940	24400	29617	16278	19323
R-sq	0.210		0.219		0.206	
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

Note: ***, ** and * indicate 1%, 5% and 10% levels of significance respectively. Standard errors are in parentheses. Each regression is with a constant.

TABLE 8B *Determinants of productivity in micro and small firms (pseudo panel, difference GMM)*

Variable	All	Micro	Small
In Productivity (lag)	−0.2099	−0.0375	−0.0732
In real age	0.753***	0.925***	1.04***
Firm age	0.137***	0.145***	0.159**
Firm age (sq.)	−5.2e−04*	−1.3e−03***	−4.80E−04
Own capital	8.50E−04	−2.40E−03	−4.80E−03
No. of observations	224	186	94
No. of groups	84	69	38
No. of instruments	17	17	17
AR2 (P value)	0.0574	0.0729	0.9373
Sargan test (P value)	0.0381	0.7575	0.0185

Note: ***, ** and * indicate 1%, 5% and 10% levels of significance respectively. Each regression is with a constant and robust standard errors.

firms), thus OLS robustness is not biased. All pseudo-panel regressions survive the Arellano–Bond test of zero autocorrelation. But only one regression (micro firms) passes the Sargan test. For the other two (all firms and small firms), if we rerun the model with fixed effect estimation the results are consistent with the previous difference in GMM output.

Concluding Remarks

The finding that real wage plays the most critical role in influencing productivity across the whole spectrum of manufacturing has significant policy implications. This, of course, raises the question: would a flexible labour market, with minimum interference from government with instruments such as minimum wage legislation or requiring better working conditions, be able to achieve the objective of industrial upgrading?

The general perception is that such legislation adversely affects the manufacturing sector, especially in creating employment. Here the policy-makers face a dilemma between labour intensity and productivity. Raising labour intensity to improve the employment rate can reduce labour productivity, as they are inversely related. In a dynamic setting an ideal situation is high wage–high productivity driving the economy.

Salter provided a formal analysis of productivity-linked wage increases and industrial restructuring.[41] It is generally believed that wage increases according to productivity growth are noninflationary. As Russell noted, the capacity to pay should be determined by the growth in real GNP, and wages should be adjusted by following the 'prices-plus-productivity' rule.[42] However, as pointed out by Salter,[43] this may adversely affect structural change as low-productivity industries would be able to continue operating, while high-productivity activities would lack incentive because their profit margin would remain stagnant. As a result, overall economic growth would be low and inadequate in lowering the unemployment rate.

As a matter of fact, low-wage countries often have lower productivity. Malinvaud showed that a reduction in wage rates had a depressing effect on capital intensity.[44] As Salter noted, the availability of a growing pool of low-paid workers makes firms complacent with regard to innovation and technological or skill upgrading.[45] Deakin and Wilkinson provided a very succinct explanation: 'Dependence upon under-valued labour provides a way by which inefficient producers and obsolete technologies can survive and compete. Firms become caught in low-level productivity traps from which they have little incentive to escape.'[46] Wilkinson described the phenomenon as 'a form of Gresham's Law' whereby bad labour standards drive out good.[47]

Singapore's experience in the 1980s offers an excellent example of how wage and labour market policies can be used for industrial restructuring. It is well known that Singapore used the labour market, in particular with high-wage policies from the late 1970s to the mid-1980s, to restructure its industries by phasing out labour-intensive activities. Singapore has a long-standing tripartite system, under the guidance of the National Wages Council (NWC), in directing wage developments. In the early 1980s, the NWC started recommending high wages with a view to forcing the economy to move towards high-skill,

41 W.E.G. Salter, *Productivity and Technical Change* (Cambridge: Cambridge University Press, 1960).

42 E.A. Russell, 'Wages policy in Australia', *Australian Economic Papers*, Vol. 4 (1965), pp. 1–26.

43 Salter, *Productivity and Technical Change*.

44 Edmond Malinvaud, 'Wages and unemployment', *Economic Journal*, Vol. 92 (1982), pp. 1–12.

45 Salter, *Productivity and Technical Change*.

46 Simon Deakin and Frank Wilkinson, *Labour Law, Social Security, and Economic Inequality* (London: Institute of Employment Rights, 1989), p. 44.

47 Frank Wilkinson, 'Wage inequalities, segmented labour markets and economic progress', Department of Economics, Cambridge University, mimeo (1989), p. 12.

high-value-added activities. By de-linking productivity-based wage increases at the enterprise level and adhering to industry-wide average productivity-based wage increases, the system raised the unit labour cost of firms with below-industry-average productivity, thereby forcing them to exit. This also meant that firms with above-industry-average productivity enjoyed lower unit labour costs, hence higher profit rates for reinvestment.

Another key instrument was the Skills Development Fund (SDF), introduced in 1979 to collect levies from the 'sunset' industries (low-skill, low-wage), thereby encouraging firms to retrain workers and making sure they remained employable. Employers were also required by law to contribute to workers' retirement funds. The government, by legislating for a compulsory employer contribution to the government-managed Central Provident Fund (CPF), has been able to create a sense of fairness in industrial relations. As the sunset firms exited under the pressure of rising costs, their workers did not fear losing their entitlements.[48]

Finally, the symbiotic relationship between the unions and the government helped Singapore to restructure the economy without union resistance. Being part of the policy-making process, trade union leaders understood the need for economic restructuring to remain internationally competitive. Trade union leaders also helped the government devise compensation packages and retraining programmes for workers who lost jobs due to restructuring.

Perhaps Indonesia could consider adopting similar wage and skill development policies to Singapore. However, the Singapore experience also shows that there is a danger of following wage-productivity-based industrial restructuring strategies too aggressively. Singapore used this mechanism aggressively during the late 1970s to mid-1980s, when wage increases were above industry-average productivity growth. This not only forced the exit of low-productivity activities but also caused a profit squeeze for firms with average productivity. As a result, the country experienced growth recession in 1985–1986.[49] Therefore, getting the right pace of restructuring is also important. Second, the two countries differ significantly in their characteristics, so the specific mechanisms must vary, instead of blind emulation. In particular, any wage-setting mechanism

48 For a discussion of labour market policies as an instrument of industry policy in Southeast Asia, see Anis Chowdhury, 'Labor market policies as instruments of industry policy: what can Europe learn from Southeast Asia?' *American Journal of Economics and Sociology*, Vol. 67, No. 4 (October, 2008), pp. 661–681.

49 See Colin Kirkpatrick, 'Real wages, profits and manufacturing performance in a small economy: the case of Singapore', University of Singapore, mimeo (1988).

that also performs as an instrument for industrial restructuring in Indonesia has to take into consideration Indonesia's large informal sector and its regional diversity.