Wages, productivity and the evolution of inequality in Indonesia: A case study on manufacturing sector

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Abstract

This paper looks at the dynamics of wage inequality and productivity in the manufacturing sector. Although the manufacturing sector maintains its role as the largest contributor to the overall GDP and is the main engine of growth, the Indonesian economy seems to have experienced negative de-industrialization. Despite this trend, manufacturing sector is still viewed as the main source of quality employment and many has advocated for revitalization of this sector. The de-linking trend between wage and productivity in the overall manufacturing sector is evident, but the dynamics within the sector is not homogenous. Significant wage and productivity gaps between large-medium (LM) and cottage-small (CS) manufacturing firms are found. In contrast to the overall de-linking trends in the sector, the positive link between wage and productivity in the large-medium (LM) manufacturing industry has led to a positive correlation between real wage and employment. This is analogous to the ideal situation where wage increases when the overall economy (employment and GDP) expands.

1 – Introduction

Build upon the overall country study on wage, productivity and evolution of inequality in Indonesia, this study specifically looks at the dynamics of wage inequality and productivity in the manufacturing sector. The manufacturing sector is considered a key sector for the advancement of the overall economy and the driving source of quality employment in the form of formal or regular waged-employment. In this paper, the analysis will be disaggregated into sub-sectors within non-oil-gas manufacturing industry. Three categories are particularly important: (a) resource base (food, ISIC code 31), (b) lower technology footloose labour intensive (textile, ISIC code 32), and (c) higher technology capital intensive (fabricated metals, ISIC code 38).

The manufacturing sector was a star performer during the New Order development prior to the 1997 Asian Financial Crisis (AFC), however, the story has been quite different after that. The relative importance of the sector has continuously declined and a case of de-industrialization has been widely observed during this time. In fact, the decline in traditional manufacturing competitiveness started even few years before the onset of the crisis.

[1] Excellent research assistance was provided by Ilmiawan Auwalin.

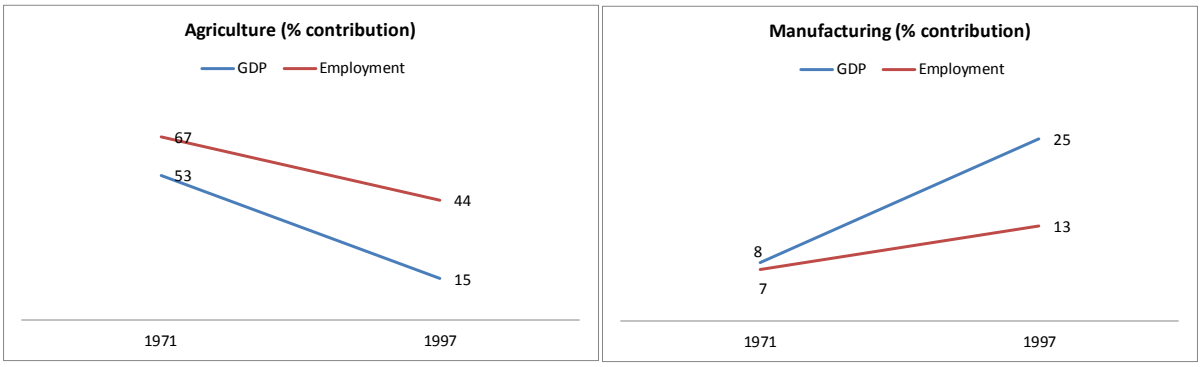
Despite the reversing trend, the manufacturing sector continues to play an important role in Indonesian economy. Furthermore, the need to revitalize the Indonesian manufacturing sector has been advocated by all quarters. This is because an overarching argument that 'manufacturing offers greater opportunities for job creation (in terms of quantity and quality), facilitates 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.' (World Bank 2012a: 3). ADB (2013) also stresses the importance manufacturing in the context of structural transformation of the economy as industrialization is a step that, in general, is difficult to bypass on the path to becoming a high-income economy. Despite the sector's relative importance and future potential, this paper highlights troubling pictures within the sector in the past decade. Moreover, the results of the employment function for large and medium (LM) manufacturing sector challenges the conventional wisdom of the negative relationship between employment and real wage. This finding points to a more idealistic trend of achieving higher productivity and real wage while the overall economy grows with both employment and output expanding.

The rest of the paper is organised as follows. Section 2 elaborates the role of manufacturing sector in the Indonesian economy from industrialization to de-industrialization and a need for a re-industrialization. Section 3 looks at the dynamics within the manufacturing sector. Sections 4 examines wage inequality and wage-productivity gap in the sector. Section 5 estimates employment function of the manufacturing sector followed by a brief conclusion in the last section.

2 – Manufacturing Sector in the Indonesian Economy

Structural transformation of the Indonesian economy from agriculture to manufacturing industry was a key feature of the three decade long New Order development. This is in addition to other socio-economic achievements such as quadrupling of average income, sharp declines in poverty, infant mortality and illiteracy rates as well as the acclaimed relatively stable level of overall inequality measured by Gini coefficient (UNDP 2001). Figure 2.1 depicts the transformation during 1971-1997. On the one hand, the agricultural sector's contribution to overall GDP dropped sharply from 53 per cent to only 15 per cent while its employment contribution fell from 67 per cent to 44 per cent. On the other hand, the manufacturing sector's share in the overall GDP jumped from 8 per cent to 25 per cent, while the progress of its employment contribution was less impressive, only increased from 7 per cent to 13 per cent. However, the overall process of industrialization was highly feasible during the New Order period.

Figure 2.1: Structural transformation of the economy, 1971 and 1997



Source: Calculated from BPS data.

The previous trend of industrialization during the New Order, however, does not continue in the post crisis, democratic and decentralized Indonesia. Figure 2.2 demonstrates that during 2001-2012 Indonesia, in fact, seems to have experienced the process of de-industrialization. De-industrialization refers to the declining shares of either manufacturing sector's GDP or employment in the overall economy. In other words, de-industrialization is simply the opposite trend of industrialization.

During 2001-2012, while the GDP and employment shares of the agricultural sector continued to decline as expected, the manufacturing sector's contribution to GDP also fell from 28 per cent to 26 per cent. Manufacturing sector's contribution to employment was relatively stagnant, barely increased from 13.3 per cent to 13.9 per cent. This indicates that the Indonesian economy passed the peak of manufacturing industry's contribution to the overall GDP at around 28 per cent in 2001. However, this figure is quite low. In advanced economies, the peak of manufacturing sector's contributions to GDP was achieved in 1960s and the figures were much higher, around 36 per cent in Japan, 32 per cent in European Union and 30 per cent in industrial countries (Rowthorn and Ramaswamy 1997). More importantly, at the peak of the industrialization in the 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 in the manufacturing sector is far below than its share in GDP indicating the failure of this sector in absorbing the surplus labour in the agricultural sector.

De-industrialization is a natural process as the development continues to progresses. Rowthorn and Ramaswamy (1997) argued that de-industrialization in advanced economies is not a negative phenomenon, but a natural consequence of further growth. The main reason for de-industrialization

is the faster growth of productivity in manufacturing than in services. This is labelled as positive de-industrialization.

The influential distinction between positive and negative de-industrializations was developed by Rowthorn and Wells (1987). Positive deindustrialization is:

> 'regarded 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. (Rowthorn and Wells 1987: 5).

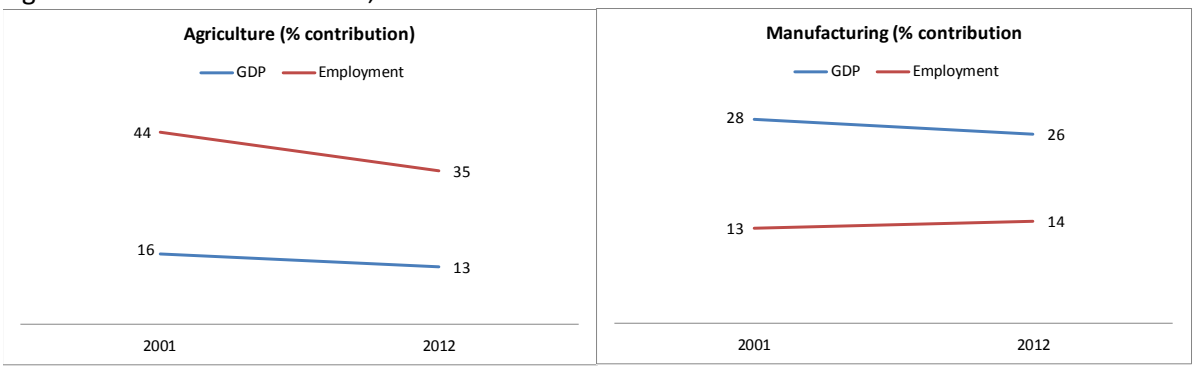
On the other hand, negative de-industrialization is 'a product of economic failure and occurs when industry is in severe difficulties … labour shed from the manufacturing sector—because of falling output or rising productivity—will not be reabsorbed into the service sector. Unemployment will therefore rise.' (Rowthorn and Wells 1987: 5).

The case of de-industrialization in Indonesia during the past decade is clearly not a case of a positive de-industrialization; it seems to resonate with the negative de-industrialization scenario.[2] As mentioned earlier, during 2001-2012, manufacturing's GDP share declined, while its employment contribution only slightly increased. During this period, while labour productivity of the manufacturing sector was the highest relative to the other sectors which had the most dominant employment generating contributions including agriculture and trade-services; the manufacturing sector's productivity growth was only 2.9 per cent, which was far below that of agriculture and trade (4.5 per cent and 4.8 per cent respectively), and less than the overall productivity growth of the economy (4.5 per cent), see Table 2.1. The majority of the 8.7 percentage point decline of employment share in the agriculture sector was absorbed by the *service* sector (3.3 percentage point), *construction* sector (1.9 percentage point); these were two sectors with productivity growth at only 1.6 per cent and 1.9 per cent respectively, much lower than the overall productivity growth of the economy at 4.5 per cent. The manufacturing sector which is more dynamic only absorbed 0.6 percentage point of the decline. The implication of this phenomenon is that the surplus labour from agriculture was not primarily absorbed by those sectors which were the most dynamic as well as well performing. More strikingly, the transport–communication sector that has experienced significantly higher (21.5 per cent) productivity growth, in fact, has reduced its employment

[2] A similar argument is also put forward by Priyarsono and Dewi (2012).

absorption by 0.4 percentage point, although this sector has been the main beneficiaries of the robust economic growth during the past decade.

Figure 2.2: De-industrialization, 2001 and 2012



Source: Calculated from BPS data.

Table 2.1: Sectoral GDP, employment and productivity, 2001 and 2012

		2001		2012		Labour productivity (M)		Productivity growth	Change in Emp. share
		% Emp	% GDP	% Emp	% GDP	2001	2012	(% annual)	(percentage point)
1	Agriculture, Forestry, Hunting and Fishery	43.8	15.5	35.1	12.5	5.6	8.4	4.5	-8.7
2	Mining and Quarrying	1.0	11.7	1.4	7.4	177.0	120.3	-2.9	0.4
3	Manufacturing Industry	13.3	27.7	13.9	25.6	33.0	43.6	2.9	0.6
4	Electricity, Gas, and Water	0.2	0.6	0.2	0.8	64.4	80.9	2.3	0.1
5	Construction	4.2	5.6	6.1	6.6	20.9	25.3	1.9	1.9
6	Wholesale Trade, Retail Trade, Restaurants and Hotels	19.2	16.2	20.9	18.1	13.4	20.4	4.8	1.7
7	Transportation, Storage, and Communications	4.9	4.9	4.5	10.1	15.8	53.1	21.5	-0.4
8	Financing, Insurance, Real Estate and Business Services	1.2	8.6	2.4	9.7	109.3	95.0	-1.2	1.2
9	Community, Social, and Personal Services	12.1	9.3	15.4	9.3	12.2	14.3	1.6	3.3
	Total	100	100	100	100	15.9	23.6	4.5	0.0

Source: Calculated from BPS data.

Despite the recent trend of negative de-industrialization, the manufacturing sector remains the most important sector in the Indonesian economy. During 2001-2012, among the nine economic sectors, the manufacturing sector recorded the highest contribution (26 per cent) to the overall GDP and the main engine of growth with the largest contributor (23 per cent) to the overall GDP growth.

However, the sector's importance in terms of employment contribution was much less. The manufacturing growth in the post crisis period has been labelled as jobless growth (Aswicahyono et al. 2011; Yusuf et al. 2012). In contrast to the situations in advanced economies, employment share of the manufacturing sector in Indonesia is only around half of the sector's added share, and labour productivity growth of the sector is also lower.

Further analyses show how depressed is the manufacturing sector in post-crisis and democratic Indonesia. The following four arguments are in order. **First**; manufacturing sector's contribution to regular waged-employment has significantly declined, while the contribution to the overall employment slightly increased (Table 2.2). In other words, the trend is negative to what is expected from the main source of quality employment of the formal sector. Note that regular waged-employment accounts for more than 90 per cent of formal employment.

Second; consistent to the above trend, there has been an increase in the level of casualization of the employment in the manufacturing sector. In fact, the casualization in the manufacturing sector increased at a faster rate than the casualization in the overall economy. Between 2001 and 2012, the share of casual employment in the manufacturing sector increased from 3.1 per cent to 5.1 per cent, while casualization in the overall economy increased from 6.7 per cent to 10.4 per cent.[3] The category of casual employment was introduced for the first time in the 2001 Sakernas, where as it was part of regular wage employment before. The shift toward casual employment could be seen as a response to the adoption of a series of labour legislations since the democratic transition. These legislations, the Manpower Act of 2003 in particular, are viewed to have created rigidities in the labour market, especially the generous severance pay and rapid increase in minimum wages. The rigidities were seen to be responsible for poor labour market outcomes in the 2000s.[4]

Third; the real wage of regular employees in the manufacturing sector was under relative depression vis-à-vis other sectors. The last two columns in Table 2.2 present wage index across sectors by assigning the value of 100 for the average wage. The wage index of the manufacturing sector declined between 2001 and 2012, while the level of wage in the sector was below the average wage of all regular employees. More disturbingly, the divergent pattern of the manufacturing wage was being observed when wages were converging across sectors as indicated by the declining trend of the coefficient of variation of sectoral wages. This assessment, however, is in contrast to the argument put forward by the proponents of the so called 'flexible' labour market who blame labour

[3] Matsumoto and Verick (2011) also argued for the increased of casualization of employment in the Indonesian economy, but they did not provide disaggregated analysis into the sectoral level.
[4] See, among others, Aswicahyono et al. (2011), World Bank (2010), OECD (2008), Manning and Roesad (2007), Aaron et al. (2004) and Suryahadi et al. (2003).

market 'rigidity' for the poor employment outcome of the manufacturing sector. Yusuf et al. (2013:4) define labour market rigidity as 'constant or increasing real wage', implying that flexible labour market is represented by declining real wage. They blame increased capital utilization and labour market 'rigidity' for the jobless growth phenomenon in the manufacturing sector, and argue for the inevitability of increased capital utilization and creation of 'flexible' labour market.

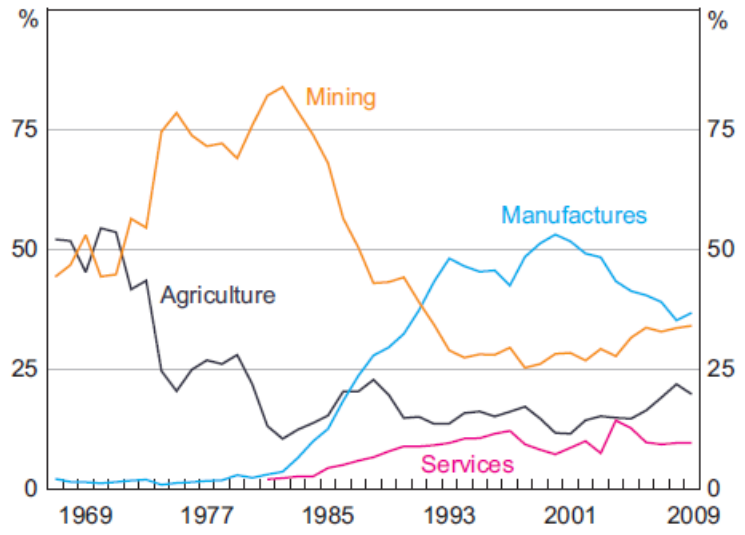
Fourth; while the manufacturing sector's share in total export dramatically increased during the New Order, it dropped significantly after 2000 (Figure 2.3). On the other hand, the role of natural resource-based commodities was on the rise, both in absolute term and as a share of total export, taking advantage of global commodity booms (Figure 2.4). It has to noted that the good old days of the manufacturing export in 1980s and 1990s was driven by labour intensive and resource base industries with limited markets. According to a major report by the United Nations Industrial Development Organization (UNIDO), four categories of manufacturing product (plywood, garments, textiles and footwear) accounted for half of manufactured exports, while three countries (the US, Japan and Singapore) bought nearly half of Indonesia's exports (Dhanani 2000). The situation has changed since the late 1990s Asian crisis. The labour intensive and resource base manufacturing products have been losing their competitiveness against Asian competitors, most notably China (World Bank 2012a); however, this trend has been observed as earlier as few years before the Asian crisis (Dhanani 2000).

Table 2.2: Regular waged employment: sectoral share and wage index, 2001-2012

	Total employment share (%)		Regular waged employment share (%)		Wage index of regular-waged employment (Indonesia = 100)	
	2001	2012	2001	2012	2001	2012
1. Agriculture	43.8	35.1	10.6	8.2	60	69
2. Mining	1.0	1.4	1.5	2.1	146	175
3. Manufacturing	13.3	13.9	28.6	24.7	88	85
4. Electr-Gas-Water	0.2	0.2	0.4	0.6	147	138
5. Construction	4.2	6.1	7.3	6.7	87	95
6. Trade	19.2	20.9	11.4	15.5	83	79
7. Transp-Com	4.9	4.5	5.6	5.2	115	120
8. Finance	1.2	2.4	3.8	5.5	161	139
9. Services	12.1	15.4	30.8	31.6	122	116
Total	100	100	100	100	100	100
Inter-sector wage inequality (CV)					0.35	0.34

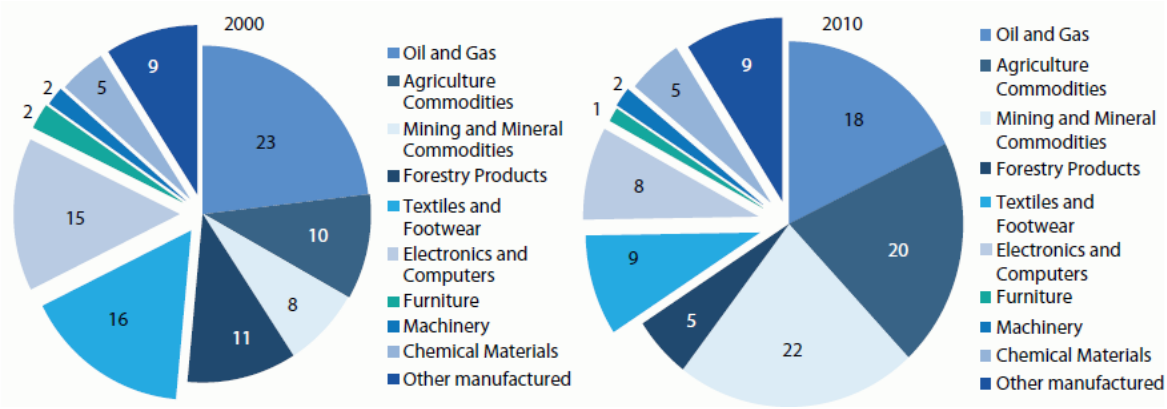
Source: Calculated from the Sakernas.

Figure 2.3: Export of goods and services by sector, share of total (%)



Source: World Bank

Figure 2.4: Share of total export by sector (%), 2000 and 2010



Source: World Bank (2012b: 2).

The argument for reversing the trend of negative de-industrialization, or a case for re-industrialization, has been widely advocated, including by premier institutions such as the World Bank.[5] However, the policy suggestions put forward by the World Bank (2012a) report did not advocate (selective) industrial policies, which is the institution's traditional policy stance as can be traced back to its previous landmark report on the East Asian miracle (World Bank 1993). In fact, industrial policies are again gaining momentum. This is associated with an assumption that the manufacturing sector in Indonesia has not matured yet. The problems lie with the facts that the

[5] See World Bank (2012a).

Indonesian manufacturing industry 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 smaller note, the current policy attention to the creative industry is also a step in right direction.[6] The next section concentrates on the dynamics within the manufacturing sector.

3 – Dynamics within the Manufacturing Sector

Disaggregated figures of the last decade performance of the non-oil and gas manufacturing sector are presented in Tables 3.1 and 3.2. The following patterns are noticeable. **First**, with regard to employment, three sub-sectors (food, textile and fabricated metals) continue to dominate the manufacturing employment. Also worth noting fact that the textile sub-sector used to be the traditional labour intensive Indonesian manufacturing that once was the star performer of Indonesian export but later lost its competitiveness.

Second; the wood sub-sector experienced the most significant setback in terms its relative position within the manufacturing sector, both from employment contribution and GDP share. In 2001, the wood sector was the third largest employer among nine manufacturing sub-sectors. During 2001-2012, the sub-sector lost half of its relative importance within the manufacturing sector. This could be attributed to the disappearing of Indonesian forest and the conversions of primary and secondary forests and industrial forest plantations into oil palm plantations and mining concessions.

Third; with regard to GDP composition, there is an apparent shift from low-technology-resource-based and low-technology-foot-loose industries (food and textile) to high technology/capital intensive industry (fabricated metals), see Table 3.1. The fabricated metals sub-sector covers, among others, electronic and automotive products. The GDP and employment shares of the fabricated metal sub-sector significantly increased during the last decade while the sub-sector's productivity level and productivity growth have been among the highest. However, the internal shift within the manufacturing sector from food and textile industries to fabricated metal industry is not echoed by a similar pattern in the export structure. Rather, as mentioned earlier, the shift toward commodity exports dominates. As presented in Figure 2.4, the share of electronic and computer products

[6] South Korea is an excellent example for the case of the development of creative economy after the country has been successful in catching up the industrial developments 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 (Connell 2013).

declined from 15 per cent to 8 per cent during 2000-2010 indicating that the growth of the fabricated metal manufacturing is primarily driven by domestic demand.

Fourth; the low-technology-foot-loose industry (textile) appears to be the most depressed manufacturing sub-sector. In 2012, its labour productivity was only IDR 16 million per year, which was much lower when compared with the productivities of the other two dominant industries, food and fabricated metal (IDR 43.4 million and IDR 97 million respectively), and the overall productivity of the non-oil-gas manufacturing industry (IDR 41 million). During 2011-2012, labour productivity of the textile industry grew only at an annual rate of 0.8 per cent, which is much lower than the overall productivity growth of the manufacturing industry (3.7 per cent). In addition, the relative importance of the sector continued to decline as both its employment and GDP shares shrunk.

Fifth; the depressed nature of the textile industry is also confirmed by its low annual growth rate its value added at only 2.2 per cent, while the overall manufacturing sector grew at 7.3 per cent. The other two dominant sub-sectors (food and fabricated metals) grew at 6 per cent and 15 per cent respectively (Table 3.2). At the same time, the sector still contributes to a quarter of manufacturing employment and one-tenth of manufacturing value added.

Table 3.1: Manufacturing sector at ISIC 2 level, 2001 and 2012

	% Employment		% GDP		Labour productivity (M)		Productivity growth
	2001	2012	2001	2012	2001	2012	% annual
31). Food	24.4	28.3	32.6	30.1	38.5	43.4	1.1
32). Textile	27.0	24.2	13.5	9.4	14.5	15.8	0.8
33). Wood	18.5	8.9	5.9	3.0	9.1	13.8	4.7
34). Paper	3.1	4.5	5.5	4.2	51.1	38.8	-2.2
35). Chemical	7.2	6.6	12.4	13.4	49.7	82.3	6.0
36). Non-metalic mineral	6.0	8.2	3.5	3.0	16.8	15.0	-1.0
37). Basic metal	3.1	4.6	2.6	1.5	24.2	13.5	-4.0
38). Fabricated Metal	10.6	14.6	23.2	34.7	63.2	96.8	4.8
39). Other manufacturing	0.1	0.1	0.9	0.6	342.1	279.8	-1.7
Manufacturing (non-oil-gas)	100	100	100	100	28.9	40.8	3.7

Source: Calculated from BPS data.

Table 3.2: Manufacturing sector, annual GDP growth and contribution to growth, 2001-2012

	% annual growth	Contribution to the overal growth
31). Food	6.0	27.0
32). Textile	2.2	4.2
33). Wood	-0.7	-0.5
34). Paper	3.5	2.7
35). Chemical	8.5	14.5
36). Non-metalic mineral	5.1	2.4
37). Basic metal	0.4	0.2
38). Fabricated Metal	15.4	49.3
39). Other manufacturing	2.7	0.3
Manufacturing (non-oil-gas)	7.3	100

Source: Calculated from BPS data.

Now let us take a look at the labour union membership and social security coverage in the manufacturing sector. The 2007 Sakernas is the only national survey that collected the data. Union membership is only relevant for regular employees. Overall, data indicates that the fraction of union membership was quite low at 11.2 per cent while the manufacturing sector recorded the highest union density (17.5 per cent), see Table 3.3.

It seems that higher union membership has had little impact to the quality of employment in the manufacturing sector. The following two facts are intuitive of the assessment. *First*, social security coverage in the manufacturing sector was much lower compared to those in the other three sectors (services, finance and electricity), see Table 3.5. *Second*, as mentioned earlier, despite having the highest union density, the wages of manufacturing employees were depressed relative to other sectors. Among other things, social security and wage level are two most important factors determining the quality of employment.

Since the systematic data of union membership and social coverage is only collected in the 2007 Sakernas, it is important to scrutinise these two variables in future Sakernas. A periodical interval of five years should be sufficient as these variables would not significantly change on yearly basis. More up-to-date data of union membership from different labour unions, if available, could be helpful. However, its comparability with the Sakernas data would be questionable.

Table 3.3: Union density across economic sectors (%), 2007

	Regular wage employment	employees with union membership	Union density (%)
1. Agriculture	2,373,850	234,136	9.9
2. Mining	468,418	67,034	14.3
3. Manufacturing	7,030,572	1,225,370	17.4
4. Electr-Gas-Water	147,571	22,144	15.0
5. Construction	2,299,070	53,553	2.3
6. Trade	3,931,662	137,882	3.5
7. Transp-Com	1,771,659	159,484	9.0
8. Finance	1,186,808	85,484	7.2
9. Services	8,832,780	1,167,380	13.2
Total	28,042,390	3,152,467	11.2

Source: Calculated from the Sakernas.

Table 3.4: Union density within the manufacturing sector (%), 2007

Suc-sectors	Regular wage employment	Union member	Union density (%)
30). Oil and gas	17,395	5,558	32.0
31). Food	1593495	294,796	18.5
32). Textile	1874772	335,596	17.9
33). Wood	621,371	95,105	15.3
34). Paper	386,622	76,298	19.7
35). Chemical	631,817	137,283	21.7
36). Non-metalic mineral	360,081	39,977	11.1
37). Basic metal	316,700	49,313	15.6
38). Fabricated Metal	1133140	182,360	16.1
39). Other manufacturing	95,179	9,084	9.5
Manufacturing	7,030,572	1,225,370	17.4

Source: Calculated from the Sakernas.

Table 3.5: Social security coverage across nine economic sectors, 2007

	Employment	have social security/insurance	social security coverage (%)
1. Agriculture	41,206,474	574,268	1.4
2. Mining	994,614	191,031	19.2
3. Manufacturing	12,368,729	2,911,563	23.5
4. Electr-Gas-Water	174,884	89,423	51.1
5. Construction	5,252,581	234,998	4.5
6. Trade	20,554,650	817,274	4.0
7. Transp-Com	5,958,811	672,179	11.3
8. Finance	1,399,490	513,420	36.7
9. Services	12,019,984	3,822,177	31.8
Total	99,930,217	9,826,333	9.8

Source: Calculated from the Sakernas.

Table 3.6: Social security coverage within the manufacturing sector, 2007

Suc-sectors	Employment	have social security/insurance	security coverage (%)
30). Oil and gas	18,419	15,297	83.1
31). Food	3384421	640,767	18.9
32). Textile	2888566	778,852	27.0
33). Wood	1609901	201,525	12.5
34). Paper	511,757	179,841	35.1
35). Chemical	736,572	355,912	48.3
36). Non-metalic mineral	967,741	80,882	8.4
37). Basic metal	459,313	137,325	29.9
38). Fabricated Metal	1637017	490,416	30.0
39). Other manufacturing	155,022	30,746	19.8
Manufacturing	12,368,729	2,911,563	23.5

Source: Calculated from the Sakernas.

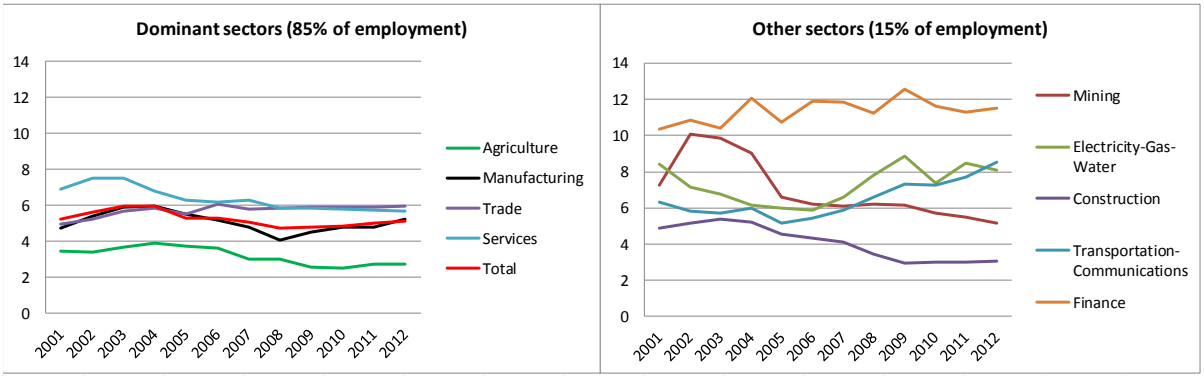
4 – Wage Inequality and Wage-Productivity Gap

This section looks at wage inequality and wage-productivity gap in the manufacturing sector in terms of (i) its relative position vis-à-vis the rest of the economy, in particular, wage-productivity gaps in manufacturing vis-à-vis other sectors; (ii) across manufacturing sub-sectors; and (iii) gap between medium-larger (LM) vs. cottage-small (CS) within the manufacturing industry.

Between sectors

Real earnings of the manufacturing sector are at par with the overall earnings of the economy in terms of its level and trend (Figure 4.1).[7] The magnitude is lower than most of other sectors, except for agriculture and construction. Moreover, the gap between earning and productivity in the manufacturing sector is quite striking. In 2012, labour earning in manufacturing was only 12 per cent of its labour productivity, which declined from 14.4 per cent in 2001. The sector's wage-productivity ratio was among the lowest and showed a declining trend (Figure 4.2). Therefore, it is suggestive that the de-linking trend between wage and productivity in the manufacturing sector is quite obvious.

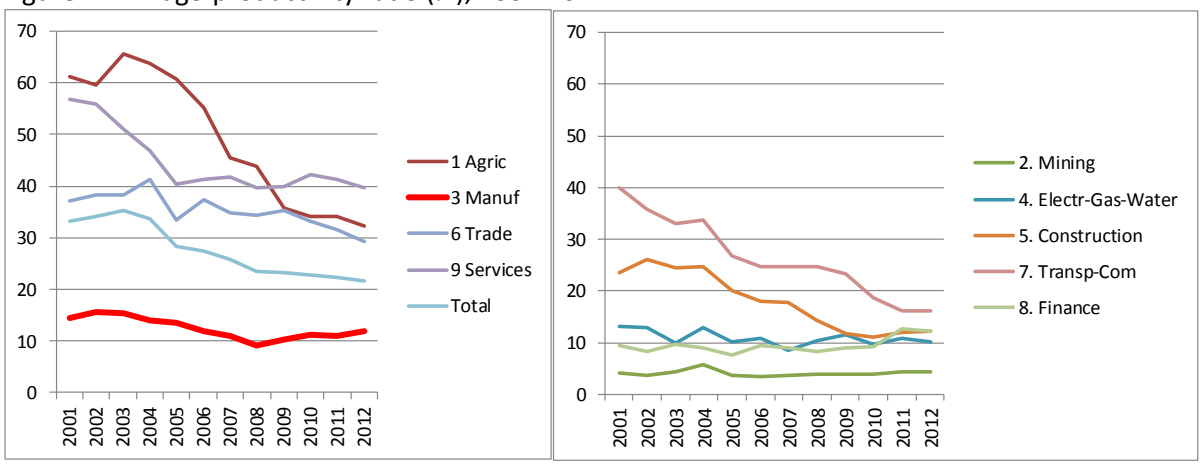
Figure 4.1: Real earnings across sectors, 2001-2012 (IDR million/year, 2000 constant prices)



Source: Calculated from the Sakernas.

[7] Earning refers to wage and income of the following four employment categories: self-employed, regular employees, casual worker in agriculture and casual worker not in agriculture, referring to the Sakernas' employment statuses no 1, 4, 5 and 6 respectively. The GDP deflator of the manufacturing sector is used to convert nominal earning to real earning.

Figure 4.2: Wage-productivity ratio (%), 2001-2012

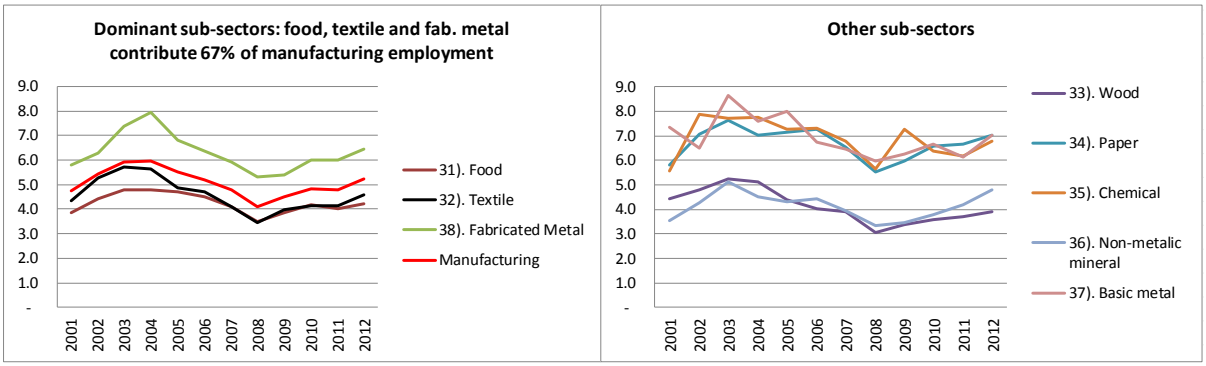


Source: Calculated from BPS data.

Within manufacturing sector

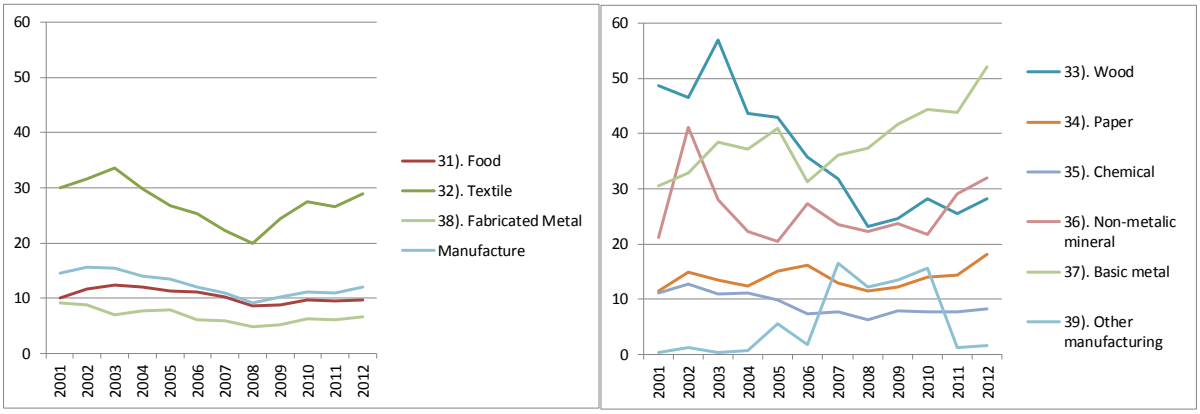
The general trend of real earning in the manufacturing sector is similar to the trends of real earning across manufacturing sub-sectors at ISIC 2 digit level. Average real wage earnings of food and textile sub-sectors are among the lowest, less than the overall real wage of the manufacturing sector (Figure 4.3). The trend of de-linking between wage and productivity was also apparent across manufacturing sub-sectors, as the wage-productivity ratios declined in most of sub-sectors (Figure 4.4).

Figure 4.3: Real earnings, Manufacturing ISIC 2, 2001-2012 (IDR million/year, 2000 constant prices)



Source: Calculated from the Sakernas.

Figure 4.4: Wage-productivity ratio (%), Manufacturing ISIC 2, 2001-2012



Source: Calculated from BPS data.

Comparing large-medium (LM) and cottage-small (CS) manufacturing

It is also important to differentiate value added and employment in the manufacturing sector according to the size of firms. The manufacturing sector consists of large, medium, small and cottage firms. The following definitions have been used since the mid-1970s, which is in accordance with international standard.

Large firms : employing 100 workers or more
Medium firms : employing 20-99 workers
Small Firms : employing 5-19 workers
Cottage firms : employing less than 5 workers (including firms with unpaid workers)

While it is interesting to examine the dynamics of the manufacturing sector based on the firm size, manufacturing related data disaggregated into the firm size is not readily available. On the one hand, the sectoral GDP or value added, employment and wage data for the overall manufacturing sector disaggregated into 9 manufacturing sub-sectors (ISIC 2) are available from the *National Income Account* and the *Sakernas*. On the other hand, similar data are available for large-medium firms from the *Large and Medium Manufacturing Statistics*. Combining the two data (overall manufacturing and Large-medium manufacturing), data for small-cottage manufacturing can be obtained.

The step by step process is as follows. From the national statistics, we have data of wage and employment for total manufacturing and nine manufacturing sub-sectors. This can be used to generate the labour cost at national level. For this purpose, the labour cost is defined as the product of wage and employment. From the medium and large manufacture statistics, we already have the labour cost/worker data. Multiplying this data with the number of workers, we get the total labour

cost for medium and large manufacturing firms. Then, by deducting the labour cost at national level with the total labour cost of medium and large firms we can obtain the labour cost for cottage and small firms. Using this data, as defined above, we can get the wage for cottage and small by dividing the labour cost with the number of workers in cottage and small manufacturing. In this case, the number of employment in the cottage and small (CS) firms is obtained by deducting national manufacturing employment with that of medium and large (LM) manufacturing.

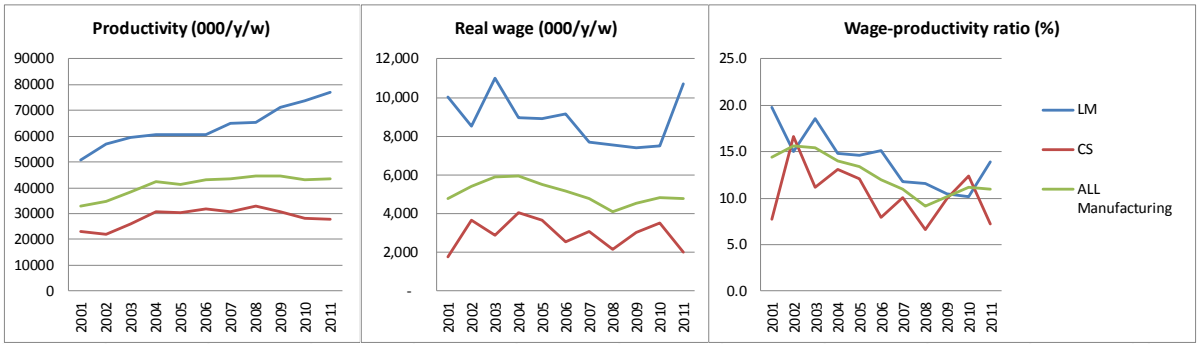
The following is the steps in generating the data for cottage and small manufacture:

- Wage ALL manufacturing x Employment ALL manufacturing = Labour Cost ALL manufacturing
- Wage LM manufacturing x Employment LM manufacturing = Labour Cost LM manufacturing
- Labour cost ALL manufacturing - Labour cost LM manufacturing = Labour Cost CS manufacturing
- Employment ALL manufacturing – Employment LM manufacturing = Employment CS manufacturing
- Labour cost CS manufacturing / Employment CS manufacturing = Wage CS manufacturing.

Therefore from this process, we will obtain employment, wage, total value added and productivity of the manufacturing sector disaggregated into large-medium (LM) and cottage-small (CS) firms. With regard to the nine manufacturing sub sector, we only focus on the three with the highest employment shares, namely: sub-sector 31 (Food), 32 (Textile), and 38 (fabricated metal). As mentioned earlier, the sub-sectors represent resource based and labour intensive industry (Food), foot loose labour intensive industry (textile), and capital intensive industry (fabricated metal).

As expected, the wage and productivity gaps between LM and CS firms are quite alarming. During 2001-2011, the trend of diverging productivity between LM and CS firms was much clearer than that of real wage (Figure 4.5). Both LM and CS firms showed declining trends of wage-productivity ratio indicating the de-linking of wage and productivity. Although productivity of LM firms increased at a much faster rate than productivity of CS firms, in the past decade, the value added share of LM firms to overall manufacturing industry stagnated at 54 per cent and their employment share in fact declined from 36 per cent to 32 per cent (Table 4.1). This finding is consistent with the overall finding on the process of de-industrialization in the Indonesian economy.

Figure 4.5: Manufacturing: ALL, large-medium (LM) and cottage-small (CS), 2001-2011



Source: Calculated from BPS data.

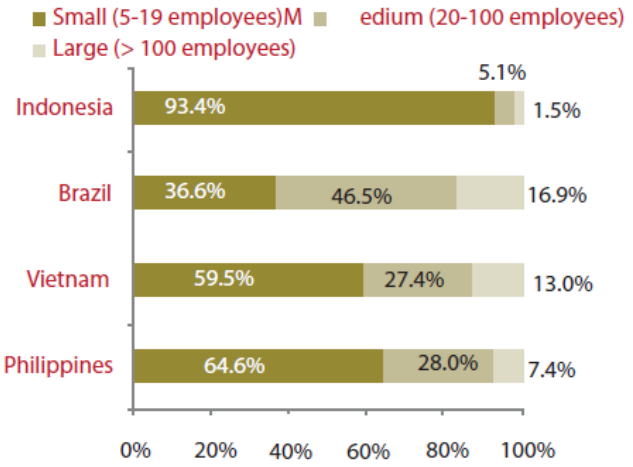
Table 4.1: Employment and value added shares of LM and CS firms

	Manufacturing Employment share (%)			Manufacturing Value added share (%)	
	2001	2011		2001	2011
Large-medium	36	32		56	56
Small-cottage	64	68		44	44
Total	100	100		100	100

Source: Calculated from BPS data.

A preliminary implication of this trend is that Indonesia needs to revitalise its industry through re-industrialization by expanding the role of LM firms in the manufacturing sector. This is because the large and medium firms in the manufacturing sector are expected to make significant investment and technological advancement as the two factors are crucial in revitalizing the manufacturing sector. However, the Indonesian manufacturing sector has been characterized with a severe imbalance because it has a disproportionately large presence of small firms, relative to other developing countries (Figure 4.6). 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 (2013) finds that the 'missing middle' situation is also observable in the Indonesian manufacturing exports.

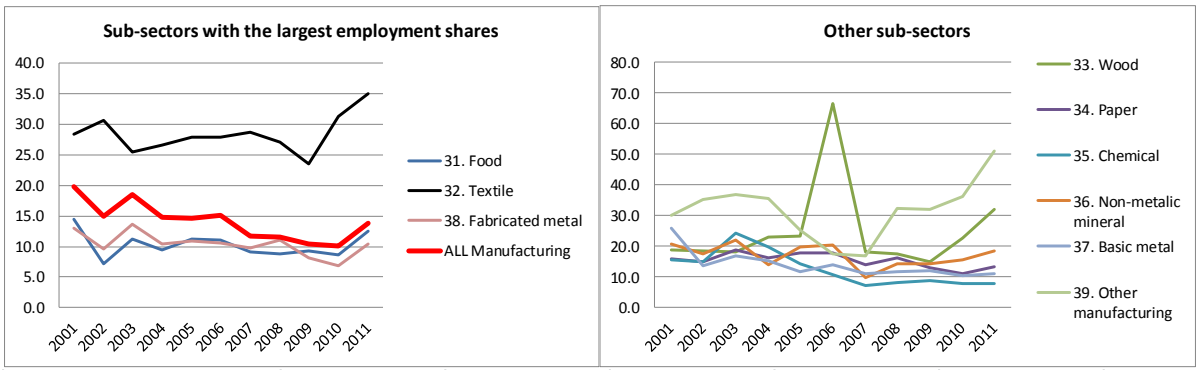
Figure 4.6: Distribution of manufacturing firms by size, 2009



Source: World Bank, Enterprise Survey 2008, quoted from World Bank (2012a:8).

Despite the above understanding, it is interesting to find that the trend of declining wage-productivity ratio was also experienced by the more modern and organized LM firms. However, the picture is not homogenous across sub-sectors of the LM industry as depicted in Figure 4.7. The wage-productivity ratios are somehow improved in the textile, wood and other manufacturing industries. Detailed figures on wage, productivity and wage-productivity ratio of the three employment dominant manufacturing sub-sectors (food, textile and fabricated metals) are presented in Figure 4.8. In the next section, we exploit variations in wage, productivity and employment across 66 manufacturing sub-sectors (ISIC 3) in estimating employment function for the overall LM manufacturing firms.

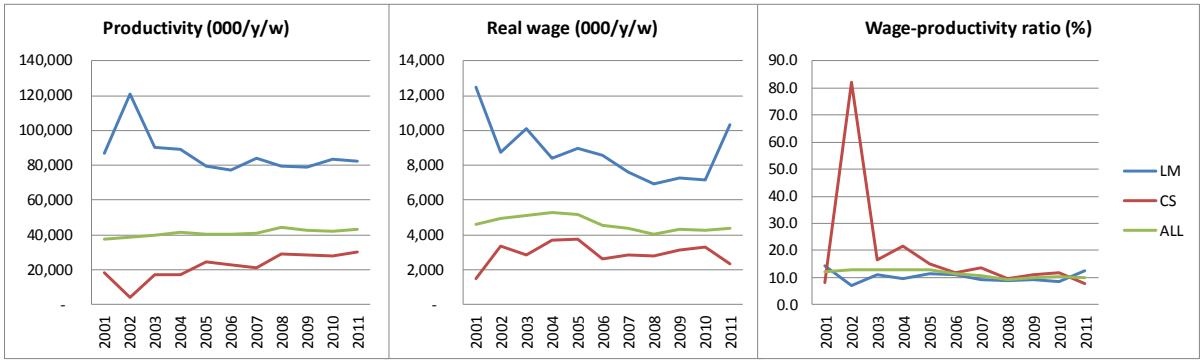
Figure 4.7: Wage-productivity ratio (%) across sub-sectors of LM industry, 2001-2011



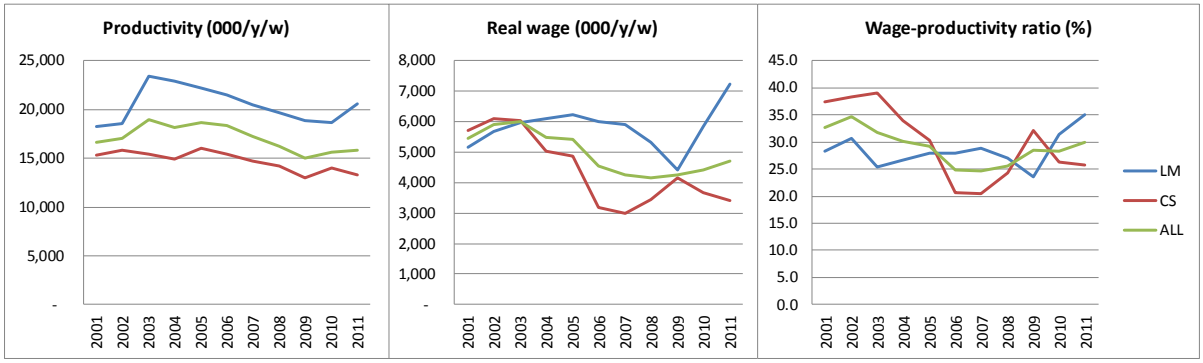
Source: Calculated from BPS data.

Figure 4.8: Wage and productivity in three employment dominant sub-sectors, 2001-2011

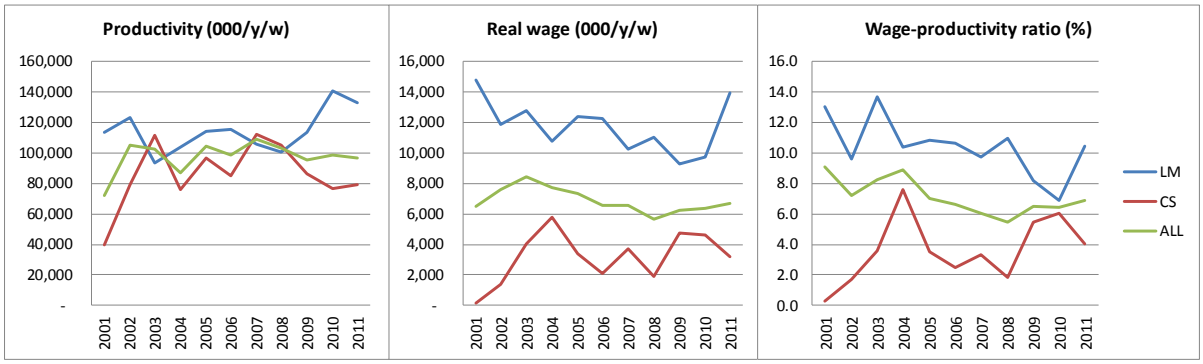
(a) FOOD sub-sector (31)



(b) TEXTILE sub-sector (32)



(c) FABRICATED METAL sub-sector (38)



Source: Calculated from BPS data.

5 – Employment Function of the Manufacturing Sector

It has been generally found that the de-linking of wage and productivity is apparent in the overall Indonesian economy, as well as across sectors and regions. This has been a key feature of the past decade of Indonesian economic development. As presented in the country study (Paper 1), the new estimates of employment function by treating real wage endogenous to labour productivity

indicates that the negative association between employment and wage is due to the de-linking between wage and productivity. If wage moves in the same direction following the increase in productivity or as the gap between the wage and productivity is reduced, one may expect the disturbing empirical regularity of negative relationship between employment and wage would no longer be tenable. With this scenario, one may expect that employment, wage, productivity and the overall GDP, all could move in same directions. In other words, this refers to an ideal situation, where real wage and the quality of employment increase, while the overall employment and the economy expand. The disaggregation of the manufacturing sector into LM and CS differentiation sheds some lights in this direction as the wage-productivity ratio of the LM firms is generally higher than that of CS firms.

The model

The main interest in estimating an employment function is to estimate the employment elasticity which is a concept that primarily concerns the ability of economic growth to generate new employment. Tadjoedddin and Chowdhury's (2012) and Tadjoeddin's (2011) provide the latest model of employment function for Indonesia. In deriving the function, it is assumed that firms minimize cost subject to a given level of output. Thus, it incorporates two important characteristics of labour demand, that is, it is a derived demand (for a given level of output) and a profit maximizing (or cost minimizing) employers employ workers by weighing the wages it has to pay against the price it receives for its product (i.e., real wage).[8] Additionally, employment decision, especially in the modern sector, is a marginal decision, that is, it depends on incremental changes from the prevailing configuration of output, employment and real wages.[9] Therefore, the model postulates that employment is a function of output, real wages and past employment. Lagged employment is included to capture the 'hysteresis' or the path dependent nature of the labour market and control for endogeneity.[10] In this model, all three independent variables are treated as exogenous. The common empirical finding, and also belief, is that real wage would have a negative sign and GDP would have a positive sign. It means that higher employment could only be achieved with either higher GDP or lower wage. The trade-off between wage and employment follows the conventionally conceived negative association between price and quantity from the demand perspective; however this only tells us half of the story as price and quantity could also be positively related.

[8] Both cost minimization and profit maximization yield the same result with respect to real wage, i.e. the optimal employment level is determined where marginal product of labor is equal to real wage, producing a downward sloping demand for labor curve.

[9] The formal sector is characterized by long-term employment and firms do not take on new workers at the start of every production period. The lagged employment, here, reflects stock adjustment.

[10] See Dhanani, Islam and Anis Chowdhury (2009) and Tadjoeddin and Chowdhury (2012).

In this paper, our innovation to improve the above model is by treating real wage as an endogenous variable. It is postulated that real wage is the function of labour productivity as in Blanchard and Katz (1999). Labour productivity is obtained by dividing the GDP with the number of employment. Naturally, higher productivity should lead to higher wage and the other way around as postulated by marginal productivity theory as well as efficiency wage theory. Wage can be seen from both perspectives of labourer and employer. From the labourer perspective, receiving higher wage is a natural consequence of rising labour productivity and the relationship can run in both directions. Higher wage would attract more employment when considering employment supply side. From the employer perspective, naturally, higher productivity should lead to higher return from the overall production process and labour should get some share of the higher return through rising wage. The employer should be encouraged to employ more labour as both labour productivity and wage go up simultaneously. Therefore, we hypothesize a positive correlation between wage and productivity and do not expect there to be a trade-off between real wage and employment as is generally found. By doing this, we consider the de-linking between wage and productivity in estimating the employment function.

Therefore, the following two-step equations to model the employment are specified below.

$$LnRW_{i,t} = \alpha_0 + \alpha_1 LnProd_{i,t} + \alpha_2 LnRW_{i,t-1} + u_i + \varepsilon_{i,t} \quad (1^{st} \text{ step})$$

$$LnE_{i,t} = \beta_0 + \beta_1 Predicted\ LnRW_{i,t} + \beta_2 LnE_{i,t-1} + u_i + \varepsilon_{i,t} \quad (2^{nd} \text{ step})$$

The first step regression specifies real wage (*LnRW*) as the function of labour productivity (*LnProd*) and real wage in the previous year.[11] It has to be noted that real wage refers to real earnings of self-employed workers, regular waged employment and casual workers. This regression is a more systematic test for the postulated de-linking between wage and productivity, which will be indicated by insignificant or negative value of α_1. In the second step regression, the dependent variable $LnE_{i,t}$ is the natural log of number of (sectoral) employment of province *i* at time *t* and $LnE_{i,t-1}$ is one period lagged of this variable. *RW* stands for real wage as an endogenous independent variable. Here, we use the predicted value *LnRW* taken from the first step regression. The remaining components in the model are the error terms: u_i represents time-invariant heterogeneity across provinces and $\varepsilon_{i,t}$ is the time-variant error term. The relationship between wage and productivity is denoted by α_1 and wage elasticity with respect to employment output is shown by β_1. Therefore, employment (*E*) will increase/decrease by β_2 per cent if real wage (*RW*) decreases/increases by 1 per cent.

[11] This is similar to Blanchard and Katz (1999) specification. Another well-known formulation is to treat wage as the function productivity and unemployment, such as Goh and Wong (2010) for the Malaysia case.

The model is estimated for the manufacturing sector, with two variants. *First,* is for the overall manufacturing by utilizing across provincial data of GDP from the *National Account*, and employment and wage from the Sakernas. Second, is for the LM firms only by exploiting variations across manufacturing sub-sectors at ISIC 3 level based on data taken from *Large and Medium Manufacturing Statistics* (BPS).

Estimation method

Since we have panel data observation with province-year and subsector-year as the units of analyses, each regression is estimated using the system GMM (generalized method of moment) regression, where by default, the lag dependent variable is included as an independent variable in each regression. The estimation method is suitable for the panel data that we have with many cross section observations during few periods, i.e. 33 provinces or 66 sub-sectors during 2001 to 2011. The two regressions are run separately. The predicted value of *LnRW* from the first step regression is treated as an independent variable for the second step regression. For comparison, a separate system GMM regression similar to the second step regression is also run, but real wage is treated as exogenous. Then, the coefficient of real wage of the endogenous setting is compared with that of the exogenous one.

In estimating panel data, two options are available, the static one, either fixed or random effects, and the dynamic one, which is called generalized method of moment (GMM). The inclusion of a lagged dependent variable (lagged employment) as one of our explanatory variables makes our model dynamic; however, the inclusion is essentially based on theoretical consideration as explained earlier. The presence of a lagged dependent variable as a regressor makes the model suffer from the problem of serial correlation. More importantly, the model is problematic due to the problem of acute endogeneity between the dependent variable and the regressor (either between wage and productivity in the first step regression, or between employment and wage in the second step regression) 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.[12] However, when the explanatory variables are persistent over time, lagged levels of these variables are weak instruments for the regression equation expressed in first differences. As Blundell and Bond (1998) show, the instruments used with the

[12] See Roodman (2006) for more discussions on the application of GMM.

standard first-difference GMM estimator (i.e. the endogenous variables lagged two or more periods) become less informative in models where the variance of the fixed effects is particularly high relative to the variance of the transitory shocks. This is likely to lead to biased coefficients, and the problem is generally exacerbated in small samples, such as these regressions. Hence, Blundell and Bond (1998) proposed a system GMM estimator that avoids small sample bias. System GMM estimator basically combines in a system the first-differenced with the same equation expressed in levels.

The main advantage of the system GMM approach is that unlike within or between (first differences) approaches, it does use the estimation in levels for estimation and this exploits not only the variation in data over time but also between the countries (provinces in our case). It thus allows to preserve more information to identify the parameters of interest. Furthermore, this additional information results in a substantial gain in the precision of the estimates.[13]

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 the problems (Arellano and Bond 1991; Arellano and Bover 1995; Blundell and Bond 1998). The first is a Sargan test of over-identifying restrictions, which tests the overall validity of the instruments. The second is Arellano-Bond test that examines the hypothesis that the error terms are not serially correlated. Failure to reject the null hypotheses of both tests provides support to our model specifications. Nonstationarity is not a big concern for panel data with small T (time periods).

GMM estimators have two popular versions: the one-step and the two-step estimators. In the case of one-step estimator, the error terms are assumed to be independent and homoskedastic across the panel units and over time. While in the case of two-step estimator, the residuals obtained from the one-step estimator are used to construct a consistent estimate of the variance–covariance matrix, thus relaxing the assumptions of independence and homoskedasticity. Therefore, the two-step estimator is asymptotically more efficient than the one-step estimator, and we employ the two-step estimator.

The Results

Based on the wage-productivity ratio of the manufacturing sector and its sub-sectors depicted in Figure 4.4 in the previous section, the de-linking between wage and productivity is apparent in the *overall* manufacturing sector. This is supported by the insignificant coefficient of the productivity

[13] More details of system GMM can be found in Rao, Tamazian and Kumar (2010).

variable in the first step regression that models real wage as the function of productivity (Table 5.1; line 1, column 1). As the consequence, the predicted real wage variable in the second step regression is negatively and significantly correlated with employment (column 2). The negative and significant relationship of the real wage disappears when real wage is treated as exogenous (column 3). We argue that the negative relationship in the second step regression (column 2) is because of the de-linking between wage and productivity as the real wage variable is treated as endogenous to productivity.

A similar regression conducted exclusively for the LM firms is also supportive of the above assessment.[14] As mentioned earlier, although the de-linking trend is still found in the overall LM firms, the trend is far from homogenous across sub-sectors of LM firms. To dig deeper, we exploit the variation across sub-sectors of LM firms at ISIC 3 level and surprisingly we find a different result namely the de-linking story is no longer valid (Table 5.1; row 2). In the first step regression, the coefficient of productivity variable is **significantly positive** (0.24) meaning that 1 per cent increase in productivity leads to 0.24 per cent increase in real wage. As a consequence, in the second step regression, the predicted real wage variable is significantly and positively related to employment with a coefficient of 0.55. This means that 1 per cent increase in real wage leads to 0.55 per cent increase in employment. In contrast to the previous finding, increase in real wages can lead to higher employment in more modern and better organized large and medium manufacturing industry. This is what we refer earlier as the ideal situation.

While the finding on positive relationship between wage and employment is encouraging, the picture is not entirely bright if we look at the disaggregated data across sub-sectors within the manufacturing industry, see Figure 4.7. This is because the desired positive link between wage and productivity in the overall LM industry seems to be driven by the depressed textile industry and the less employment generating wood and other manufacturing sub-sectors. For sure, the positive link is not due to the performance of the resource based sub-sector of food industry and the higher technology capital intensive sub-sector of fabricated metal.

[14] It should be noted that the unit of observations in the employment function of the LM manufacturing industry is the panel setting of 66 manufacturing sub-sectors (at ISIC 3) during 2001-2011. This is different from our unit of observation in the previous employment function, where we use the panel setting of 33 provinces during 2001-2012. This is because we do not have access to the raw data of the *Large and Medium Manufacturing Industry Survey* and rely only on the annual BPS publication of *Large and Medium Manufacturing Statistics*, where the disaggregated data into the provincial level is not provided.

Table 5.1: Employment function – Manufacturing

	Endogenous Wage (2 step System GMM)			Exogenous Wage
	1st step		2nd step	System GMM
	(LnWage=LnProductivity, lagLnWage)		(LnEmp = predictedLnWage, lagLnEmp)	(LnEmp = LnWage, lagLnEmp)
	Productivity coef.	Remark	Wage coef.	Wage coef.
	(1)		(2)	(3)
Manufacturing-ALL	0.033	De-linking	-3.887 ***	-0.012
Manufacturing-LARGE and MEDIUM industry	0.243 ***	NOT a case of de-linking	0.552 ***	0.009 ***

Notes: ***, ** and * indicate 1%, 5% and 10% levels of significance respectively; detail regression results are presented in appendixes.

6 – Conclusion

The paper has examined the relative importance of the manufacturing sector, and comparative dynamics of wage and productivity within the sector as well as with other economic sectors. Although the manufacturing sector maintains its role as the largest contributor to the overall GDP and is the main engine of growth, the Indonesian economy seems to have experienced negative de-industrialization. Despite this trend, manufacturing sector is still viewed as the main source of quality employment and many has advocated for revitalization of this sector.

The de-linking trend between wage and productivity in the overall manufacturing sector is evident, but the dynamics within the sector is not homogenous. Significant wage and productivity gaps between LM and CS manufacturing industries are found. In contrast to the overall de-linking trends in the sector, the positive link between wage and productivity in the large-medium (LM) manufacturing industry has led to a positive correlation between real wage and employment. This is analogous to the ideal situation where wage increases when the overall economy (employment and GDP) expands.

A key implication concerns with the importance of re-industrialization for quality employment, which is targeted at the overall up-grading of the economy especially in the manufacturing sector. In this regard, looking at the experience of earlier industrialized countries in East Asia, or even China, the role of the government in industrial development cannot be overlooked. As argued by Chang (2010, 2011), the government can pick 'winners', when he refers to the 'selective' policy interventions in the form of a policy package to create and support 'winners'.

This paper should affirm the momentum for renewed industrial policy in decentralized and democratic Indonesia to reverse the trend of negative de-industrialization since the late 1990s Asian

crisis. No less than premier institution like the World Bank has recently advocated the importance of the manufacturing sector in the Indonesian economy (World Bank 2012a). However, its policy prescription has not changed much from the institution's well-known policy view with regard to industrialization in developing countries. World Bank (1993) is the best example for argument advocating that 'difficult' policies like (selective) industrial policy should not be tried by developing countries with limited bureaucratic capabilities. An elaboration on a new industrial policy for the post-crisis Indonesia would be a logical consequence of analyses offered in this paper; however, it is beyond the scope of the current work.

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Appendix 1: Employment function with Endogenous wage
(Two-step System GMM, two-step estimator)

	ALL manufacturing		Large-medium (LM) firms	
First step (Dep.Var: Ln Real Wage)				
Ln Productivity	0.033		0.243	***
Ln Real Wage (lag)	0.108	***	0.084	***
Wald χ^2 (*P-value*)	0.000		0.000	
Sargan test, *P-value*	0.987		0.159	
(H_0: overidentifying restrictions are valid)				
Arellano-Bond test				
(H_0: no autocorrelation)				
AR(1), *P-value*	0.007		0.000	
AR(2), *P-value*	0.162		0.444	
Second step (Dep.Var: Ln Employment)				
Ln Real Wage (predicted)	-3.887	***	0.552	***
Ln Employment (lag)	0.817	***	0.721	***
Wald χ^2 (*P-value*)	0.000		0.000	
Sargan test, *P-value*	0.9913		0.191	
(H_0: overidentifying restrictions are valid)				
Arellano-Bond test				
(H_0: no autocorrelation)				
AR(1), *P-value*	0.0001		0.0003	
AR(2), *P-value*	0.455		0.700	
No. of observations	330		648	
No. of group (provinces/sub-sectors)	33		66	
No. of instruments used	56		56	

Notes: ***, ** and * indicate 1%, 5% and 10% levels of significance respectively; each regression has a constant term.

Appendix 2: Employment function with Exogenous wage (System GMM, two-step estimator)

	ALL manufacturing		Large-medium (LM) firms	
Ln Real Wage	-0.012		0.009	***
Ln Employment (lag)	0.879	***	0.716	***
Wald χ^2 (*P-value*)	0.000		0.000	
Sargan test, *P-value*	0.9898		0.210	
(H_0: overidentifying restrictions are valid)				
Arellano-Bond test				
(H_0: no autocorrelation)				
AR(1), *P-value*	0.0002		0.035	
AR(2), *P-value*	0.385		0.551	
No. of observations	330		648	
No. of group (provinces/sub-sectors)	33		66	
No. of instruments used	56		56	

Notes: ***, ** and * indicate 1%, 5% and 10% levels of significance respectively; each regression has a constant term.