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Domestic Value Added, Exports, and Employment: An Input–Output Analysis of Indonesian Manufacturing

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Abstract: *The paper is motivated by the current emphasis on the share of domestic value added in exports (SVEX) as a policy criterion for export development strategy in developing countries. Our hypothesis is that the policy emphasis on SVEX, which harks back to the import substitution era, is inconsistent with the objectives of achieving economic growth with employment generation in this era of economic globalisation. We test this hypothesis by examining the relationship of the SVEX with both export-induced employment and the total domestic value added, or the contribution of exports to gross domestic product, by applying the standard input–output methodology to data from Indonesian manufacturing. Our findings do not support the view, widely held in policy circles, that industries characterised by a higher SVEX have the potential to make a greater contribution to employment generation and total domestic value added. The policy inference is that, in this era of economic globalisation, policy makers should focus on the export potential of industries in designing export development policy, rather than on the SVEX.*

Keywords: Indonesia, linkages, value added, global value chain, global production sharing

JEL Classification Code: F13, F14, O19

1. Introduction

Policymakers in Indonesia emphasise the share of domestic value added in exports (SVEX) when determining sectoral priorities in export development. For instance, in November 2014, President Joko Widodo asked companies engaged in the domestic oil palm industry to accelerate the 'downstreaming' of the industry to 'increase the value [added] and the export volume of palm oil products'.[1] An earlier ban on exports of raw minerals came into force in January 2014, and a ban on exports of log and wood splinters was in effect during 1981–1986. This policy emphasis has resulted in protectionist policies in the form of an array of restrictions on intermediate goods imports. For example, in 2012 the Government of Indonesia imposed tariffs on imports of machinery and materials used in the assembly of automobiles. The regulation stipulates that 'at least 30% of total value of machines used must have been locally produced'.[2] Similar policies are found in other sectors such as power plants, the footwear industry, and food and beverages (Patunru and Rahardja, 2015). In 2017, the Ministry of Industry introduced a regulation requiring a minimum of 30 percent local content in the manufacturing of fourth-generation mobile phones.[3]

A policy emphasis on SVEX is not unique to Indonesia. In India, a key focus of the Modi government's grand vision of 'make-in-India' is to incubate domestic industry rather than expose it to undue pressure of competition with a view to broadening and deepening the domestic procurement base of export-oriented industries (Sharma, 2015). The past 3 years have seen the introduction of selective tariff increases and financial incentives to promote domestic intermediate goods production to encourage export producers to turn to domestically produced inputs (Athukorala, 2019; Sharma, 2015). In South Africa, the National Industrial Policy Framework promotes the 'beneficiation of raw materials in downstream sectors in a logical progression to complete various chains in the South African economy'.[4] The

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[1] As reported in *Kompas Daily,* 28 November 2014. Downstreaming also goes by other names: beneficiation, linkage approach, and value-added approach. In Indonesia it is popularly known as 'hilirisasi'.

[2] Minister of Finance Regulation No. 76/2012.

[3] Minister of Industry Regulation No. 29/2017.

[4] A policy brief released by South Africa's Department of Trade and Industry in 2006, cited by Hausmann, Klinger, and Lawrence (2008).

Minister of Trade and Industry of Papua New Guinea reportedly announced that the government is 'keen to promote downstream processing of raw materials to create value-added products for export and to generate employment'.[5] Many more examples in other industries can be found in many different countries: in Solomon Islands (timber and fish), Ghana and Gabon (log), Zambia (copper), Botswana (diamond), and Australia (uranium). All of these policies aim to ban the export of raw materials or intermediate goods to allow them to be used as inputs in domestic export-oriented final-goods industries instead.

The usual justification given by the proponents of these policies is that increasing domestic input usage as a percentage of gross output of exports (*per unit value added*[6]) will create more domestic employment while boosting the overall growth of the economy (increase in gross domestic product [GDP]) in terms of *total* net export earnings (total value added of exports). What this reasoning overlooks is that, under export-oriented industrialisation (as opposed to conventional import-substitution industrialisation), direct policy intervention to per unit domestic value added could in fact hinder the growth of and employment generated by domestic manufacturing, for three reasons. First, production for competitive export markets requires the use of high-quality inputs procured at world market prices. Second, in a context where industrial production is becoming increasingly globalised driven by the ongoing process of global production sharing (production fragmentation), per unit value added in exports naturally tends to *decline* everywhere. Therefore, an increase in total net export earnings (that is, total domestic value added of exports) of industries based on global production sharing depends increasingly on the expansion of export *volume*.[7] Third, intermediate goods production is typically more capital intensive compared to the assembly of final goods, which is more labour intensive. This means that shifting the domestic production structure towards final goods production and away from intermediate production would enhance the employment generation potential of

[5] As reported in the *New York Times* in 2006 and cited by Hausmann, Klinger, and Lawrence (2008).

[6] Henceforth, for brevity, we use 'value added' to imply 'per unit value added', except when explicit distinction is needed.

[7] Therefore, it is important to distinguish between total value added and per unit value added (value added ratio) in analysing gains from exports: the latter may decline while the former goes up.

domestic manufacturing in a labour-abundant country (that is, generate ‘pro-poor’ growth) (Little, 1999).

The emphasis on domestic value added as a policy criterion has received added impetus from a new wave of literature dealing with the measurement and patterns of manufacturing exports after converting gross (customs record-based) data into ‘value-added’ terms using an input–output methodology.[8] This literature was originally motivated by a valid concern that the gross trade data tend to exaggerate the magnitudes of bilateral trade imbalances under the ongoing process of global production sharing. This concern arose mainly because of the widening trade deficit of the United States with China underpinned by China’s rise as the ‘assembly centre’ within global production networks (Athukorala and Yamashita, 2009; Bergsten et al., 2006; Dedrick et al., 2010). It was for this reason that the former World Trade Organization (WTO) Director General, Pascal Lamy initiated the WTO-Organisation for Economic Cooperation and Development project on value-added trade (Lamy, 2011). However, many researchers and policy advisors have subsequently begun to use the data generated by this project (and that of other research projects that have emerged to generate value added trade data, such as the Groningen’s World Input–Output Database) to make inferences relating to the developmental implications of export-oriented industrialisation and various other facets of global economic integration.[9]

The purpose of this paper is to assess the validity of using the SVEX as a performance criterion in designing policies for export-oriented growth. Our hypothesis is that, in the context of the ongoing process of internationalising production, industries characterised by high-import intensity (i.e. low per unit domestic value added) have the potential to make a greater contribution to employment generation and growth of national income compared to industries that are deeply rooted in the domestic economy. The import intensities of most of the dynamic product areas are largely determined by factors beyond the control of the individual exporting nations. Therefore, the use of the SVEX as a policy guide can be both ineffective and counterproductive. We provide evidence in support of this hypothesis by examining

[8] See Johnson (2014) and Timmer et al. (2014) for surveys of this literature.
[9] For a criticism of this approach, see Patunru and Athukorala (2019).

the relationship of value added with both the employment intensity of Indonesian exports and the contribution of exports to the country's national income by applying the standard input–output methodology to the data for the years 1995, 2000, 2005, and 2010.

2. The Issue

The emphasis on domestic value added (alternatively known as 'domestic content' and 'domestic retained value') was central to the policy debate on industrialisation in the first 3 decades after the Second World War when import substitution held sway as the basic tenet of development strategy. This provided the justification for imposing local content requirements on foreign-invested firms in domestic manufacturing, selectivity in tax concessions, and other incentives for firms to use domestic inputs in the production process. Estimating and analysing the determinants of domestic value added or import intensity of exports and identifying 'key industries' (that is, industries with a strong domestic supply base in terms of forward- and backward input linkages) were a key focus of empirical development economics during this period.[10]

The basic policy thrust of the import-substitution strategy was to turn inward and seek the key to industrial development in greater interaction amongst domestic industries, while ignoring 'efficiency' (or 'factor proportions') considerations with regard to resource allocations, as advocated by mainstream economists (Hirschman, 1958). Therefore, the empirical development literature at the time mainly aimed to help policymakers to find '*an alternative* … to linking the economy to the rest of the world on the basis of comparative advantage' (Findlay, 1984: 23) (emphasis added).

The emphasis on domestic value added as a policy criterion dissipated from the development literature in the late 1970s as a result of an important paradigm shift in development thinking away from import substitution and toward export-oriented industrialisation. This is because, in a labour-abundant economy, attempts to 'create'

[10] See Hazari (1970), Acharya and Hazari (1971), Bulmer-Thomas (1978), and the literature cited therein. Surprisingly, these papers are missing in the reference lists of recent works on value-added trade, even though there is no real novelty in the methodology used compared to this early literature.

domestic value added through direct policy intervention could stifle the evolution of the export structure of a given country in line with its comparative advantage in the internationalisation of production. This in turn will hinder the achievement of employment and income growth objectives.

There are two key relevant considerations here. First, in an open economy, the factor intensity of production depends not only upon the technology in the final and intermediate stages of domestic production, but also upon the structure of foreign trade. This is because participation in international trade provides the economy with the opportunity to specialise in products in which it has comparative advantage (i.e. labour-intensive products in the case of a surplus-labour economy), while relying on world trade for the procurement of intermediate inputs. Intermediate goods production is typically more capital intensive compared to the final assembly of products (Riedel, 1975; 1976). Therefore, importing intermediate inputs for export production involves an implicit substitution of labour for relatively capital-intensive intermediate products in the production process. For instance, when an economy imports capital-intensive inputs such as machinery, synthetic fibre, and industrial chemicals, with foreign exchange earned by exporting labour-intensive products such as garments, footwear, and toys, it is implicitly substituting labour-intensive goods for capital-intensive goods in the production structure. This would enhance the labour intensity of the overall production process. Thus, resource allocation considerations make a strong case for the development of footloose (i.e. loosely linked) export industries in a labour-abundant economy.

Second, an emphasis on achieving greater domestic content in exports can run counter to the objective of increasing income levels through rapid penetration in world trade. In contrast to the closed-economy approach of import-substitution industrialisation, the key to success under export-oriented industrialisation lies in a country's ability to produce what international buyers demand. For a surplus-labour country, light consumer goods (e.g. clothing, footwear, and sporting goods) and component production and assembly in vertically integrated global industries are the most promising areas in the early stage of export-led industrialisation. In the production of these light consumer goods, the use of imported inputs is essential to maintain high quality standards (and thus international competitiveness) in the final products. In component production and final assembly within vertically integrated global industries, import content is naturally high and, in many cases, there is virtually no possibility of local substitution of intermediate inputs. Thus, per unit value added of final assembly is generally lower than in import-substitution production and even in the traditional export-oriented manufacturing production. Nevertheless, given the vast market potential for the assembled products, total value added (and hence the contribution to GDP and employment generation) could be much higher.

There is a vast case study-based literature covering the industrialisation experiences of both the newly industrialised countries in East Asia and the second-tier newly industrialised countries that casts doubt on the use of value added as a policy criterion in the context of export-led industrialisation (Chow and Papanek, 1981; Little, 1999; and Ranis, 1973; 1995). One of the strongest inferences worth quoting here is that by Little (1999: 234):

> Some critics have used the pejorative term 'shallow' to describe the development [in the 1960s and 1970s] of Korea and Taiwan, by which it is meant that there are relatively little backward linkages from exports. In that case, development in depth must be declared the enemy of employment and equity. All labour-intensive sectors have their *K/L* [capital–labour] ratios raised by backward linkages [that is, an increase in domestic content], because all the intermediaries – petrochemical, artificial fibre, steel, non-ferrous metals, etc. – are highly capital intensive. *These intermediaries are the curse of developing countries*. (emphasis added)

The above arguments by no means imply that a labour-surplus country must remain locked-in in 'footloose' manufacturing activities forever. On the contrary, the important message is that attempts to 'create value added' through direct intervention could run counter to the objectives of growth and employment generation under an export-oriented development strategy. With the gradual depletion of excess supplies of labour and adjustment in response to competition emanating from greater international specialisation, the industrial structure will gradually shift to more capital- and skill-intensive industries (provided, of course, that the required preconditions, including human capital development, are met). With the further global integration of the manufacturing sector, the quality of intermediate goods produced in the country would also improve through increased international exposure, although global production sharing naturally sets a limit on the substitution of locally produced parts and components compared to those exchanged within cross-border production networks.

3. Methodology

Our methodology draws on the standard input–output framework developed by Leontief (1936).[11] We calculate domestic value added, employment intensity of exports (export-related employment), and net export earnings (i.e. contribution of exports to domestic value added and GDP) based on the Leontief inverse matrix. Export-related employment captures both direct employment in export production and employment generated indirectly by export production through backward linkages with other industries. Likewise, net export earnings (i.e. total domestic value added of exports) is defined as gross exports minus direct and indirect imported inputs embodied in exports

Let X be an n x 1 vector of gross output and M be an n x 1 vector of imports. Furthermore, Y^D and E are n x 1 vectors of domestic demand (including usage in consumption and investment) and export demand for domestically produced outputs, respectively, and Y^M is an n x 1 vector of final demand for imported products (for both consumption and investment). We then have:

$$X = A^D X + Y^D + E \qquad (1)$$

$$A^M X + Y^M = M \qquad (2)$$

where $A^D = [a_{ij}^D]$ is an n x n matrix of direct input coefficients of domestic products, and

$A^M = [a_{ij}^M]$ is an n x n matrix of direct imported input coefficients. That is,

$$a_{ij}^D = z_{ij}^D / X_j \qquad (3)$$

[11] For an excellent textbook treatment of input–output analysis with the latest developments in the subject area, see Miller and Blair (2009).

$$a_{ij}^{M} = z_{ij}^{M}/X_j \tag{4}$$

where z_{ij}^{D} and z_{ij}^{M} are elements of n x n matrices Z^D and Z^M – the domestic transaction table and the imported intermediate inputs transaction table, respectively – the summation of which is the n x n total transaction matrix Z.

Solving (1) for X gives

$$X = (I - A^D)^{-1}(Y^D + E) \tag{5}$$

where the first term on the right-hand side is the Leontief domestic inverse matrix, with I being the identity matrix. The element of this matrix, $\tilde{a}_{ij}^{D}$, is the output required of the ith sector to sustain one unit of the output of the jth sector.

To measure net export earnings, the import intensity of domestic production must first be subtracted from gross exports. Import intensity is calculated as

$$M = R(I - A^D)^{-1} \tag{6}$$

where M is the import inverse matrix, and R is the diagonal matrix of imported input coefficients (i.e. the share of imported inputs in the total output of the given sectors). An element of M, m_{ij}, represents both direct and indirect imports required to produce one unit of product j domestically. Thus, the increase of the imported inputs in sector j when the final demand of sector j increases by one unit is given by

$$M_{tj} = \sum_{i=1}^{n} m_{ij} \text{ for } j = 1,2,\ldots,n \tag{7}$$

The total imports embodied in sector j's total exports (denoted by e_j) ('foreign content of exports' [National Research Council, 2006]) is

$$m_{tj}^{e} = e_j M_{tj} \tag{8}$$

Accordingly, we can derive the 'domestic content of export' or 'net export earnings' of sector j as

$$e_j^n = e_j(1 - M_{tj}) = e_j - m_{tj}^e \quad (9)$$

Finally, the SVEX (or, more precisely, per unit domestic content of exports) is given by the ratio of net exports and gross exports, as

$$SVEX_j = e_j^n / e_j \quad (10)$$

Export-related employment is measured by a similar approach. That is,

$$L = G(I - A^D)^{-1} \quad (11)$$

where *L* is the employment inverse matrix and *G* is the diagonal matrix of labour input coefficients. An element of *L*, l_{ij}, represents both direct and indirect employment required to produce one unit of product *j* domestically. Thus, the increase of employment in sector *j* when the final demand of that sector increases by one unit is given by

$$L_{tj} = \sum_{i=1}^{n} l_{ij} \text{ for } j = 1,2,\ldots,n \quad (12)$$

Finally, l_{tj}^e is export-related employment (MPEX) in sector *j*:

$$MPEX = l_{tj}^e = e_j L_{tj} \quad (13)$$

The dataset for the empirical analysis is constructed by bringing together the input–output tables of Indonesia for 1995, 2000, 2005, and 2010 and employment data from the annual labour force survey for the same years from the Indonesian Office of Statistics (BPS). Indonesia is one of the few developing countries that has produced 'complementary import type' input–output tables[12] every 5 years for more than 3

[12] Input–output tables take two forms: the 'complementary import' type and the 'competitive import' type. The former comprises two intra-industry matrices, one for domestic inputs and another for imported inputs. That is, the import content of each inter-industry transaction is identified separately and allocated to a separate import matrix. In the latter, imported inputs and domestically procured inputs are lumped together in a single intra-industry transaction table.

decades.[13] The number of sectors in each table varies from 172 to 185. We synchronised the tables to 163 sectors (including 83 manufacturing sectors[14]) to allow for sector-by-sector intertemporal comparison. Employment data from the labour force survey are classified by the same sectors in order to calculate export-related employments.

It is worth noting that input–output tables for most countries (including the United States, China, India, and Viet Nam) are of the competitive import type. For these countries, the calculation of import intensity and net export earning requires separating the intra-industry metric into domestic and imported input matrices by employing the stringent 'import similarity assumption' – within the product categories of the input–output table, the mixes of imports and domestically made goods are the same.[15] The use of this assumption can lead to significant biases in the estimated domestic contents of exports if the exports are heavily concentrated in some manufacturing sectors that depend heavily on imported inputs (such as electronics, electrical goods, and automobiles) (Patunru and Athukorala, 2019). The presence of duty drawback schemes and other government initiatives that facilitate duty-free access for the intermediate inputs used in export production could compound such biases. Fortunately, our analysis does not suffer from this limitation because the Indonesian input–output tables, as noted, are of the complementary import type, with separate domestic and imported input matrices. Both tables are constructed using input-structure data collected from the annual industry survey.

It is pertinent to mention that our estimation procedure may lead to an underestimation of import intensity of export, for two reasons. First, the import content of exports produced in each industry is identical to the average import intensity of the industry's total production (the assumption on which Equation [3] is based). This assumption is not entirely consistent with reality. The usual pattern is that, even when

[13] The 2015 input–output table is presently under construction.

[14] According to the commodity classification of the Indonesian Office of Statistics, 'animal and vegetable oil (input–output sector [I-O] 55), petroleum processing (I-O 99), and smoked and crumb rubber (I-O 100) are treated as 'manufacturing'. We excluded these three sectors from our manufacturing classification because standard (unprocessed or semi-processed) primary products account for over 90% of production of these sectors.

[15] For instance, if 30% of the gross output of agriculture is used in the food processing industry, then 30% of agricultural imports are also used in food processing. Similarly, if 40% of the gross output of the mineral sector goes to the iron and steel industry, so does 40% of the mineral imports.

industries are finely classified, the import content in an industry's production for export is higher than in its production for the home market. Second, since the estimates are based on the inter-industry transaction table, they incorporate only the direct import requirements of export production. These estimates do not capture the import intensity of domestic investment (i.e. capital formation) in export-producing industries.

4. Results

We computed the domestic contents of exports (net export earnings), export-related employment, and backward and forward linkages using the Indonesian input–output tables for 1995, 2000, 2005, and 2010. The estimates for the 83 manufacturing industries and the supporting statistical tables are given in the Appendix. Tables 1 and 2 provide the summary indicators derived from these tables.

The export-weighted average of value added share of manufacturing has remained within the narrow margin of 0.77%–0.82% without showing any clear trend (Table 1). As we hypothesised, both the total net export earnings (the net addition to GDP) and export-related employment exhibit quite distinct patterns. Net export earnings in 2010 stood at Rp611 trillion, compared to Rp281 trillion in 1995. Total export-related employment increased from 5,493 to 8,029 over the same period. Both total net exports and export-related employment were slightly higher in 2000 compared to both 2005 and 2010. This seems to reflect the slowing down of manufacturing exports in the first decade of the new millennium, presumably due to the 'Dutch disease' effect of the resource boom and some policy backsliding that eroded incentives for export-oriented production (Patunru and Rahardja, 2015).

Table 1: Domestic Value Added, Net Exports and Export-Induced Employment in Indonesian Manufacturing – Summary Data

	1995	2000	2005	2010
Domestic value added share (%)[a]	0.82	0.77	0.77	0.79
Total net export earnings ($ million, at 2010 prices)	23,658	52,818	47,658	49,247
Total export-related employment	5,152	11,343	8,739	7,383

[a] Export-weighted average.
Source: Based on the Tables in the Appendix.

In Table 2, we summarise our estimates for the industries, which are closely associated with global production networks (GPNs), together with the overall industry averages (last row) for comparison. The classification system used for delineating GPN products and further distinguishing between 'producer driven' and 'buyer-driven' GPNs is discussed by Athukorala (2019). It is important to note that this classification as applied to the industries at the input–output classification level (the two-digit level of the International Standard Industry Classification) does not permit the precise delineation of the characteristics of GPN products. This is because the output of a 'GPN industry' identified at the two-digit level is a combination of production based on global production sharing (vertical specialisation) and traditional production for the domestic market (horizontal specialisation). Normally, the import content of vertical specialisation tends to be higher than in horizontal specialisation (Brumm et al., 2019; Koopman, Wang, and Wei, 2014).

Distinguishing between producer-driven and buyer-driven GPNs is important for assessing a country's gains from export expansion through production sharing, and for formulating related policies. Buyer-driven networks are common in diffused technology-based consumer goods industries such as clothing, footwear, travel goods, toys, and sporting goods. In these production networks, the 'lead firms' are international buyers (large retailers such as Walmart, Marks & Spencer, and H&M) or brand manufacturers (such as Victoria's Secret, Gap, Zara, and Nike). Global production sharing in these networks takes place predominantly through arm's length relationships, with global sourcing companies (value chain intermediaries, such as

Hong Kong-based Li & Fung and Mast Industries [Far East]) playing a key role in linking producers and lead firms. Thus, there is room for local firms to engage directly in exporting through links established with foreign buyers and to substitute local inputs for imported inputs, depending of course on the ability of local suppliers to meet the required quality standards.

In a producer-centred production network, the 'lead firm' is a multinational enterprise. Global production sharing takes place predominantly through the lead firms' global branch network. Producer-centred production networks are common in vertically integrated global industries such as electronics, electrical goods, automobiles, and scientific and medical devices. In these industries, production technology is normally specific to the lead firm and is closely protected to prevent imitations. Moreover, the production of final goods in these industries requires highly customised and specialised parts and components whose quality cannot be assured by a third party. Thus, opportunities for increasing domestic value added are limited compared to the specialisation within buyer-driven production networks.

The average (export-weighted) value added ratio of GPN industries (about 70%) is smaller than the overall industry average (about 80%). As expected amongst GPN products, value added is larger for industries in buyer-driven networks (78%) than for their producer-driven counterparts (64%). Within producer-driven GPN products, value added is notably lower than the overall industry average for all products other than automobiles and motorcycles. Notwithstanding low domestic value added, both net export earnings and export-related employment in GPN industries grew faster than total manufacturing between 1995 and 2010. During this period, net exports of GPN products increased at a compound annual rate of 7.6% compared to the industry average of 5.3%. The difference in terms of the rate of employment growth was even wider, 6.1% and 2.6%, respectively. Net exports of producer-driven GPN products have increased at a much faster rate (9.1%) than that of buyer-driven products (4.1%).

Table 2: Domestic Value Added, Net Exports and Export-Induced Employment in Global Production Network Products[a]—Indonesian Manufacturing

I-O Code	Product/product group	Value added share (%)		Net exports at 2010 prices ($ million)		Export-related employment (‘000)		Annual compound growth rate (1995–2010) (%)	
		1995	2010	1995	2010	1995	2010	Net exports	Export-related employment
	(a) Producer-driven GPN products	0.65	0.64	2,908.4	10,745.1	941.3	2,241.8	9.1	6.0
114	Prime-mover engines	0.66	0.63	3.8	38.1	0.3	1.8	16.6	11.6
115	Machinery and parts	0.42	0.62	361.2	592.5	11.4	59.8	3.4	11.7
116	Electric generators and electric motors	0.75	0.57	50.0	174.2	5.4	9.2	8.7	3.6
117	Electrical machinery and parts	0.74	0.68	96.3	875.7	14.4	38.3	15.9	6.8
118	Communication equipment and parts	0.67	0.56	1,274.7	3,817.2	85.9	321.2	7.6	9.2
119	Electronic household appliances	0.77	0.70	42.2	651.0	5.5	57.7	20.0	16.9
120	Other electrical appliances	0.67	0.49	131.7	777.1	20.4	36.9	12.6	4.0
121	Batteries	0.75	0.61	180.6	392.7	13.2	27.1	5.3	4.9
122	Ships and ship repair services	0.77	0.64	246.1	538.0	40.6	73.1	5.4	4.0
124	Motor vehicles, except motorcycles	0.75	0.85	101.4	1,753.6	3.3	95.9	20.9	25.2
125	Motorcycles	0.73	0.89	74.3	208.6	2.3	10.0	7.1	10.4
126	Other transport equipment	0.67	0.66	140.4	171.0	100.6	13.5	1.3	-12.5
127	Aircraft and aircraft repair services	0.43	0.64	40.3	82.6	26.0	7.1	4.9	-8.3
128	Measuring, photographic, and optical equipment	0.75	0.59	165.3	672.7	24.8	40.2	9.8	3.3
	(b) Buyer-driven GPN products	0.79	0.78	3,943.9	7,238.1	587.2	1,450.1	4.1	6.2
76	Apparel	0.77	0.78	2,311.8	5,110.3	187.5	1,100.4	5.4	12.5
80	Footwear	0.83	0.79	1,595.6	1,878.8	366.6	328.7	1.1	-0.7
131	Toys and sporting goods	0.79	0.86	36.5	249.0	33.2	21.0	13.7	-3.0
	(c) Total GPN products (a + b)	0.73	0.70	6,852.3	17,983.2	1,528.5	3,691.9	7.6	6.1

Memorandum item									
	Total manufacturing	**0.80**	**0.81**	**30,949.5**	**67,191.6**	**5493.4**	**8029**	**5.3**	**2.6**

I–O = input–output, GPN = global production network.

[a] I-O industries in which global production sharing related exports are concentrated.

Source: Based on Tables in the Appendix.

Automobiles (motor vehicles and motorcycles) stand out amongst GPN products for their higher domestic value added compared to the other GPN products. What explains this difference? Unlike most other GPN products (in particular, electronics and electrical goods), automobiles are bulky and 'low-value-to-weight' goods, and, hence, transport costs are a key determinant of market price. There is also a need to design the product to suit the taste and budget of the consumer. Therefore, there is a natural tendency for assembly plants to be located in countries with large domestic markets.

Once automakers set up assembly plants in a given country, parts and component producers follow them, for two reasons. First, most auto parts are bulky and have low value-to-weight ratios, making it too costly to use air transport. This naturally creates a formidable constraint on timely delivery to meet the just-in-time production schedules of the final assembler. Second, there is an asymmetrical market power relationship between component makers and automakers within the global automobile industry; the products of many auto part manufacturers are used in the vehicles made by a handful of carmakers. This is different from electronics parts like integrated circuits and semiconductors that are used in many industries. Thus, there is incentive for part makers to set up factories next to the assemblers to secure their position in the market (Kohpaiboon and Jongwanich, 2013; Klier and Rubenstein, 2008).

Once a complete production base (involving both final assembly and component assembly and production) is established in a given large country, exporting to third countries becomes a viable option for automakers. Scale economies gained from domestic expansion make the export of both assembled vehicles and parts and components profitable as part of their global profit maximisation strategy. The adaptation of products to suit domestic demand conditions and lower transportation costs compared to exporting from the home base has also become an important driver of exporting to regional markets from the new production base. Given that parts and component production bases evolve around the final assemblers, these exports tend to be characterised by higher domestic value added compared to other GPN exports. However, part of the measured value added could be 'pseudo' domestic value added given the dominant role played by foreign companies in the domestic parts and component supply base.

To supplement this broad-brush comparison, we estimated the following regression using a panel dataset constructed by putting together the data for the 4 years covered by Indonesia's input–output tables (1995, 2000, 2005, and 2010).

$$\left.\begin{matrix} TVEX_{it} \\ MPEX_{it} \end{matrix}\right\} = \alpha + \beta_1 SVEX_{it} + \beta_2 PROD_{it} + \beta_3 DGPN_i + \beta_4 DGPN_i * SVEX_{it} + \beta_5 DGPN_i * PROD_{it} + \delta_i + \gamma_t + \varepsilon_{it}$$

(14)

where i=1,2,...,N is the product category, t=1,2,...,T is the time unit in years, *TVEX* is the total domestic value added of export, *SVEX* is the share of value added of exports, *MPEX* is export-related employment, *PROD* is productivity, *DGPN* is a dummy variable that takes the value of 1 for GPN products and zero otherwise, δ_i is the unobservable fixed characteristics of industries' product-specific effects, γ_t is unobservable time-specific effects, and ε_{it} is the disturbance term.

The main variable of interest is *SVEX*, which, according to the proponents of using value added share as a policy criterion, is postulated to have a positive effect on both *TVEX* and *MPEX*. *PROD* is included to capture the efficiency of production. This variable is measured as real value added per worker or labour productivity. Labour productivity by construct captures both the technical efficiency of machinery and other capital equipment available for the worker to work with and his own efficiency in using this equipment in production.[16] Ideally, we should include these as two separate variables, but the lack of data at this level of industry disaggregation prevents us from doing so.

The intercept and slope dummies for *GPN* products are included to test whether the hypothesised relationships vary between these products and total manufacturing. All four variables – *TVEX*, *MPEX*, *SVEX*, and *PROD* – are measured at constant 2010 prices; and *TVEX*, *MPEX*, and *PROD* are used in natural logarithms so that the

[16] For this reason, value added per worker is also used as an alternative measure of capital intensity: 'capital deepening tends to increase the relative output of a sector with a greater capital share' (Acemoglu and Guerrieri, 2008).

coefficients of the latter two variables can be interpreted as elasticities. The expected sign of the coefficient of this variable is positive in the TVEX, and negative in the MPEX equation.

We estimated Equation (14) for the total value added and export-related employment using fixed effects and random effects estimators, and compared the results using the Wu-Hausmann test. This test decisively rejected the null hypothesis that unobserved explanatory variables (the unobserved effects) are not distributed independently of the explanatory variables, favouring the use of the *FE* estimator. The results are reported in Table 3, and summary statistics are given in Table 4 to facilitate the interpretation of the results

Table 3: Value Added Share of Exports, and Total Value Added and Export-Induced Employment in Indonesian Manufacturing[a]

Explanatory variable	Total value added (TVEX)		Export-related employment (MPEX)	
	Model 1	Model 2	Model 1	Model 2
Value added share (*SVEX*)	0.85 (0.80)	1.09 (0.94)	0.08 (0.91)	0.12 (1.08)
Productivity (*PROD*)	0.15*** (0.05)	0.18*** (0.08)	-0.14** (0.06)	-0.12* (0.08)
*DGPN*SVEX*		-1.29 (1.64)		-0.35 (1.81)
*DGPN*PROD*		-0.10 (0.08)		-0.06 (0.11)
D2000[b]	1.07*** (0.16)	1.07*** (0.16)	0.87*** (0.18)	0.87*** (0.19)
D2005[b]	0.98*** (0.16)	0.98*** (0.16)	0.70*** (0.19)	0.71*** (0.19)
D2010[b]	0.86*** (0.22)	0.86*** (022)	0.48*** (0.22)	0.48*** (0.22)
Constant term	12.02*** (0.73)	11.96*** (0.74)	10.14*** (0.84)	10.13*** (0.86)
Industry fixed effects	Yes	Yes	Yes	Yes
Observations	324	324	324	324
Number of sector	82	82	82	82
Memorandom item: results for global production network products[c]				
SVEX		-0.19 (1.35)		-0.23 (1.48)
PROD		0.08* (0.04)		-0.18** (0.08)

[a] Heteroscedasticity-corrected (robust) standard errors in parentheses, with the statistical significance of the coefficients denoted as *** p<0.01, ** p<0.05, and * p<0.1.
[b] Time (year) dummy with the year 1995 as the base dummy.

[c] Derived from the overall regression. The coefficients are the linear combinations of the base coefficient and the coefficient of the global production network interaction dummy. The standard errors are derived from the covariance of the two coefficients.
Source: Authors' calculation.

Table 4: Summary Statistics

					Correlation			
	Mean	**Std. Dev.**	**Min**	**Max**	***TVEX***	***MPEX***	***SVEX***	***PROD***
TVEX	13.40	2.85	2.64	19.02	1.00			
MPEX	9.54	2.73	-2.53	14.92	0.90	1.00		
SVEX	0.84	0.13	0.39	0.99	-0.24	-0.16	1.00	
PROD	4.27	1.83	-0.62	12.86	0.27	-0.12	-0.16	1.00

Max = maximum, Min = minimum, MPEX = export-related employment, PROD = productivity, Std. Dev. = standard deviation, SVEX = share of domestic value added in exports, TVEX = total value added in exports.
Source: Authors' calculation.

In each of the two panels in Table 3, Model 1 is the base model (without the *GPN* dummies). In Model 2, the GPN dummy interaction variables cover all 17 GPN products identified in Table 2. We also estimated an alternative specification of Model 2 after excluding automobiles (input–output sector [I-O] 125) and motorcycles (I-O 126), but it is not reported here because there were no notable differences in coefficient estimates compared to Model 2. The fixed effects estimator automatically dropped the GPN intercept dummy. The results of *SVEX* and *PROD* for the GPN products derived from the overall regressions are reported as memorandum items in the table.

In both sets of equations, the coefficient of *SVEX* is not statistically significant, even at the 20% level. Thus, the results clearly do not reject the null hypothesis that there is no statistically significant association between the SVEX and both the total contribution of exports to GDP (total value added) and employment generation. The results are remarkably insensitive to the inclusion of dummy interaction variables for GPN products.

The signs of the coefficient of *SVEX* for GPN products is negative in both the TVEX and MPEX equations. This is consistent with what we observed in the simple comparison between total manufacturing and GPN products based on the data in Table 2. However, the coefficients have failed to achieve statistical significance, presumably because of the limitations involved in the identification of GPN products at this level of commodity disaggregation. The coefficient of *PROD* in both models of the TVEX equation indicate a strong positive association between productivity and total value added in exports (contribution of exports to GDP), as expected. However, there is no statistically significant difference between total manufacturing and GPN-related industries as regards this relationship. The coefficient of *PROD* in the two models of the MPEX equation is negative and statistically significant, suggesting a plausible trade-off between improvement in labour productivity and total employment. Interestingly, the magnitude of this trade-off seems greater for GPN products: the negative coefficient of *PROD* for GPN products is larger in magnitude (see the memorandum item), but this result must be taken with caution because, as noted, *PROD* is also a widely used proxy for capital intensity. From that point of view, the results permit the alternative interpretation that specialisation in global production sharing has greater employment potential than does engagement in traditional horizontal specialisation. Unfortunately, it is not possible to distinguish between these two interpretations due to a paucity of data.

5. Concluding Remarks

We have examined the implications of using the share of domestic value added (per unit value added) as a criterion in designing national policy for export-oriented industrialisation in this era of economic globalisation. The key hypothesis is that, given the increased cross-border spread of production processes within vertically integrated industries, policy emphasis on increasing the domestic value added ratio in exports, which harks back to the era of import-substitution industrialisation, runs counter to the national objectives of achieving economic growth and generating employment under economic globalisation. Production for competitive export markets requires the use of high-quality inputs procured at world market prices. Moreover, given the growing importance of global production sharing as the prime mover of manufacturing export expansion over the past few decades, per unit value added in exports naturally tends to *decline* everywhere, and national gains from export expansion are fundamentally dependent on volume expansion, not on the increase in domestic content in a given country. Finally, since intermediate goods production is typically more capital intensive compared to the assembly of final goods, domestic value added is likely to correlate negatively, rather than positively, with the employment creation (and hence poverty reduction) potential of export-oriented industrialisation at the early stage of industrialisation in developing countries.

We have provided evidence in support of this hypothesis by applying the standard input–output methodology to data for the Indonesian economy. The findings clearly show that export expansion and the growth of export-related employment in the Indonesian economy during 1995–2010 occurred in a context where domestic value added, as usually measured by the domestic content of exports as a percentage of gross exports, remained virtually unchanged. The findings become even more striking when we recall that they are based on an estimation procedure that could perhaps lead to an underestimation of the import intensity of export production.

The policy inference of our findings is that, in this era of economic globalisation, policymakers should focus on the export potential of industries rather than on the share of domestic value added of exports in designing export development policy. Using the value added ratio as a criterion in industrial approval and attempting to engineer value added through other direct policy interventions could run counter to the objectives of growth and employment generation under the export-oriented development strategy. The gradual depletion of the domestic production base through global integration would improve the quality of intermediate goods produced in the country, resulting in an increase in domestic value added in exports. However, the rapid expansion of global production sharing naturally sets a limit on the substitution of locally produced parts and components for those exchanged within cross-border production networks. In this context, an increase in domestic value added of exports (net export earnings) and employment expansion depends crucially on export volume expansion and the ability of manufacturing firms to move towards high-value tasks and segments in the global manufacturing value chain.

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Appendix

Table A1: Per-Unit Domestic Value Added and Export-Related Employment

I-O code	Sector	Domestic value added				Export-related employment			
		1995	2000	2005	2010	1995	2000	2005	2010
48	Meat, entrails of slaughtered animals	0.94	0.92	0.97	0.96	0.71	0.05	0.03	0.02
49	Processed and preserved meat	0.94	0.92	0.95	0.96	0.34	0.05	0.02	0.02
50	Dairy products	0.87	0.79	0.89	0.92	0.10	0.11	0.08	0.02
51	Canned and preserved fruit and vegetables	0.95	0.93	0.95	0.93	0.27	0.08	0.06	0.02
52	Salted and dried fish	0.98	0.95	0.96	0.98	0.05	0.05	0.02	0.01
53	Processed and preserved fish	0.95	0.92	0.94	0.97	0.07	0.05	0.02	0.02
54	Copra	0.97	0.95	0.96	---[a]	0.17	0.08	0.04	0.02
56	Rice milling	0.96	0.97	0.96	0.97	0.44	0.19	0.11	0.05
57	Wheat flour	0.53	0.59	0.39	0.66	0.04	0.03	0.01	0.00
58	Other flour	0.86	0.80	0.95	0.96	0.57	0.07	0.05	0.03
59	Bakery products and similar products	0.88	0.78	0.79	0.87	0.12	0.05	0.03	0.02
60	Noodles, macaroni, and similar products	0.82	0.80	0.70	0.83	0.12	0.04	0.02	0.01
61	Sugar	0.95	0.94	0.93	0.91	0.12	0.14	0.09	0.04
62	Chocolate and sugar confectionery	0.95	0.81	0.91	0.94	0.06	0.05	0.04	0.01
63	Milled and peeled coffee	0.96	0.95	0.95	0.95	0.26	0.07	0.03	0.04
64	Processed tea	0.98	0.93	0.94	0.96	0.26	0.14	0.09	0.03
65	Soybean products	0.97	0.73	0.77	---[a]	0.16	0.04	0.03	0.03
66	Other food	0.91	0.86	0.88	0.92	0.21	0.09	0.06	0.03
67	Animal feed	0.86	0.87	0.91	0.93	0.62	0.08	0.05	0.03
68	Alcoholic beverages	0.93	0.80	0.91	0.85	0.19	0.06	0.05	0.02
69	Non-alcoholic beverages	0.92	0.80	0.88	0.91	0.09	0.05	0.04	0.01

70	Tobacco products	0.86	0.78	0.86	0.83	0.91	0.12	0.11	0.02
71	Cigarettes	0.90	0.86	0.88	0.89	0.13	0.04	0.02	0.02
72	Yarn and cleaned cotton thread	0.69	0.71	0.59	0.76	0.04	0.03	0.02	0.01
73	Textiles	0.71	0.68	0.69	0.59	0.02	0.03	0.02	0.02
74	Processed textiles except apparel	0.78	0.48	0.76	0.80	0.40	0.03	0.02	0.03
75	Knitted materials	0.61	0.64	0.77	0.81	0.23	0.03	0.02	0.04
76	Manufacture of ready-made garments	0.77	0.73	0.80	0.78	0.04	0.04	0.03	0.02
77	Manufacture of carpet, rope, and other textiles	0.73	0.45	0.63	0.71	0.17	0.03	0.02	0.02
78	Tanned and processed leather	0.80	0.90	0.95	0.93	1.19	0.06	0.03	0.01
79	Leather products	0.85	0.78	0.89	0.94	0.30	0.05	0.03	0.04
80	Footwear	0.83	0.87	0.88	0.79	0.11	0.05	0.03	0.02
81	Sawmill and preserved wood	0.95	0.89	0.88	0.94	0.07	0.07	0.04	0.02
82	Manufacture of plywood and similar products	0.91	0.83	0.82	0.92	0.08	0.07	0.04	0.01
83	Wooden building materials	0.94	0.87	0.87	0.89	0.18	0.08	0.05	0.01
84	Manufacture of furniture and other products, mainly of wood, bamboo, and rattan	0.94	0.86	0.88	0.87	0.32	0.12	0.06	0.09
85	Pulp	0.87	0.60	0.86	0.83	0.05	0.02	0.02	0.01
86	Paper and cardboard	0.71	0.58	0.73	0.77	0.02	0.02	0.01	0.00
87	Paper and cardboard products	0.83	0.70	0.78	0.76	0.04	0.02	0.01	0.01
88	Printing and publishing	0.84	0.75	0.71	0.73	0.05	0.02	0.01	0.04
89	Basic chemicals, except fertiliser	0.64	0.73	0.63	0.59	0.02	0.01	0.00	0.00
90	Fertiliser	0.52	0.90	0.89	0.79	0.01	0.01	0.00	0.00
91	Pesticides	0.75	0.53	0.56	0.79	0.06	0.07	0.02	0.01
92	Synthetic resin, plastic, and fibre	0.61	0.75	0.70	0.69	0.02	0.01	0.00	0.00
93	Paints, varnishes, and lacquers	0.75	0.60	0.61	0.83	0.03	0.02	0.01	0.01
94	Drugs and medicine	0.72	0.70	0.67	0.81	0.04	0.02	0.01	0.01
95	Traditional herbal medicine	---[a]	---[a]	0.86	0.92	0.18	0.04	0.02	0.02

96	Soap and cleaning materials	0.62	0.68	0.62	0.87	0.07	0.03	0.01	0.02
97	Cosmetics	0.72	0.78	0.64	0.69	0.03	0.03	0.01	0.01
98	Other chemical products	0.69	0.54	0.58	0.79	0.03	0.01	0.01	0.00
99	Products of refined petroleum	0.86	0.86	0.78	0.86	0.01	0.00	0.00	0.00
100	Smoked and crumb rubber	0.92	0.94	0.94	0.92	0.14	0.05	0.03	0.03
101	Tyres	0.77	0.64	0.67	0.89	0.10	0.02	0.01	0.03
102	Other rubber products	0.92	0.80	0.79	0.79	0.09	0.03	0.02	0.01
103	Plastic products	0.62	0.63	0.59	0.72	0.02	0.01	0.01	0.01
104	Ceramics and products of clay	0.91	0.83	0.86	0.85	0.30	0.04	0.03	0.02
105	Glass and products of glass	0.88	0.78	0.79	0.85	0.26	0.04	0.03	0.00
106	Cement	0.91	0.91	0.89	0.85	0.11	0.04	0.02	0.00
107	Other non-ferrous products	0.89	0.88	0.84	0.88	0.20	0.03	0.02	0.01
108	Basic iron and steel and their products	0.79	0.70	0.65	0.84	0.02	0.02	0.01	0.00
109	Non-ferrous basic metal	0.92	1.00	0.93	0.77	0.02	0.01	0.01	0.00
110	Products of non-ferrous basic metal	0.56	0.55	0.73	0.71	0.05	0.02	0.01	0.01
111	Products of metal moulding	0.74	0.72	0.81	0.72	0.13	0.02	0.01	0.03
112	Metal-based building materials	0.61	0.58	0.71	0.85	0.03	0.02	0.01	0.01
113	Other metal products	0.71	0.68	0.67	0.72	0.03	0.02	0.01	0.01
114	Prime-mover engines	0.66	0.44	0.66	0.63	0.03	0.01	0.01	0.00
115	Machinery and parts	0.42	0.42	0.42	0.62	0.01	0.01	0.01	0.01
116	Electric generators and motors	0.74	0.66	0.81	0.57	0.05	0.02	0.01	0.00
117	Electrical machinery and parts	0.74	0.64	0.75	0.68	0.06	0.02	0.01	0.00
118	Communication equipment and parts	0.67	0.69	0.66	0.56	0.03	0.02	0.01	0.01
119	Electronic household appliances	0.77	0.74	0.74	0.70	0.06	0.02	0.01	0.01
120	Other electrical appliances	0.67	0.69	0.71	0.49	0.06	0.02	0.01	0.00
121	Batteries	0.75	0.62	0.64	0.61	0.03	0.02	0.01	0.00

122	Ships and ship repair services	0.77	0.59	0.63	0.64	0.07	0.02	0.01	0.01
123	Trains and train repair services	0.73	0.70	0.60	0.73	1.03	0.02	0.01	0.01
124	Motorised vehicles, except motorcycles	0.75	0.65	0.60	0.85	0.01	0.02	0.01	0.01
125	Motorcycles	0.73	0.77	0.77	0.89	0.01	0.02	0.01	0.00
126	Other transport equipment	0.67	0.68	0.71	0.66	0.27	0.02	0.01	0.01
127	Aircraft and aircraft repair services	0.43	0.41	0.42	0.64	0.16	0.01	0.01	0.01
128	Measuring equipment, photographic and optical equipment, and watches	0.75	0.73	0.72	0.59	0.06	0.08	0.04	0.00
129	Jewellery	0.70	0.48	0.54	0.82	0.05	0.04	0.03	0.03
130	Musical instruments	0.88	0.78	0.74	0.82	0.89	0.07	0.04	0.01
131	Toys and sporting goods	0.79	0.89	0.85	0.86	0.41	0.10	0.09	0.01
132	Other manufactured goods	0.83	0.78	0.76	0.84	0.15	0.17	0.05	0.01

I-O = input–output.

[a] Data not available.

Source: Computed from the Indonesian Input–Output Tables, provided by the Indonesian Office of Statistics (BPS).

Table A2: Net Exports, 2010 Prices
($ million)

I-O code	Sector	1995	2000	2005	2010
48	Meat, entrails of slaughtered animals	1.0	6.0	2.3	2.2
49	Processed and preserved meat	8.0	2.8	4.5	18.9
50	Dairy products	9.9	69.1	103.9	65.5
51	Canned and preserved fruit and vegetables	108.8	188.5	245.4	209.9
52	Salted and preserved fish	60.3	72.6	91.0	35.9
53	Processed and preserved fish	1,017.5	1,729.9	2,339.4	1,679.6
54	Copra	0.0	55.8	24.9	---[a]
56	Rice milling	1.9	0.8	16.3	0.5
57	Wheat flour	0.0	0.7	7.2	9.2
58	Other flour	124.1	78.6	117.7	153.3
59	Bakery products and similar products	16.6	27.6	91.5	144.8
60	Noodles, macaroni, and similar products	8.5	27.7	43.1	7.0
61	Sugar	36.4	14.2	41.9	69.4
62	Peeled grains, chocolate, and sugar confectionery	67.4	284.1	350.2	425.4
63	Milled and peeled coffee	469.0	499.1	42.9	165.7
64	Processed tea	94.7	208.1	147.2	150.0
65	Soybean products	6.3	4.0	5.5	---[a]
66	Other food	48.0	29.9	185.8	439.1
67	Animal feed	25.8	26.4	11.8	11.4
68	Alcoholic beverages	5.6	20.7	28.5	28.1
69	Non-alcoholic beverages	11.9	11.2	4.1	26.2
70	Tobacco products	1.2	96.8	131.0	107.8
71	Cigarettes	140.5	252.6	232.0	398.1

72	Yarn and cleaned cotton thread	676.9	1,727.3	1,341.0	1,077.4
73	Textiles	1,211.4	1,996.7	1,263.2	1,002.8
74	Processed textiles, except apparel	118.8	131.1	155.4	430.9
75	Knitted materials	596.6	2,143.6	2,287.0	67.4
76	Manufacture of ready-made garments	2,311.8	4,451.9	3,723.5	5,110.2
77	Manufacture of carpet, rope, and other textiles	207.4	355.5	302.2	0.0
78	Tanned and processed leather	40.8	173.2	138.8	108.0
79	Leather products	87.1	249.0	98.1	141.2
80	Footwear	1,595.6	1,814.9	1,613.7	1,878.8
81	Sawmill and preserved wood	318.6	190.7	16.6	361.3
82	Manufacture of plywood and similar products	3,484.1	3,529.9	1,669.5	1,252.7
83	Wooden building materials	673.5	1,361.7	1,259.1	226.5
84	Manufacture of furniture and other products, mainly of wood, bamboo, and rattan	1,130.6	2,807.9	2,636.3	211.6
85	Pulp	385.5	825.1	971.7	947.1
86	Paper and cardboard	536.1	1,896.8	1,482.8	2,292.3
87	Paper and cardboard products	171.1	287.0	445.3	313.2
88	Printing and publishing	111.3	657.5	152.3	3.2
89	Basic chemicals, except fertiliser	467.2	2,243.7	2,140.6	2,257.3
90	Fertiliser	179.1	361.0	296.6	339.8
91	Pesticides	15.0	70.2	42.7	135.7
92	Synthetic resin, plastic, and fibre	219.5	1,105.5	839.9	1,007.6
93	Paints, varnishes, and lacquers	4.1	10.4	22.3	61.9
94	Drugs and medicine	35.9	116.8	204.1	205.0
95	Traditional herbal medicine	---[a]	---[a]	6.6	68.7
96	Soap and cleaning materials	80.1	216.7	234.3	400.3
97	Cosmetics	27.5	33.2	62.1	171.5

98	Other chemical products	257.7	89.8	129.3	575.0
101	Tyres	166.0	400.6	615.4	1,323.8
102	Other rubber products	485.1	822.1	209.6	394.4
103	Plastic products	202.6	709.8	850.1	874.7
104	Ceramics and products of clay	67.2	164.8	142.3	281.1
105	Glass and products of glass	194.4	519.6	346.7	249.7
106	Cement	6.9	229.6	120.9	65.6
107	Other non-ferrous products	79.6	348.2	231.1	98.8
108	Basic iron and steel and their products	290.5	520.0	548.7	1,228.8
109	Non-ferrous basic metal	1,088.9	2,332.8	3,946.3	5,659.2
110	Products of non-ferrous basic metal	20.7	86.1	153.4	129.1
111	Products of metal moulding	190.2	481.3	252.2	55.9
112	Metal-based building materials	54.9	194.2	139.8	228.3
113	Other metal products	168.1	443.6	935.1	464.3
114	Prime-mover engines	3.8	46.5	6.9	38.1
115	Machinery and parts	361.2	1,877.3	1,341.6	592.5
116	Electric generators and electric motors	50.0	415.3	264.9	174.2
117	Electrical machinery and parts	96.3	686.1	705.4	875.7
118	Communication equipment and parts	1,274.7	6,859.6	4,947.8	3,817.2
119	Electronic household appliances	42.2	122.9	145.3	651.0
120	Other electrical appliances	131.7	616.6	699.3	777.1
121	Batteries	180.6	329.3	445.9	392.7
122	Ships and ship repair services	246.1	162.6	345.6	538.0
123	Trains and train repair services	0.3	10.3	4.4	3.2
124	Motorised vehicles, except motorcycles	101.4	326.9	885.2	1753.6
125	Motorcycles	74.3	131.4	248.6	208.6

126	Other transport equipment	140.4	145.8	113.8	171.0
127	Aircraft and aircraft repair services	40.3	56.5	140.4	82.6
128	Measuring equipment, photographic and optical equipment, and watches	165.3	297.4	298.8	672.7
129	Jewellery	158.0	80.9	80.2	160.7
130	Musical instruments	45.5	219.3	278.2	331.7
131	Toys and sporting goods	36.5	69.6	24.0	249.0
132	Other manufacturing goods	287.7	556.4	387.2	1,907.9
	Total	**23,658.1**	**52,817.7**	**47,658.2**	**49,246.6**

I-O = input–output.

[a] Data not available.

Source: Computed from the Indonesian Input–Output Tables, provided by the Indonesian Office of Statistics (BPS).

Table A3: Export-Related Employment (Number of Workers)

I-O code	Sector	1995	2000	2005	2010
48	Meat, entrails of slaughtered animals	1,299	1,248	413	378
49	Processed and preserved meat	5,057	601	728	2,932
50	Dairy products	1,967	38,831	54,626	10,390
51	Canned and preserved fruit and vegetables	55,177	67,308	98,405	38,031
52	Salted fish and dried fish	5,418	13,940	11,542	3,430
53	Processed and preserved fish	127,707	354,867	322,140	266,555
54	Copra	13	18,495	6,310	---[a]
56	Rice milling	1,528	577	11,869	203
57	Wheat flour	---[a]	139	773	564
58	Other flour	145,682	27,738	41,017	50,973
59	Bakery products and similar products	4,119	6,695	23,882	33,784
60	Noodles, macaroni, and similar products	2,138	5,735	6,993	914
61	Sugar	8,212	8,335	24,860	25,625
62	Chocolate and sugar confectionery	7,190	69,040	87,808	56,623
63	Milled and peeled coffee	223,108	156,481	7,848	57,321
64	Processed tea	43,830	121,420	91,776	38,044
65	Soybean products	1,814	975	1,311	---[a]
66	Other food	19,804	11,956	72,475	136,007
67	Animal feed	32,870	9,102	4,154	3,546
68	Alcoholic beverages	2,021	5,691	9,717	4,848
69	Non-alcoholic beverages	2,124	2,696	1,143	3,504
70	Tobacco products	2,226	60,908	108,826	22,335
71	Cigarettes	36,634	41,060	31,910	72,592
72	Yarn and cleaned cotton thread	72,355	256,979	257,460	117,547

73	Textiles	70,409	398,379	234,048	359,035
74	Processed textiles except apparel	108,599	36,298	31,589	141,440
75	Knitted materials	399,079	432,634	453,679	31,787
76	Manufacture of ready-made garments	187,461	1032,143	742,984	1,100,366
77	Manufacture of carpet, rope, and other textiles	82,857	93,518	63,731	2
78	Tanned and processed leather	107,047	43,187	29,526	12,304
79	Leather products	53,587	60,430	20,464	51,448
80	Footwear	366,551	424,023	320,376	358,725
81	Sawmill and preserved wood	42,493	63,156	5,019	67,181
82	Manufacture of plywood and similar products	518,473	1,196,909	537,197	157,477
83	Wooden building materials	232,907	509,834	409,608	28,353
84	Manufacture of furniture and other products, mainly of wood, bamboo, or rattan	684,058	1,523,299	1,184,907	203,458
85	Pulp	35,112	130,835	132,438	67,289
86	Paper and cardboard	29,868	234,866	177,515	130,947
87	Paper and cardboard products	13,512	32,739	52,048	20,311
88	Printing and publishing	10,952	69,152	18,474	1,566
89	Basic chemicals, except fertiliser	23,161	70,549	97,173	66,923
90	Fertiliser	7,801	8,895	5,916	15,450
91	Pesticides	2,064	36,035	10,573	11,916
92	Synthetic resin, plastic, and fibre	11,240	43,061	32,261	40,152
93	Paints, varnishes, and lacquers	267	1,140	1,633	5,392
94	Drugs and medicine	3,420	13,541	25,598	19,502
95	Traditional herbal medicine	---[a]	---[a]	1,139	16,255
96	Soap and cleaning materials	15,840	37,204	31,843	79,769
97	Cosmetics	2,021	4,394	7,859	26,059
98	Other chemical products	19,350	9,191	9,815	30,633

99	Products of refined petroleum	83,280	62,090	66,602	106,786
100	Smoked and crumb rubber	554,034	321,723	605,324	1,745,992
101	Tyres	38,608	51,208	62,105	340,364
102	Other rubber products	81,587	113,876	27,064	62,631
103	Plastic products	10,957	61,461	73,392	129,485
104	Ceramics and products of clay	39,399	35,302	26,524	57,366
105	Glass and products of glass	101,481	114,045	72,150	12,630
106	Cement	1,436	43,233	17,441	3,130
107	Other non-ferrous products	31,470	53,616	35,450	5,378
108	Basic iron and steel and their products	14,383	48,815	31,950	58,150
109	Non-ferrous basic metal	46,678	64,581	155,866	243,093
110	Products of non-ferrous basic metal	3,039	9,720	10,327	11,458
111	Products of metal moulding	60,777	66,038	23,690	21,408
112	Metal-based building materials	5,294	23,402	11,277	12,589
113	Other metal products	12,035	57,122	79,501	34,320
114	Prime-mover engines	345	4,308	558	1,781
115	Machinery and parts	11,429	178,058	111,779	59,789
116	Electric generators and electric motors	5,432	59,794	20,278	9,183
117	Electrical machinery and parts	14,360	83,079	50,993	38,348
118	Communication equipment and parts	85,911	941,278	377,501	321,188
119	Electronic household appliances	5,521	15,562	10,874	57,677
120	Other electrical appliances	20,388	54,211	52,664	36,878
121	Batteries	13,200	38,321	27,238	27,115
122	Ships and ship repair services	40,569	22,598	31,600	73,050
123	Trains and train repair services	687	1,094	377	278
124	Motorised vehicles, except motorcycles	3,285	38,454	65,246	95,880

125	Motorcycles	2,269	16,763	17,399	9,987
126	Other transport equipment	100,591	18,220	9,801	13,515
127	Aircraft and aircraft repair services	26,029	6,181	11,543	7,136
128	Measuring equipment, photographic, and optical equipment, watches	24,808	125,956	116,028	40,197
129	Jewellery	20,666	29,776	26,774	58,836
130	Musical instruments	81,404	75,343	92,197	33,947
131	Toys and sporting goods	33,168	30,258	15,949	20,987
132	Other manufacturing goods	88,468	488,567	157,022	288,607
	Total manufacturing	5,152,309	11,343,066	8,739,026	7,383,910

I-O = input–output.

[a] Data not available.

Source: Computed from the Indonesian Input–Output Tables, provided by the Indonesian Office of Statistics (BPS).

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