Gains from Export Growth: Do Linkages Matter?

by

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and

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Abstract

Policy makers in developing countries often place emphasis on inter-sectoral input linkages ('linkages' for short) in determining sectoral priorities in export development policy, particularly in designing export promotion schemes and in screening and monitoring export-oriented foreign direct investment. Development analysts too place emphasis on linkages as an operational norm in assessing the developmental impact of emerging export industries. The purpose of this paper is to argue that the use of this *closed-economy* planning tool as a performance criterion in the context of export-oriented growth strategy is fundamentally flawed. We illustrate our argument using Indonesia as a case study. The methodology adopted involves the examination, using the Leontief inter-industry accounting framework as the main analytical tool, of the relationship between sectoral input linkages, and employment impact and contribution to net foreign exchange earnings of manufactured exports in Indonesian manufacturing during 1985-95.

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Gains from Export Growth: Do Linkages Matter?*

1. Introduction

The linkage analysis due to Hirschman (1958) was widely used as a planning tool in developing countries during the import-substitution era (1950s and 1960s). The key premise of Hirschman's policy advocacy was that, under the existing domestic demand conditions, a country can maximise developmental gains from limited investible resources by directing investment flows towards *key sectors*. A key sector was defined as a sector which has maximum linkages with the rest of the economy in terms of potential sales to other sectors (*forward linkages*) or purchase from other sectors (*backward linkage*s). Like other popular growth theories of the time, Hirschman's unbalanced growth strategy was intended to serve as "an alternative strategy to linking the economy to the rest of the world on the basis of comparative advantage" (Findlay 1984). In other words, the basic policy thrust was to turn inward and seek the key to industrial development in greater interaction between domestically oriented sectors, while ignoring neoclassical "efficiency" (or factor proportions) considerations of resource allocation.[1]

By the mid-1970s, there was ample evidence that import-substitution policies had largely failed. Consequently an increasing number of countries have since then been opening up their economies and integrating them into the international economic system. Notwithstanding this palpable policy shift, surprisingly, the concept of linkages, whose very purposes was to *assist developing countries to delink from the international economy*, has continued to linger in the minds of both policy makers and

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1. To the criticism that administratively created linkages may imply waste, Hirschman replied that such criticism is valid only if one assumes resources to be in fixed supply; as he saw it, disequilibria resulting from emphasis on key sectors would call into being extra investment by stimulating entrepreneurship.

development analysts. Policy makers often take into account potential linkages[2] in determining sectoral priorities in export development policy. Linkages are also an important consideration underlying export incentive policies, and approval and monitoring of export-oriented foreign direct investment. Development analysts often place emphasis on linkages as an operational norm in assessing the developmental impact of emerging export industries. For instance, the popular criticism of affiliates of multinational enterprises (MNEs) involved in export-oriented industries in developing countries for stifling linkage development in manufacturing and labelling thriving labour-intensive export industries as "footloose" (or "enclave") industries are based on the implicit perception that linkages are a key to success through export-oriented industrialisation.

The purpose of this paper is to argue that the use of linkages - a closed-economy planning tool- as a performance criterion in the context of export-oriented growth strategy is fundamentally flawed. More specifically we argue that placing emphasis on linkages in determining sectoral priorities is likely to yield wrong policy inferences under export orientation. This is because under the ongoing process of internationalisation of production, industries with low linkages could well have the potential to make a greater contribution to employment and net foreign exchange earnings. We illustrate our arguments using Indonesia as a case study. The methodology adopted involves the examination, using the Leontief inter-industry accounting framework as the main analytical tool, of the relationship between sectoral input linkages, and employment impact and contribution to net foreign exchange earnings of manufactured exports in Indonesian manufacturing during 1985-95.

The choice of Indonesia as the subject of our study was motivated by the following reasons. First, following the market-oriented policy reforms initiated in the mid-1980s Indonesia has experienced strong growth in manufactured exports. While

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[2] Forward-linkages essentially relates to domestic downstream processing of sectoral output, and therefore are not relevant in assessing the implications of export expansion for the domestic economy. Therefore, in the context of an export-oriented policy regime the term 'linkages' is usually used to mean 'backward linkages'. In this paper we use these two terms interchangeably.

there was very heavy reliance initially on just two products, plywood and clothing, the export commodity mix has begun to diversify considerably since about the late 1980s (See Appendix 1).[3] This ongoing process of export diversification provides an excellent laboratory for the study of on-going changes in the commodity structure and their developmental implications at the initial stage of export-led industrialisation in a surplus-labour economy.

Second, import intensity and/or the footloose nature of emerging export patterns has attracted much attention in the recent economic policy debate in Indonesia (Jayasuriya and Manning 1996). In particular, redirecting investment to the export sectors which make greater use of domestic intermediate inputs has been a key element of the export development policy embodied in successive five-year development plans (*Repelita*), starting with *Repelita* IV (1984/85-1988/89). A recent influential consultancy report for the Indonesian government has emphasised that "in the emerging international environment .....export sustainability requires that the base of Indonesia's competitive advantage be broadened and deepened, with the upgrading of export products, *greater local context in export activity*, and broad entry into more high value-added products' (Lall and Rao 1995, p.1) (emphasis added). However, the rationale behind this policy emphasis has not been seriously examined in the otherwise rich literature on Indonesian policy reforms.

The third consideration relates to data availability. The empirical analysis of the issue at hand requires a complete set of input-output tables which put export and domestic production on a comparable basis, while separating imports from domestic output relating to all intermediate and final transactions. Indonesia is one of the few developing countries which meet this data requirement.

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[3] There have been a number of studies on Indonesia's export policy and emerging export patterns. See, in particular, Hill 1996a (Chap. 8) and 1996b, Pangestu 1994 and James 1996.

The remainder of the paper is organised as follows: Section 2 presents and clarifies the conceptual issues surrounding the linkage analysis in the context of export-oriented industrialisation, in order to provide the setting for the ensuing empirical analysis. Section 3 presents the empirical procedure for the measurement of linkages, net exports and export-induced manufacturing employment. Section 4 presents interpres the results. Concluding remarks are in section 5.

2. Linkages and Export-oriented Industrialisation: Conceptual Issues

The use of linkage as a policy criterion in the context of export-oriented industrialisation suffers from two fundamental limitations. First it runs counter to the conventional factor proportions considerations which are at the heart of the current debate on gains from export-led industrialisation. Second it overlooks the nature of market potential for manufactured exports from developing countries. When these two considerations are appropriately taken into account, there are strong grounds for the alternative view that attempts to forge linkages through direct policy intervention can be both ineffective and counterproductive. In this section, we present and elaborate on, this alternative view in order to set the stage for the ensuing empirical analysis.

Let us begin with the factor proportions considerations. 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 technology which underlies 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 industries are typically more capital intensive than are final goods industries. The importation of intermediate inputs for export production, therefore, 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 the latter labour intensive goods for the former capital-intensive goods in the production process. This would enhance the labour intensity of the overall production process. Thus, resource allocation considerations derived from the principle of comparative advantage seems to make a strong case for the development of footloose (loosely linked) export industries in a labour -abundant economy (Riedel 1975 and 1977). [4] Such specialisation would reduce the resource cost of production and enhance the employment potential of export expansion.[5]

As regards market potential, our contention is that emphasis on achieving a greater domestic content in exports can run counter to the objective of rapid market penetration in world trade. Unlike in the closed-economy approach of import-substitution industrialisation (ISI), the key to success under export oriented industrialisation (EOI) lies in a country's ability to produce what is demanded in international markets. This in turn requires timely and swift changes in the export structure in line with changing patterns of internationalisation of production. In this context there is little room for forging input linkages through government intervention.

For the purpose of analysing market opportunities for exports from developing countries, it is useful to distinguish between four different product categories of manufactures: (1) 'resource-based' manufacturing or manufacturing activities which involve further local processing of material previously exported in raw state; (2) light (labour-intensive) consumer goods (e.g. clothing, toys, shoes, sporting goods), (3) component production and assembly within vertically integrated or otherwise tightly controlled production systems; and (4) mature technology final products (motor vehicles, radios, TVs, computers). A resource rich country (like Indonesia) has considerable room for the expansion of exports in the first category. However, quite apart from the obvious limits which would eventually be set by the resource

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[4] There is ample evidence that administratively created linkages through emphasis on intermediate industries was one of the main causes of very high capital intensity in manufacturing and sometimes of value subtracted at world prices (Little, 1982, p 44).

[5] In this study we focus only on the latter aspect. For an interesting theoretical exposition and empirical test of the former aspect see Riedel 1995.

endowment, there are other constraints on export success in this arena (Helleiner 1973, p. 25). For instance, some processing activities, particularly those in the mineral and chemical industries, are characterised by high physical and/or human capital intensity and may not therefore be suitable for location in a low-income country. Moreover, world demand growth for resource-based manufactures has proved to be much slower than that for the other three product categories. In the area of differentiated final goods (category 4), world exports originate almost exclusively from developed market economies or in more advanced newly industrialising countries (NICs). In these products labour cost, while significant, take second place to the availability of high-quality operator and technical skills, a good domestic basis of supplies and services and excellent infrastructure. Also, given the heavy initial fixed costs, MNEs - which play a pivotal role in the production and trade in these products - hesitate to establish an overseas plant without considerable experience of involvement in the host country (Guisinger 1985).

For a labour-surplus country, light manufactured goods (Category 2) and component production and assembly (Category 3) are the most promising areas in the early stage of export-led industrialisation. Production in both categories is characterised by the use of technologies extremely intensive in low-skilled labour. In the 1960s, when the present-day NICs began to make strides along the export-led growth path, the former was the most promising growth area. Since the late 1960s production activities in the latter area have shown phenomenal growth as a new aspect of modern world trade. This phenomenon has been the outcome of the growing ability of modern industry to 'slice up the value chain' of goods traditionally viewed as skill-, capital-, or technology-intensive and shift the labour -intensive slices to low-wage locations (Krugman 1995). The transfer abroad of component assembly occurs in many industries where the technology of production permits the separation of labour-intensive segments from other stages of production. Assembly activities related to high-tech electronic industries, the production of semi-conductor devices in particular, are by far the most important. The other industries with significant assembly operations located in developing countries are computers, electrical appliances, automobile parts, electrical machinery and optical products. The indications are that this form of internationalisation of production will continue to expand giving labour-

surplus countries the opportunity to find expanded niches for labour intensive production.

In the area of standard consumer goods, market potential for goods that are *made to local specifications* using local inputs (and hence have greater potential for forging backward linkages) is extremely limited. Such goods account for only a small and shrinking share of manufactured exports from DCs. Success in expanding the volume of exports in this sphere depends crucially on the country's ability to enter the fast-growing markets for *made-to-order* manufactured goods, which are generally more import intensive. As distinct from meeting consumer requirements in a shortage-ridden suppliers' market for import-substituting products, producing what is sought in the former markets call for a vector of imported inputs meeting exacting quality requirements and specifications. The substitution of such inputs with locally produced inputs of secondary quality may lead to significant market losses, and the cost involved in correcting the defect in a further stage may be prohibitive ((Wortzel and Wortzel 1980, Keesing and Lall 1992, p. 179).

Limits to the use of local raw materials (even if they meet quality requirements) in the production of light consumer goods can also derive from the nature of global strategies of multinational enterprise (MNE) and international buying groups.[6] MNE subsidiaries operate within a framework of their own international production and marketing networks. The parent firms generally aims to preserve a high level of international mobility for their processing operations. Establishing long-term commercial relationships with local suppliers may run counter to this goal (Athukorala 1995, p. 561). Even in a situation where production is undertaken largely by local firms without MNE involvement, like in the case of the clothing industry in Indonesia, successful market penetration in these goods depends on the relationship between domestic producers and buyers abroad, a relationship which is normally formed through the involvement of international buying groups (the 'buyers', for short). The

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[6] MNE subsidiaries are directly involved in both production and exporting while the buying groups are trade intermediaries who play a crucial role in linking domestic producers with sellers in end markets.

buyers place orders with producers according to their own market assessment, and in most cases, they insist on the use of inputs from specific foreign sources for quality considerations (Keesing 1993, Keesing and Lall 1992, Rhee et al. 1984).

Assembly production in vertically integrated industries (Category 3) naturally tends to be even more import intensive than light manufactured goods. Because of the multi-stage vertical integration of the overall production process, value added by a manufacturing facility in a given location is likely to be only a small fraction of the value of its shipments, which are dominated by the cost of intermediate inputs (Krugman 1995, p 334). Moreover, the input structure of this type of production activity is rigidly determined as part of the overall global value chain. In particular, in semi-conductor and other high-tech industries which account for the bulk of world trade in assembly activities, offshore assembly activities are often carried out by subsidiaries (mostly fully-owned) of the end-user companies using components obtained through intra-firm trade. This is because of the need to preserve technical secrets and undertake precision operation to exacting standards. Given these features of the production process, there is limited, if any, room for encouraging local sourcing through government policy. However, despite the high import intensity and meagre value addition on *a per* unit basis, the entry into the process of 'slicing up of value chain', which accounts for a large and ever expanding share of world trade, is an effective means for a developing country to maximise its *total* net export earnings and to open up a vent for its surplus labour.

It follows from the above that, in the context of emerging patterns of international division of labour, there are powerful forces which make the export structure of a surplus-labor economy import intensive and hence footloose. When the export structure shifts away from traditional resource based processing activities and towards more dynamic product lines, in particular when the manufacturing industry successfully links itself to the process of "slicing of value chain" in vertically integrated industries, import intensity of export production could well increase leading to a decline in overall sectoral linkages. However, the enlarged market potential for these new product lines would lead to a rapid expansion of *total* net export earnings. At the same time growing labour intensity of the emerging export structure (as a result of the

increased substitution of labour for intermediate inputs), coupled with rapid export growth, would be reflected in growing employment opportunities in export-oriented manufacturing. Thus we hypothesise that declining (or stagnating) input linkages, and rapid growth of total net exports earnings and export-related employment can go hand in hand at the initial stage of export-led industrialisation in a surplus-labour economy. From a policy point of view, this implies that linkages are a misleading indicator of the developmental implications of export-oriented industrialisation.

3. Methodology and Data

(a) Methodology

The empirical analysis of this paper involves the measurement of three important aspects of export performance, backward (input) linkages, net foreign exchange earnings and employment generation. For this purpose we make use of the Leontief inter-industry accounting framework which provides for capturing both direct and indirect (intersectoral) repercussion in the measurement process.

Following an input-output framework of the 'complementary import' type[7], let

$$\boldsymbol{X = A^d X + Y^d + E} \qquad (1)$$

Where X is the vector of total gross output, $A^d = [a_{ij}^d]$, $a_{ij}^d = \frac{X_{ij}}{X_j}$, is the domestic input-output coefficient matrix; and Y^d and E are vectors of domestic and export demand on domestically produced goods.

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[7] Input-output tables are basically of two types, depending on the way import transactions are treated in the compilation. In a complementary import type I-O table the import content of each transaction is separately identified and allocated to an import matrix. A competitive import type" I-O table treat all imports (intermediate plus final) as competing with domestic production and thus, imports are not separated from domestic transactions. For the purpose of accurate measurement of linkages and import intensity of domestic production it is necessary to work with a table of the former type (Bulmet-Thomas 1982).

Solving equation (1) for X,

$$\boldsymbol{X = (I-A^d)^{-1} (Y^d + E)} \qquad (2)$$

where $(I-A^d)^{-1}$ is the Leontief domestic inverse matrix. An element of this matrix, A_{ij}^d, indicates output required of the ith sector to sustain one unit of output of sector j. Thus the sum of the jth column of $(I-A^d)^{-1}$ gives a measure of total backward linkages (BWL_j) when domestic final demand or exports for the jth commodity increases by one unit:

$$\boldsymbol{BWL_j} = \sum_i^n A_{ij}^d \qquad (3)$$

Note that BWL_j shows the *total* units of output required directly and indirectly from all sectors (including the unit of output delivered to final demand by the given sector) when the demand for the jth commodity rises by one unit.

To measure import intensity of domestic production, define a diagonal matrix of impoted input coefficients, $R = [r_i]$, $r_i = \frac{R_i}{X_i}$, where R_i shows direct imports used per unit-production in a given sector. The empirical basis for the quantification of the total import content of sectoral production can then be obtained as,

$$R(I-A^d)^{-1} = M \qquad (4)$$

where M is the import inverse matrix (total import requirement matrix of domestic production) . An element of this matrix, m_{ij} , indicates the total amount of import i (both direct and indirect) required to produce a unit of commodity j locally. Therefore, when there is a unit increase in final demand for sector j, the corresponding increase in total demand from that sector for imported inputs (m_{Tj}) is given by,

$$\boldsymbol{m_{Tj}} = \sum_{i=1}^{m} r_{ij} \qquad (j = 1,2,..., n) \qquad (5)$$

Let e_j refer to the value of total exports from sector *j*. Assuming that imports required to produce a unit of output are identical whether the product is sold domestically or exported, the total value of imports embodied in e_j, which is denoted by m_{Tj}, can be estimated as,

$$m_{Tj}^{e} = m_{Tj} e_j \qquad (6)$$

Net export earnings of sector j (denoted by e_j^n) is given by :

$$e_j^n = \boldsymbol{e_j} - m_{Tj} e_j = \boldsymbol{(1 - m_{Tj})\, e_j} \qquad (7)$$

Total net export earnings (net foreign exchange earnings from exports) of the economy (E_T) is therefore,

$$\mathrm{E_T} = \sum_{j} e_j^n \qquad (8)$$

The procedure for measuring employment implications of exports is similar to that adopted in measuring import intensity. The starting point is to define a diagonal matrix of employment coefficients, $G = [g_i]$, $g_i = \frac{G_i}{X_i}$, where G_i is number of workers employed in industry *i*. The empirical basis for the quantification of the total import content in sectoral production can be obtained as,

$$G\ (I\text{-}A^d)^{-1} = L \qquad (9)$$

Where L is the employment inverse matrix (total employment requirement matrix of domestic production). An element of this matrix, which we denote by l_{ij}, indicates the total number of workers employed by sector I (both direct and indirect) to produce a

unit of commodity *j* locally. Therefore, when there is a unit increase in final demand for sector *j*, the corresponding increase in total employment (l_{Tj}) is given by,

$$l_{Tj} = \sum_{i=1}^{m} l_{ij} \qquad (j = 1,2,..., n) \qquad (10)$$

Based on *L* sectoral and total export-induced employment can be estimated by replicating the estimation procedure suggested by Equations (7) and (8).

(b) Data

In order to implement the methodology developed in the previous section we make use of the input-output tables for 1985 and 1990 and export data for the period 1985-1995 provided by the Biro Pusat Statistik (BPS). The input-output tables are based on the *Klasifikasi Lapangan Usaha Indonesia* (KLUI) - the Indonesian version of the International Standard Industry Classification (ISIC). For the purpose of our analysis two modifications are made to the original data provided by the BPS. First, in order to achieve intertemporal comparability we reclassify the 169-sector 1990 table according to the 128-sector classification used in 1985, using a sectoral concordance provided by the BPS. Second, export data for the period 1985-95 which are based on the Standard International Trade Classification (SITC) system are converted to the I-O classification using the SITC-KLUI concordance developed in Santosa (1994). After undertaking the computations relating to Equations (2), (4) and (9) using the 138 sector tables, final estimates of net exports and export-related employment were made for the manufacturing sectors only. After omitting three "non-exporting industries' (i.e. industries for which there were no reported exports for any of the years) and two sectors for which there was ambiguity in separating 'manufactured' component from total exports, the final analysis cover 77 KLUI /ISIC industries.

There is no unique way to separate manufactured exports from total merchandise exports. The two most widely used definitions are the *ISIC-based definition* under which all products belonging to ISIC 3 are treated as manufactures and the *SITC based definition* which covers only the products in SITC sections 5 through 8, less 68 (non-ferrous metals). To ensure wider comparability of our results,

we prepare estimates under both definitions, with the difference between the two identified as a third category, resource based manufacturing. In order to see the sensitivity of the results to the 'special' market conditions faced by processed wood and clothing during the period under study we also generate alternative estimates net of these exports.[8]

Before turning to the results, it is pertinent to comment on limitations of our estimation procedure. First the estimation procedure is based on the implicit assumption that the import content of production of exports in each industry is identical to the average import content of total production of the industry. This is not entirely accurate. The usual pattern is that when industries are finely classified, import content in an industry's production for exports is higher than its production for the home market (Michaely 1984, p. 28; Athukorala and Bandara, 1989, p. 899). Our estimation procedure may, therefore, have led to an *under estimation* of the relative import intensity of manufactured exports (and therefore over estimation of linkages and net exports). Second, the estimates , as they are based on the inter-industry transaction table, incorporate import requirements on the current account only. The unavailability of a capital coefficient matrix precludes the measurement of import requirements on the capital account. Third, the measurement of linkages solely on the basis of material flows has its own limitations. In particular, the charting of simple interindustry flows fails to account for the degree to which components of value added - returns to capital, labour and the state - interact with the rest of the economy.[9] This (third) limitation does not, however, pose a problem for our analysis; the current debate on the economic effects of manufactured exports expansion has largely (if not solely) focussed on material (input) linkages.

4. Results

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[8] The expansion of processed wood exports was propelled by government -enforced export substitution (through progressive prohibition on the export of logs since the early 1980s), buttressed by the country's power in the international market for tropical timber. Clothing exports have been influenced by export quotas imposed under the Multi-fibre Arrangement (Hill 1996 Chap. 8).

[9] For a useful discussion on the limitations of the measurement of linkages using I-O tables see Weisskoff and Wolf (1977).

Summary indicators of linkages, import intensity and net exports are reported in Table 1. Estimates of sectoral linkage indices and data on export composition used in deriving these summary measures are reported in Appendix table 1.

The estimates clearly point to a decline in the degree of linkage of manufactured exports during the period under study. This result is remarkably resilient to the particular definition of manufactures used and the inclusion/exclusion of plywood and clothing as part of total exports. In terms of the broader ISIC definition, in 1985 US$1000 worth of exports was reflected in an increase in output by US$1820 from all sectors in the economy. This declined to 1752 in 1990 and further to 1730 by 1995. The decline is even sharper for non-clothing SITC exports of exports, from 17900 in 1990 to 1600 in 1995.

The time patterns of import intensity of exports are largely consistent with this reduction in export linkages. In all cases, the degree of import intensity has increased, with non-clothing SITC exports indicating the sharpest increase. This is consistent with our expectation based on the ongoing process of export diversification towards assembly-type activities and relatively more import dependent light consumer goods such as shoes, toys and spots goods.

Despite the increased import dependence and weakened linkages, net export earnings from manufactured exports have recorded strong growth. Thus, in line with our postulation, rapid expansion in export volume (in gross terms) under the emerging pattern of export orientation has more than compensated for the increased import intensity of the production structure. Interestingly, even when the increased import intensity of exports is appropriately allowed for, there has been an impressive

Table 1: Linkages, Import Intensity and Net Export Earnings of Manufactured Exports

	1985	1990	1993	1995
Backward linkage index				
ISIC manufactures	1.820	1.752	1.732	1.730
ISIC manufactures excluding plywood and clothing	1.782	1.718	1.644	1.672
SITC manufactures	1.646	1.784	1.763	1.716
SITC manufactures excluding clothing	1.790	1.665	1.625	1.614
Import intensity				
ISIC manufacturing	0.195	0.229	0.249	0.255
ISIC manufacturing excluding plywood and clothing	0.229	0.288	0.304	0.309
SITC manufacturing	0.320	0.344	0.350	0.360
SITC manufacturing excluding clothing	0.355	0.386	0.417	0.419
Exports, gross and net (within brackets) (US$ million)				
ISIC manufacturing	3929 (3162)	11589 (8935)	23602 (17725)	28411 (21165)
ISIC manufacturing excluding plywood and clothing	2245 (1731)	5535 (3940)	11910 (8290)	17143 (12379)
SITC manufacturing	1060 721	5718 (3751)	14302 (9296)	173845 (11126)
SITC manufacturing excluding clothing	548 (354)	3288 (2018)	8744 (5098)	11851 (6885)
Contribution to total net exports (%)				
ISIC manufacturing	26.33	48.73	65.90	66.66
ISIC manufacturing excluding plywood and clothing	14.42	23.26	30.82	42.03
SITC manufacturing	6.01	22.15	34.56	37.78
SITC manufacturing excluding clothing	2.95	11.92	18.95	23.38
Other (primary) exports*	73.67	51.27	34.10	33.34
Total merchandise exports	100	100	100	100
US$ million	12005	16933	26896	29453

* Difference between total merchandise exports and ISIC manufactures.

Source and method:

Authors' estimates based on the methodology and data sources discussed in the text.

increase in the share of manufactures (in terms of all alternative definitions) in Indonesia's total export composition. For instance, the share of total ISIC manufactures in total net exports increased from 26 percent in 1985 to over 66 percent in 1995. When the narrow SITC definition is used, manufacturing share in total net export earnings in 1995 was about 50% percent, up from in 1985. In making inferences for future export growth potential, it is pertinent to pay more attention to SITC exports net of clothing. Import intensity of this export category has increased significantly as a result of recent shifts towards both light manufactures such as shoes, toys and sport goods and dynamic component production activities in electrical goods, electronics and optical goods. Notwithstanding this, their share in total net exports increased from 3 per cent in 1985 to 19 percent in 1990, and then to over 23 percent in 1995.

Estimates of employment implications of manufactured exports are given in Table 2. The employment multiplier (which measure the number of workers related to US$1000 worth of exports) for total ISIC and SITC exports has declined marginally between 1993 and 1995, following an impressive increase between 1985 and 1993. This decline is due to the fall in the relative export shares of the two largest export items, clothing and wood products, which are highly labour intensive compared to most other export items. When these two categories are excluded (that is, in terms of ISIC exports net of wood products and clothing and SITC exports net of clothing) there are clear indications of a continuous increase in employment intensity. Thus, as one could anticipate on factor proportions grounds, there has been a clear shift in the composition of new export lines towards greater employment intensity.

Total employment induced by total ISIC exports show a four-fold increase, from 1.1 million to 4.4 million between 1985 and 1990. According to our prediction based on the 1990 input-output structure, this would have increased to over 10 million by 1995. In terms of the SITC definitions the increases are from 514 thousand in 1985 to 1.4 million in 1990 and then to 6.5 million in 1995. The increase is much sharper for non-clothing SITC exports, a five-fold increase between 1985 and 1990

Table 2: Manufactured Exports and Employment

	1985	1990	1993	1995
Employment multiplier (workers per US$ 1000 of exports)				
ISIC manufacturing	0.289	0.378	0.382	0.367
ISIC manufacturing excluding plywood and clothing	0.229	0.256	0.315	0.383
SITC manufacturing	0.364	0.358	0.382	0.333
SITC manufacturing excluding clothing	0.261	0.263	0.279	0.326
Export-related employment ('000)				
ISIC manufacturing	1137	4384	9016	10427
	(1.82)	(5.93)	---	---
ISIC manufacturing excluding plywood and clothing	514	1416	3752	6566
	(0.82)	(1.92)	---	---
SITC manufacturing	436	2044	5643	5789
	(0.70)	(2.76)	---	---
SITC manufacturing excluding clothing	154	865	2440	3863
	(0.24)	(1.11)	---	---

Source and method:

Authors' estimates based on the methodology and data sources discussed in the text.

(from 154 thousand to 865 thousand) and then a six-fold increase to 1995 (3.8 million).

The discussion so far has clearly shown that both the contribution of manufactured exports to net foreign exchange earnings and their employment contribution have been impressive despite decline in linkages. And this inference remains unaltered when plywood and clothing, the two largest product categories which benefited from special market circumstances, are excluded from our calculations. In fact, the growth trends in net exports and export-related employment are much sharper for the non-clothing SITC exports, which holds the future for Indonesia's manufactured export expansion drive. Thus the results support our contention that at the early stage of export-led industrialisation, linkages are not an appropriate criteria for judging developmental implications.

As a further test, we undertook a correlation analysis of the relationship between sectoral linkages, and sectoral contribution to growth of net foreign exchange earning and export employment. Contribution to employment and net export growth are measured (in current US$ terms) between 1985/86 and 1993/95. Two year averages at the beginning and end of the period are used to allow for possible random changes in data. Linkages indices used are the ones based on the 1990 I-O table.[10] The results are reported in Table 3.

There is little support for a positive association (as implied in the linkage enthusiast's position) between linkages (BWL) and, contribution to net export growth (CGNX) and contribution to employment increment (CGEM). The coefficients for total SITC exports are positive, but they are not statistically different from zero. For total ISIC exports the coefficients are negative but do not attain statistical significance.

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[10] Obviously the 1990 I-O table better reflects the export production structure during the post-reform era than the table for 1985. he results are, however, remarkably resilient to the use of 1985 linkage estimates. In other word there has not been significant change in sectoral ranking in terms of linkages between the two year. The correlation coefficient between the two linkage series is as high as 0.82.

Table 3: Correlation Coefficients: Linkages (BWL), Growth of Net Exports (CGNX) and Export-Related Employment (CGEM)[1]

Export category[2]	BWL and CGNX	BWL and CGEM	CGNX and CGEM
ISIC manufacturing (77)	-0.054	-0.003	0.946***
ISIC manufacturing excluding plywood and clothing (69)	-0.206**	-0.185*	0.793***
SITC manufacturing (51)	0.018	0.112	0.923***
SITC manufacturing excluding clothing (47)	-0.294**	-0.220*	0.832***

Notes:

1 The level of statistical significance is denoted as: * 10 percent, ** 5 percent, *** one-percent.

2 Number of observations is given in brackets.

Source: Estimated using data reported in Appendix 2.

By contrast the coefficients are negative and statistically significant at least at the 10 percent level or better for ISIC exports excluding wood products and clothing and SITC exports excluding clothing. Thus, when wood products and clothing are excluded to focus appropriately on product categories in which Indonesia has room for further export expansion, there is statistical support for our alternative proposition that linkages are negatively (*not* positively) related to contribution to employment expansion and net export growth.

Finally, it is interesting to note that for all export categories, no matter what definition of manufacturing is used, there is a strong positive relationship between sectoral contributions to net export earning and employment. The upshot is that that product categories which make a greater contribution to net exports (and hence to domestic output expansion) are also the ones which exhibit a superior performance in terms of employment generation. This finding is consistent with our postulate (Section 2) that at the present stage of export drive in Indonesia, both light manufactured goods

and assembly activities in vertically integrated industries are to be preferred on both net export growth and employment grounds.

5. Conclusion

In this paper we have taken a critical look at the prevalent emphasis on linkages as an important criterion for formulating policies for and assessing development implications of manufactured export expansion in surplus labour economies. Our findings, based on the export experience of Indonesia during 1985-95, suggest this policy emphasis is unwarranted. Import intensity and linkages of most of the dynamic product areas are largely determined by factors beyond the control of the individual exporting nations. Emphasis on linkages can therefore be both ineffective and counterproductive. In the context of the ongoing process of internationalisation of production, industries characterised by high import intensity and hence low domestic input linkages have the potential to make a greater contribution to employment expansion and growth of net export earnings.

It is important to note that the findings of this study by no means imply that linkages are bad and/or the footloose nature of production is an immutable feature of the export structure of a developing country. The greater the linkages between the export sectors and the rest of the economy the greater would be the benefits to the economy from export expansion, provided such linkages are the natural outcome of industrial deepening. What we simply argue here is that there is little room for creating linkages through policy intervention, and such policy intervention can in fact be both ineffective and counterproductive. In particular, direct intervention in the form of domestic procurement requirement can stifle the evolution of the export structure in line with changing patterns of internationalisation of production and thus frustrate the achievement of employment and balance of payments objectives. With the gradual adjustment of the domestic cost structure as a result of greater international specialisation and with increase in domestic income levels, the industrial structure will gradually shift over to intermediate and investment goods industries. This would lead to strong interindustry linkages, provided of course that the incentive structure and the

general investment climate of the economy continue to remain conducive for such specialisation.

Appendix 1

Percentage Composition of Manufactured Exports, 1985, 1990, 1993, 1995

ISIC Code		1985	1990	1993	1995
	Resource-based Manufactures				
52	Canned and preserved meat	0.081	0.080	0.017	0.126
53	Dairy products	0.000	0.141	0.016	0.033
54	Processed and preserved vegetables	0.153	0.562	0.390	0.566
55	Processed and preserved fish	0.082	0.593	0.359	0.490
56	Vegetable and animal oil	11.30	4.619	3.573	4.864
57	Milled and polished rice	0.143	0.020	0.017	0.000
60	Other flour	0.051	0.185	0.094	0.093
61	Bread and bakery products	0.033	0.044	0.016	0.011
62	Noodle/macaroni/similar products	0.005	0.030	0.025	0.123
63	Sugar	0.571	0.304	0.156	0.123
64	Chocolate and sugar confectionary	0.122	0.292	0.094	0.178
65	Syrups of all kind	0.000	0.002	0.031	0.061
66	Ground coffee	0.145	0.019	1.482	2.158
68	Processed soybeans	0.002	0.000	0.001	0.022
69	Other foods	0.117	0.095	0.733	0.144
70	Animal feed	0.003	0.097	0.530	0.499
71	Alcoholic beverages	0.003	0.014	0.016	0.004
72	Non-alcoholic beverages	0.020	0.090	0.062	0.026
73	Cigarettes	0.130	0.570	0.187	0.441
74	Other processed tobacco	0.010	0.000	0.749	0.005
84	Swan and processed wood	9.657	4.358	1.576	13.454
85	Plywood and other products	19.826	23.518	19.284	2.939
86	Wooden construction material	0.057	0.419	2.293	0.063
87	Wooden furniture and fixtures	0.289	2.501	2.839	3.104
104	Processed rubber	17.440	7.120	0.499	6.904
114	Nonferrous basic metal	12.767	4.982	4.368	2.453
	Total (%)	73.011	50.659	39.406	38.884
	Total (US$ million)	2868.7	5871.3	9300.7	11060.4
	SITC Manufactures				
75	Spinning	0.337	1.464	2.028	2.858
76	Weaving	4.272	6.844	8.799	5.289
77	Made-up textile goods except apparel	0.223	0.766	0.468	0.622
78	Knitting	2.465	2.813	0.125	0.135
79	Wearing apparel	6.060	11.016	14.151	11.396
80	Carpet/rug/rope etc	0.858	0.396	0.125	0.066
81	Other textiles	0.272	0.202	0.031	0.389
82	Tanned and finished leather	0.194	0.548	0.187	0.158
83	Footwear and leather products	0.057	0.602	6.989	7.546
89	Woven goods except yarn and plastic	0.274	0.197	0.094	0.474
90	Paper and cardboard	0.684	1.693	0.562	2.566
91	Goods made of paper and cardboard	0.004	0.012	1.701	0.710
92	Printed material	0.009	0.305	0.016	0.025
93	Non-fertiliser basic chemical	0.649	0.995	1.092	2.003
94	Fertiliser and pesticides	2.036	1.851	0.640	0.969
95	Synthetic resin and plastic material	0.568	0.423	0.406	1.106

96	Paint and varnish	0.000	0.060	0.234	0.156
97	Medicine	0.392	0.178	0.109	0.145
98	Cleaning material and cosmetics	0.714	1.048	0.593	0.661
105	Tyres and tubes	0.190	0.567	0.343	0.640
106	Other rubber goods	0.124	3.687	0.094	0.187
107	Plastic ware	0.046	1.413	1.061	0.583
108	Ceramic and earthenware	0.127	0.394	0.187	0.239
109	Glass and glassware	0.212	0.802	0.530	0.585
110	Structural clay and ceramic products	0.002	0.025	0.140	0.290
111	Cement and limestone	0.547	0.835	0.699	0.086
112	Other non-metallic mineral products	0.018	0.056	0.780	0.244
113	Basic iron and steal	0.853	1.980	1.217	1.221
115	Kitchen industries	0.002	0.449	0.375	0.504
116	Cutlery and agricultural tools	0.000	0.060	0.172	0.198
117	Metallic furniture and fixtures	0.028	0.194	0.577	0.465
118	Structural metal products	0.005	0.063	1.451	0.105
119	Other metal products.	0.126	0.343	0.530	1.340
120	Motor vehicles except motorcycles	0.219	0.368	0.718	0.090
121	Electrical machinery	0.002	0.077	1.295	2.130
122	Communication equipment	3.003	1.315	4.618	5.745
123	Household electrical appliances	0.000	0.035	0.063	0.052
124	Other electrical appliances	0.012	0.201	0.250	1.990
125	Accumulator and dry battery	0.031	0.442	0.031	0.511
126	Ship and spare parts	0.040	0.496	0.421	0.320
128	Car bodies	0.157	0.202	0.203	0.169
129	Motor cycles	0.005	0.044	1.061	0.868
130	Non-motorised vehicles	0.005	0.181	0.140	0.181
131	Aircraft and spare parts	0.017	0.129	0.078	0.059
132	Profession and scientific instruments	0.437	0.049	0.250	0.079
133	Photographic equipment	0.086	0.423	0.686	0.520
134	Watch, clock and like	0.172	0.058	0.156	0.200
135	Jewellery	0.190	0.453	1.841	1.174
136	Musical instruments	0.008	0.041	0.281	0.364
137	Spotsing goods	0.005	0.243	0.156	1.478
138	Other manufacturing.	0.252	2.300	1.84	1.222
	Total (%)	26.989	49.341	60.594	61.116
	Total (US$ million)	1060.4	5718.1	14301.5	17384.5
	ISIC Manufactures (%)	100.0	100.0	100.0	100.0
	ISIC Manufactures (US$ million)	3929.1	11589.4	23602.2	28444.9

Source: Compiled from PBS data tapes.

Appendix 2
Sectoral Linkages, and Contribution to Net Exports and Export-related Employment

ISIC code		BWL:1985	BWL: 1990	CGNX	CGEM
	Resource-based Manufactures				
52	Canned and preserved meat	2.265	2.302	0.133	0.057
53	Dairy products	2.051	1.997	0.032	0.015
54	Processed and preserved vegetables	1.817	1.906	0.776	0.335
55	Processed and preserved fish	2.077	2.076	0.742	0.317
56	Vegetable and animal oil	1.971	1.604	5.444	2.279
57	Milled and polished rice	2.041	2.062	0.050	0.015
60	Other flour	2.029	1.789	0.116	0.077
61	Bread and bakery products	1.911	1.829	0.006	0.004
62	Noodle/macaroni/similar products	1.931	1.629	0.139	0.118
63	Sugar	1.821	1.776	0.063	0.045
64	Chocolate and sugar confectionary	1.957	1.353	0.181	0.282
65	Syrups of all kind	1.847	2.094	0.066	0.040
66	Ground coffee	1.866	1.661	3.463	5.259
68	Processed soybeans	1.797	1.782	0.014	0.026
69	Other foods	2.112	2.038	0.170	0.267
70	Animal feed	2.148	1.839	0.728	1.156
71	Alcoholic beverages	1.369	1.471	0.009	0.006
72	Non-alcoholic beverages	2.074	2.094	0.038	0.022
73	Cigarettes	1.786	1.609	0.459	0.102
74	Other processed tobacco	2.007	1.861	0.004	0.000
84	Swan and processed wood	1.659	1.636	18.173	26.168
85	Plywood and other products	1.848	1.637	-0.119	-0.708
86	Wooden construction material	1.891	1.895	0.073	0.105
87	Wooden furniture and fixtures	1.764	2.059	4.210	6.099
104	Processed rubber	2.062	2.042	5.031	1.580
114	Nonferrous basic metal	1.633	1.589	0.483	0.170
	SITC Manufactures				
75	Spinning	1.245	1.331	2.458	2.175
76	Weaving	1.746	1.774	4.634	7.368
77	Made-up textile goods except apparel	1.813	2.136	0.633	0.958
78	Knitting	1.967	1.827	-0.068	-0.111
79	Wearing apparel	2.009	2.054	10.942	16.605
80	Carpet/rug/rope etc	1.450	1.741	-0.009	-0.063
81	Other textiles	1.980	1.741	0.371	0.535
82	Tanned and finished leather	2.148	2.146	0.175	0.202
83	Footwear and leather products	1.931	1.573	8.368	11.866
89	Woven goods except yarn and plastic	1.648	1.744	0.587	0.865
90	Paper and cardboard	1.348	1.684	2.427	0.922
91	Goods made of paper and cardboard	1.308	1.991	0.781	0.255
92	Printed material	1.419	1.918	0.026	0.008
93	Non-fertiliser basic chemical	1.304	1.449	1.689	0.484
94	Fertiliser and pesticides	1.432	1.561	0.467	0.066
95	Synthetic resin and plastic material	1.122	1.686	0.690	0.178
96	Paint and varnish	1.279	1.529	0.185	0.054
97	Medicine	1.428	1.672	0.100	0.024

98	Cleaning material and cosmetics	1.294	1.702	0.593	0.156
105	Tyres and tubes	1.706	1.856	0.545	0.224
106	Other rubber goods	1.628	1.819	0.187	0.062
107	Plastic ware	1.105	1.413	0.313	0.241
108	Ceramic and earthenware	1.568	1.761	0.266	0.727
109	Glass and glassware	1.469	1.513	0.624	1.873
110	Structural clay and ceramic products	1.405	1.641	0.362	1.005
111	Cement and limestone	1.859	1.881	0.044	0.019
112	Other non-metallic mineral products	1.674	1.691	0.325	0.974
113	Basic iron and steal	1.577	1.735	1.159	0.096
115	Household appliances	1.819	1.759	0.649	0.354
116	Cutlery and agricultural tools	1.574	1.759	0.240	0.131
117	Metallic furniture and fixtures	1.530	1.841	0.542	0.283
118	Structural metal products	1.443	1.756	0.109	0.076
119	Other metal products.	1.404	1.727	1.393	0.853
120	Motor vehicles except motorcycles	1.093	1.685	0.025	0.005
121	Electrical machinery	1.449	1.698	1.933	0.317
122	Communication equipment	1.207	1.458	5.055	0.946
123	Household electrical appliances	1.455	1.711	0.068	0.010
124	Other electrical appliances	1.349	1.546	2.000	0.319
125	Accumulator and dry battery	1.844	1.825	0.500	0.080
126	Ship and spare parts	1.355	1.731	0.333	0.180
128	Car bodies	1.342	1.402	0.123	0.091
129	Motor cycles	1.772	1.694	1.009	0.608
130	Non-motorised vehicles	1.441	1.719	0.153	0.087
131	Aircraft and spare parts	1.180	1.683	0.104	0.090
132	Profession and scientific instruments	1.150	1.625	0.072	0.022
133	Photographic equipment	1.390	1.625	0.569	0.398
134	Watch, clock and like	1.311	1.624	0.191	0.129
135	Jewellery	1.771	1.697	2.597	1.480
136	Musical instruments	1.415	1.713	0.495	0.283
137	Spotsing goods	1.860	1.984	1.528	0.971
138	Other manufacturing	1.536	1.647	0.952	0.682

Legend

LKG	Backward linkage index
CGNX	Percentage contribution to growth of net exports between 1985-86 and 1994-95.
CGEM	Percentage contribution to growth of export-related employment between 1985-86 and 1994-95.

Source and Method: Authors' estimates based on the methodology and data sources discussed in the text.

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