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International Trade and Manufacturing Employment Outcomes in India

A Comparative Study

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Abstract

The Indian economy has observed significant trade reforms since the mid 1980s, and the Indian manufacturing sector has rapidly increased its integration with the world economy. In this paper, we ask the question: did the increased trade integration create or destroy jobs in the Indian manufacturing sector? We attempt to answer this question by employing a variety of methodological approaches – factor content, growth accounting and econometric modelling. We also compare India's employment outcomes with four other countries – Bangladesh, Kenya, South Africa and Vietnam, where similar methodological approaches were used. We find that the impact of international trade on manufacturing employment seems to be similar to those found for the two African countries – Kenya and South Africa – rather than the two Asian countries – Bangladesh and Vietnam. Thus, the overall effect of international trade on manufacturing employment has been minimal, a surprising result for a country with an apparent comparative advantage in labour-intensive manufacturing goods, and a large excess supply of unskilled labour.

Keywords: international trade, manufacturing, employment, India

JEL classification: F16, J21, O57

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1 Introduction

Whether globalization can be a strong positive force for reducing world poverty is one of the most controversial development issues of the day. The labour market is the key channel by which globalization can impact on poverty. Increased integration with the world economy can potentially reduce poverty through the creation of new jobs in export industries. However, greater openness also brings increased competition from imports for previously protected industries. This can lead to job losses in certain sectors, with workers falling into poverty as a result of retrenchment. Whether globalization creates or destroys jobs, and who are the winners and losers in employment is ultimately an empirical issue.

In spite of its importance in understanding the links between globalization and poverty, there has been scant empirical research on the impact of international trade on employment in developing countries.[1] Much of the initial work in this area was undertaken in a multi-country study sponsored by the National Bureau of Economic Research in the early 1980s (Krueger et al. 1981). Recently, Jenkins and Sen (2006) examined the impact of trade flows and foreign investment on employment in four developing countries – Bangladesh, Kenya, South Africa and Vietnam. This research showed that integration with the world economy has led to a significant increase in the number of unskilled jobs, particularly for women, in Bangladesh and Vietnam. However, job creation as a result of greater openness has been minimal in Kenya and South Africa and is biased towards more skilled workers.

This research suggests a potential continental divide in the pro-poor outcomes of globalization, with Asian economies benefiting more from increased integration with the world economy than African economies. Yet it is not clear whether such a finding is robust, and what may explain such a continental divide, if it exists. An influential line of argument in this regard is that of Wood (2003) who predicts that Africa's long-term development path would be more like that of the land-abundant Americas than land-scarce Asia. Wood argues that Africa's high land/labour ratio relative to that of Asia, imply that Africa has less of a comparative advantage in labour-intensive manufacturing activities than Asia. Thus, differences in factor endowments between Africa and Asia explain why Africa's exports structure seems to be biased towards natural resource based commodities rather than unskilled labour-intensive manufacturing exports. A corollary to this argument is that it is unlikely that globalization can exert the same positive direct impact on employment creation in African countries as in Asia, given that labour-intensive manufacturing seems to be the key sector in developing countries that has benefited most from the increase in world trade that has occurred in the past few decades.

Wood's argument provides a possible explanation of the results that have been obtained by Jenkins and Sen. However it leaves several questions unanswered. First, how robust is the finding of an apparent 'continental divide'? If factor endowment is the crucial driving force behind the differences in employment outcomes between Bangladesh and Vietnam on the one hand, and Kenya and South Africa on the other, does this hold for other Asian countries which also have plentiful supply of unskilled labour relative to

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[1] See Rama (2003) for a recent review of the limited research in this area. See also Ghose (2003: esp. ch. 4).

land? Second, how important is the policy regime in mediating the relationship between factor endowments and favourable employment outcomes in the manufacturing sector? Could it be argued that favourable policies towards export-oriented foreign direct investment in Bangladesh and Vietnam may have been more important in explaining the significant increase in labour-intensive exports in these two countries, a phenomenon that is not observed amongst some other neighbouring countries in the region. Third, does the manner in which increased international integration is undertaken matter in determining the magnitude of impact of globalization on the labour market? There is preliminary evidence that Vietnam's gradualist trade reforms may have limited job losses due to import penetration as compared to South Africa where radical trade liberalization was undertaken more rapidly. Finally, does international trade necessarily have a positive impact on employment, even in sectors or industries which are unskilled labour-intensive? As industries seek to compete against imports or in international markets, job losses due to trade-induced technological change may occur. Evidence from South Africa and Vietnam suggests that sectors subject to import penetration have been particularly prone to labour saving technological advances.

The above discussion implies that a proper assessment of the impact of globalization on employment outcomes in developing countries can only be arrived at by undertaking a more complete comparative study that includes countries that are different from the four countries previously studied either in terms of factor endowments or the policy regime. The current paper builds on the research undertaken by Jenkins and Sen (2006) to augment our understanding of the complex and contradictory ways by which globalization impacts on the labour markets of developing countries. We will undertake a case-study of India for the period 1975-1999, the period for which industry data is available. The Indian experience with globalization relating to manufacturing employment is an important one to consider, given the high rates of poverty in the country and the limited possibility of agricultural growth being the driver of poverty declines in many regions of the country (Palmer-Jones and Sen 2003). Furthermore, India provides an interesting contrast to Bangladesh in that it shares with Bangladesh similar factor endowments – that is, plentiful supplies of unskilled labour – but differs with respect to the policy regime, in particular, a relatively unfavourable environment for foreign direct investment, and labour market regulations that constrain the flexibility of small and medium enterprises, as compared to Bangladesh. However, India has well developed technological capabilities built through several decades of import substituting industrialization, and a large pool of scientific and technical personnel, which may allow Indian firms to penetrate world markets in products that are not necessarily unskilled labour intensive or to withstand import competition in capital intensive industries. This would imply that the impact of globalization on the labour market in India may differ in substance from that observed in the case of Bangladesh. The key question which the paper sets out to answer is whether trade integration has created or destroyed jobs in the Indian manufacturing sector.

The rest of the paper is in seven sections. The next sets out the theoretical framework. Section 3 introduces the three empirical methods. Section 4 outlines the trade reforms in India. Sections 5, 6 and 7 apply, respectively, the factor content, growth decomposition and labour demand approaches to Indian industry and trade data. Section 8 concludes with a discussion of alternative interpretations of the results.

2 Trade and manufacturing employment: theoretical linkages

The overall level of manufacturing employment in an economy is by definition equal to the level of manufacturing output times the weighted average employment coefficient for the manufacturing sector.

$$L = Q.\Sigma\, w_i\, (L/Q)_i \qquad (1)$$

where L is total manufacturing employment

Q is total manufacturing output

$w_i = Q_i/Q$

i refers to branches of manufacturing.

The impact of trade on manufacturing employment can therefore be decomposed into three elements represented in Equation (1). First, it may have an impact on the total output of the manufacturing sector (Q). Increased exports have a positive effect on the level of output, tending to increase employment, while greater import penetration depresses output and displaces labour. Second, trade influences the shares of different industries in overall manufacturing output (w_i), increasing the output of exportables and reducing output of import competing industries. Finally, trade can have an impact on employment by changing labour coefficients within industries $(L/Q)_i$. These three impacts are referred to in this paper as the *scale* effect, *the composition* effect, and the *process* effect of trade.

Theory suggests that trade might influence manufacturing employment through each of these effects. One determinant of the size of the manufacturing sector is a country's comparative advantage, which may in turn reflect factor endowments. In the model first proposed by Krueger (1977) and extended by Leamer (1987), the crucial variable determining trade and production structure is the land/labour ratio. Thus, land-abundant developing countries such as those in Africa and Latin America, would be more likely to specialize in primary commodities while developing countries in Asia would be more likely to specialize in (labour-intensive) manufactures. Wood (2003) finds persuasive evidence for the Krueger-Leamer variant of the Heckscher-Ohlin model – differences in factor endowments between Africa and Asia seem to explain why Africa's export structure is biased towards natural resource based commodities rather than labour-intensive manufacturing exports. Increased trade would therefore tend to lead to slower growth (or even contraction) of the manufacturing sector in African countries compared to Asian countries.

An alternative view would explain a country's comparative (dis)advantage in manufacturing in Ricardian terms where differences in technology across sectors explain the effects of trade. In this case, the size of the manufacturing sector in a country is determined by its overall competitiveness which in turn is partly a result of technological capabilities in manufacturing. In this case it is the acquisition of technological capabilities that determines the impact of trade on manufacturing employment rather than factor endowments. For countries which have a comparative disadvantage in manufacturing, this view is less optimistic that a contraction of the manufacturing sector as a result of increased trade is matched by expansion of other

non-manufacturing sectors. This is particularly true when greater trade openness occurs in the presence of specific factors or labour market rigidities. We refer to the impact of trade on employment via the overall size of the manufacturing sector as the *scale* effect, irrespective of the ultimate causes of changes in manufacturing output.

The composition effect of trade depends on the impact of trade on the share of different branches in total manufacturing output. An increase in the share of labour-intensive industries in aggregate output would tend obviously to raise the overall level of manufacturing employment. A key prediction of the standard two factor Heckscher-Ohlin model is that with international trade, developing countries with plentiful supplies of labour will export labour-intensive commodities and import commodities with relatively higher capital requirements. Thus, as a developing country gradually integrates with the world economy, it will observe a change in the composition of its output towards more labour-intensive activities. This will shift the national demand for labour curve to the right, and under an assumption of a fairly elastic supply of labour, will lead to an increase in overall employment.[2]

Not all trade theories suggest that increased trade will necessarily lead to a more labour-intensive composition of output in developing countries. This is mainly applicable to cases of inter-industry trade and far less relevant where there is intra-industry trade.[3] Indeed, as Feenstra and Hanson (1996) have shown, it is possible in the latter case that, contrary to the orthodox Heckscher-Ohlin prediction, trade increases the demand for the scarce factor in developing countries.[4] In any case intra-industry trade may be more a reflection of economies of scale and product differentiation than of factor endowments. Once again we refer to the effects of changes in the weights of different branches of manufacturing on employment as the *composition* effect, irrespective of the factors which have contributed to such changes.

The final way in which international trade can impact on manufacturing employment is that it can lead to change within a sector which affects the quantity and kind of labour required to produce a given output. Within the standard trade theory such changes are due to a shift in relative factor prices brought about by changes in relative factor demand as the economy opens up (the Stolper-Samuelson effect). These in turn lead to factor substitution in production.

Industry level impacts on employment may also occur via induced productivity effects, as firms shed labour in response to external competitive pressures, due to either greater export orientation or increased import penetration (Greenaway et al. 1999). Such a trade-induced productivity effect could be due to a decrease in X-inefficiency as trade

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2 This is the assumption made by the individual country studies in the NBER project on trade and employment led by Krueger, and is a fairly plausible assumption for most low-income developing countries.

3 Strictly speaking intra-industry trade would not lead to any change in the composition of output because imports and exports are in the same industry. In practice however if intra-industry is defined in terms of relatively broad industrial categories while if a more detailed classification of production is used, then it is possible for intra-industry trade to have some impact on the composition of output and hence on employment.

4 In their model the factors of production are unskilled and skilled labour and they show trade increasing the demand for skilled labour in the less developed country (Feenstra and Hanson 1996).

reform leading to increased international competition brings about a reduction in 'slack' in labour input (Horn et al. 1996).[5] It could also be due to trade-induced technological transfers (for example, via an increase in the importation of capital goods). We refer to all these effects of trade on employment within industrial branches as the *process* effect of international trade.

In this paper, we attempt to assess the importance of the scale effect, the composition and the process effect of international trade on employment for the four countries under consideration. In order to do this, we need to implement a set of methodologies that allow us to capture all three effects.

3 The methodological approaches

The paper employs three commonly used methodological approaches to study the impact of international trade on employment. These are *factor content, growth accounting,* and *labour demand* approaches.

3.1 Factor content approach

Factor content studies have been widely used both in order to test theories of international trade and to estimate the employment effects of trade, particularly between developed and developing countries.[6] This approach allows us to examine whether a change in the structure of production as a result of greater outward orientation leads to an increase in the labour-intensity of production, and hence, overall employment. This it does by computing direct and indirect labour requirements per unit of exports and import substitutes, with indirect labour requirements calculated using input-output tables. In this paper, we will only examine the direct labour requirements per unit of exports and import substitutes, as we lack the requisite input-output tables for the countries in question for the more recent periods.

3.2 Growth accounting approach

Factor content studies only consider the impact of trade on employment, but growth accounting can be used to go beyond this to analyse the impact of different forces on changes in employment. This approach decomposes changes in employment into the effects of changes in domestic demand, exports, imports and productivity.

Starting from the basic accounting identity that

$$Q_{it} = D_{it} + X_{it} - M_{it} \qquad (2)$$

where

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5 That trade reforms often lead to productivity gains in the manufacturing sector is well-documented in the literature – see Levinsohn (1993) and Harrison (1994).

6 For reviews of such studies, see Wood (1994: ch. 3); Lawrence (1996: ch. 2).

D_{it} is domestic absorption of industry i at time t

Q_{it} is domestic production of industry i at time t

X_{it} is exports of industry i at time t

M_{it} is imports of industry i at time t

Employment can be calculated as

$$L_{it} = l_{it}(D_{it} + X_{it} - M_{it}) \quad (3)$$

where L_{it} is employment in industry i at time t

$l_{it} = L_{it}/ Q_{it}$

Changes in employment between t=0 and t=1 can then be decomposed using the equation:

$$\Delta L_i = l_{i1}(1- m_{i0})\Delta D_i + l_{i1}\Delta X_i + l_{i1} (m_{i0} - m_{i1})D_{i1} + (\Delta l_i) Q_{i0} \quad (4)$$

where

$$m_{it} = M_{it} /D_{it}$$

The first term on the right hand side measures the impact of changes in domestic demand on employment, the second the effect of changes in exports, the third the impact of changes in import penetration and the final terms indicates the effect of productivity changes. This corresponds to a Chenery type decomposition. This approach assumes that increases in exports create additional employment while increased import penetration reduces employment.

The growth accounting approach has been subject to methodological criticisms, including the arbitrariness of the decompositions involved and the fact that since they derive from basic accounting identities, they cannot be interpreted in a causal way (Martin and Evans 1982). Moreover, as Wood (1994) has argued, part of the technological change which occurs may be defensive, where firms respond to increased competitive pressure from imports. Therefore it is invalid to assume that reduced employment as a result of increased productivity is independent of trade. Nevertheless, despite these limitations, growth accounting has been extensively used in the literature, both on developed and developing countries, and as such provides a useful first approximation to considering the impacts of trade flows on employment. Furthermore, as was shown above, growth accounting provides a useful way of separating out the scale effects from the composition effect of trade on employment.

3.3 Labour demand modelling

The first two approaches estimate the effect of international trade on employment via changes in the labour-intensity of production *across* industries (as in the factor content approach) or via the expansion or contraction of output due to export expansion or import penetration (as in the growth accounting approach). However, as we have argued

earlier, international trade can also lead to changes in the efficiency of labour use within the same industry. This can be captured by the estimation of labour demand equations at the industry level, where employment regressed at the industry level against a number of explanatory variables, derived from a standard labour demand framework.[7] This approach has been used by Hine and Wright (1998) and Greenaway et al. (1999) to analyse the impact of trade on employment in UK manufacturing and in a developing country context by Milner and Wright (1998) for Mauritius.

Consider a standard derived demand for labour equation at the industry-level, augmented by a variable that captures the extent of integration of the industry with the world market.

$$L_{it} = \alpha + \beta_1 W_{it} + \beta_2 Q_{it} + \varphi Z_{it} \qquad (5)$$

where L_{it} is employment in industry i at time t, W_{it} is real wage in industry i at time, and Q_{it} is real output in industry i at time t, and Z_{it} measures the degree of open-ness of industry i in time t.

We will estimate the equations using the natural logarithms of L, W and Q, so that the coefficients on W and Q in equation (4) can be interpreted as the wage and output elasticities of labour demand.

As is standard in the literature, we capture the degree of open-ness (Z_{it}) by the import penetration ratio (IM) and the export-output ratio (EO) defined at the industry level (Hine and Wright 1998, Greenaway et al. 1999).[8] The use of these two variables also allows us to separate the effects of import competition from export orientation on the efficiency of labour use. Thus, we can re-write (7) as:

$$L_{it} = \alpha + \beta_1 W_{it} + \beta_2 Q_{it} + \varphi_1 IM_{it} + \varphi_1 EO_{it} \qquad (6)$$

This approach can take account of the indirect impact of trade on employment via trade-induced productivity changes. In fact since the output variable incorporates the direct effects of changes in exports and imports, the import and export penetration variables capture the indirect effects. We would expect that $\beta_1 < 0$, and $\beta_2 > 0$. Also, following our discussion in the previous section, we would expect that $\varphi_1 < 0$ and $\varphi_2 < 0$. We use dynamic panel data methods to allow for short-run rigidities to labour adjustment to its optimal level, following shocks to domestic demand, productivity and India's export markets.

4 Trade policy in India

The import and exchange rate regime that Indian policy-makers followed since independence was aimed at the comprehensive, direct control over foreign exchange

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7 There have also been firm level econometric studies of trade-employment linkages but these are not discussed here.

8 We define the import penetration ratio for a particular industry as its imports as a ratio of domestic demand (i.e., imports+output-exports); while the export-orientation ratio is exports as a ratio of output.

utilization, with an overwhelming reliance on quotas rather than tariffs (Bhagwati and Srinivasan 1975). Import licenses allocated reflected two major criteria: (1) the principle of 'essentiality'; and (2) the principle of 'indigenous non-availability'. Thus, imports, in terms of both magnitude and composition, were to be permitted only if the firm in question certified to the government that they were 'essential' (as inputs or equipment for production). At the same time, the government had to clear the imports from the viewpoint of indigenous availability: if it could be shown that there was domestic production of the imports demanded, then the imports were not permitted (regardless of cost and quality considerations). Nearly all imports were subject to discretionary import licensing or were 'canalized' by government monopoly trading organizations. The only exceptions were commodities listed in the Open General License (OGL) category. Capital goods were divided into a restricted category and the OGL category. While import licenses were required for restricted capital goods, those in the OGL could be imported without a license subject to several conditions. Intermediate goods were also classified into the banned, restricted and limited permissible categories plus an OGL category. As these names suggest, the first three lists were in order of import licensing stringency. OGL imports of intermediate goods were also governed by the 'actual user' condition. The import of consumer goods was, however, banned (except those which were considered 'essential' and could only be imported by the designated government canalizing agencies).

Beginning with the export-import policy of 1977-78, there was a slow but sustained relaxation of import controls. Several capital goods that were not allowed to be imported without an import license were steadily shifted to the OGL category. The number of capital goods on the OGL list increased from 79 in 1976 to 1170 in April 1988. These changes were made with the intention of allowing domestic industries to modernize. Moreover, during the 1980s the import licensing of capital goods in the restricted list were administered with less stringency (Pursell 1992). As a consequence, the import penetration ratio in the capital goods sector increased from 11 per cent in 1976-77 to 18 per cent in 1985-86 (Goldar and Renganathan 1990). In the case of intermediate goods too, there was a steady shift of items from the restricted and limited permissible categories to the OGL category. However, in practice a capital or an intermediate good was placed in the OGL list only if it was not being domestically produced. Thus, import liberalization during this period may have led to some degree of competition to established producers of intermediate and capital goods in India (though in several instances, the goods that were allowed to be imported were imperfect substitutes of domestically produced goods). Furthermore, there was an increase in tariff rates across all commodities, and in particular, on capital goods. By 1987/88, the unweighted average of tariffs on manufactured goods was 147 per cent, with most tariff lines for manufacturing clustered around a range of 140-160 per cent.

The pace of the trade reforms – in particular, the shift from quantitative import controls to a protective system based on tariffs – initiated in the mid-seventies were considerably quickened by the new government (led by Rajiv Gandhi) that came into power in November 1985. Restrictions on the import of capital goods were further eased to encourage technological modernization. Also, beginning in the mid-1980s, there was a renewed emphasis by the new administration on export promotion. The number and value of incentives offered to exporters were increased and their administration streamlined. The allotment of REP licenses – tradable import entitlements awarded to exporters on a product-specific basis – became increasingly generous (Agarwal et al.

1995). Finally, the duty exemption scheme for imported inputs was extended to cover all imported inputs for both direct and indirect exporters.

In 1991, as a part of the comprehensive economic reform programme initiated that year, there was a significant liberalization of the trade regime with respect to capital goods. Import licensing was virtually abolished with respect to the imports of most machinery and equipment and manufactured intermediate goods (Ahluwalia 1999). There was also a significant cut in tariff rates, with the peak tariff rate reduced from 300 per cent to 150 per cent and the peak duty on capital goods cut to 80 per cent.[9] Import-weighted custom duty rates fell from an average of 97 per cent in 1990-91 to 29 per cent in 1995-96. There was, however, little change in trade policy with respect to consumer goods which remained in the 'negative' (banned) list (Balasubramanyam 2003).

The radical reforms of the trade regime in 1991 coincided with an equally significant set of reforms in industrial policy. Prior to 1991, there was a system of industrial licensing of private industry in place which governed almost all aspects of firm behaviour in the industrial sector, controlling not only entry into an industry and expansion of capacity, but also technology, output mix, capacity location and import content. In 1991, previous piecemeal efforts towards liberalization of controls were consolidated in a comprehensive wave of domestic deregulation. Industrial licensing was abolished altogether, except for a list of environmentally sensitive industries. Along with this was the removal of restrictions on large business groups to merge or expand, and the opening up of several industries to the private sector, which had been previously reserved for the public sector.

This was reflected in the significance of international trade in the Indian economy.[10] Exports plus imports as a ratio of GDP is often used as an outcome-based measure of openness (Figure 1). We compute this measure both for goods and services and for goods only. As is well-known, India has been a major exporter of information technology services in recent years. This is reflected in the larger increase in the ratio of exports plus imports of both goods and services to GDP as compared to ratio of exports plus imports of only goods to GDP. However, both indicators have shown a steady increase since the late 1980s, and the ratio of exports plus imports of goods to GDP stood at around 25 per cent in 2003. Clearly, since the trade reforms of the 1980s and early 1990s, the Indian economy has significantly increased its integration with the world economy.

Manufacturing goods comprise an increasing share of total exports and imports for the Indian economy (Figure 2). This is particularly evident in the case of manufacturing exports which now comprise around 75 per cent of all of India's merchandise exports. The manufacturing trade balance also shows an increase in the 1990s, after persistent

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9 As Joshi and Little (1997) argue, the concentration of emphasizing an early reduction in tariffs on capital goods in the reform process was probably intended to avoid discouraging investment because of the expectation of a later reduction in tariffs.

10 The main emphasis of the paper is on the impact of trade rather than trade *liberalization* on employment. This is a broader question which focuses on changes in a country's integration with the global economy rather than just on its trade policy, although of course trade policy is a factor which affects trade flows. A similar point is made with reference to the literature on trade and poverty in UNCTAD (2004, part II, ch. 1).

deficits in the 1980s (Figure 3). Along with the increase in merchandize exports as a ratio of GDP, this indicates the increasing importance of manufacturing both in India's economic activities and in the country's relationship with the rest of the world.

5 A factor content approach

We begin this section by examining the factor-intensity of manufacturing exports, as a prelude to the factor content calculations.[11] In order to do so, we apply Krause's (1982) classification of ISIC manufacturing industries according to their dominant factor input.[12] This distinguishes between natural resource intensive, labour intensive, technology intensive and human capital intensive industries. The natural resource intensive industries are further sub-divided into agricultural and mineral-based industries. Unskilled labour-intensive industries are those with the lowest value added per worker. The remaining industries are divided into technology intensive and human capital intensive, with the industries with a high ratio of R&D to value added being classified as technology intensive.[13]

We find that unskilled labour intensive commodities are the most important in India's manufacturing exports, comprising 45 per cent of total manufacturing exports in 1996-1999 (Table 1 and Figure 4). However, while the share of unskilled labour intensive commodities in total manufacturing exports has increased over the period 1975-1999, the increase has not been substantial, from 37 per cent in 1975-80. In contrast, the increase of the share of unskilled labour intensive exports in total manufacturing exports of Bangladesh and Vietnam has been far more striking (Table 2). However, in comparison to Kenya and South Africa, India's share of unskilled labour intensive exports is substantially higher. India's human capital intensive and technology intensive exports has also increased as a share of total manufacturing exports over the period 1975-1999 from 10 and 17 per cent in 1975-1980 to 15 and 24 per cent in 1996-1999 respectively. On the other hand, India's agricultural intensive exports as a share of total manufacturing exports has fallen quite dramatically from 31 per cent in 1975-1980 to 12 per cent in 1996-1999.

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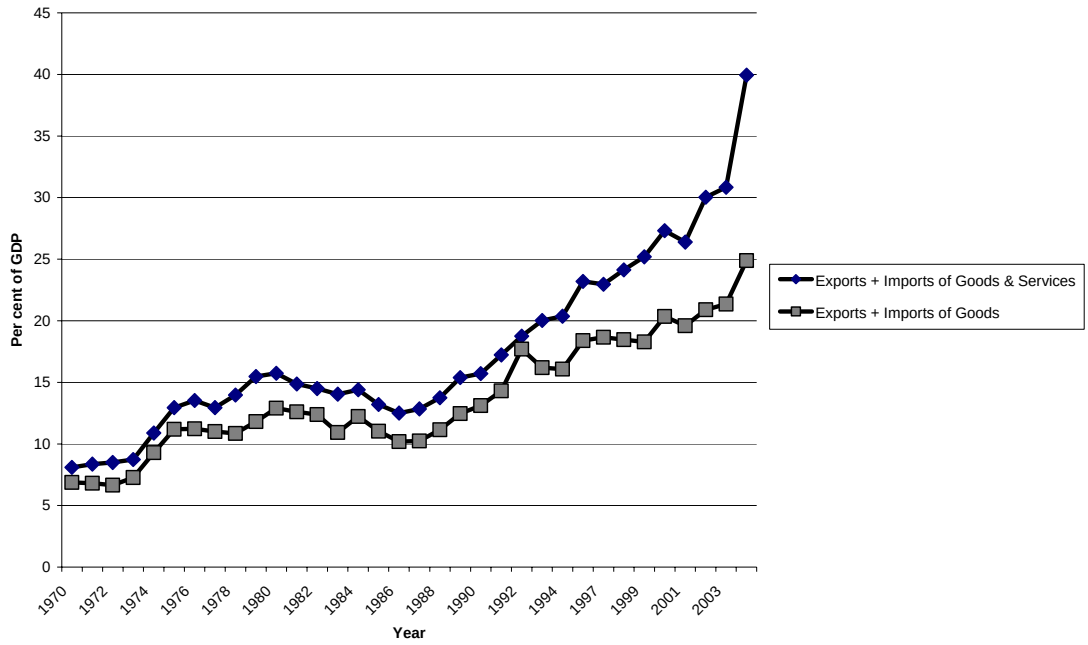
11 It should be noted that the paper uses the International Standard Industrial Classificiation (ISIC) definition of manufacturing, which is broader than the Standard International Trade Classification (SITC) and includes processing of many primary products.

12 The trade data comes from the International Economic Database of the Australian National University and has been reclassified from COMTRADE data according to the International Standard Industrial Classification (ISIC Rev. 2). Because the trade data is only available at the four digit level and in a small number of cases, Krause uses a five digit classification, we have had to slightly modify his groupings.

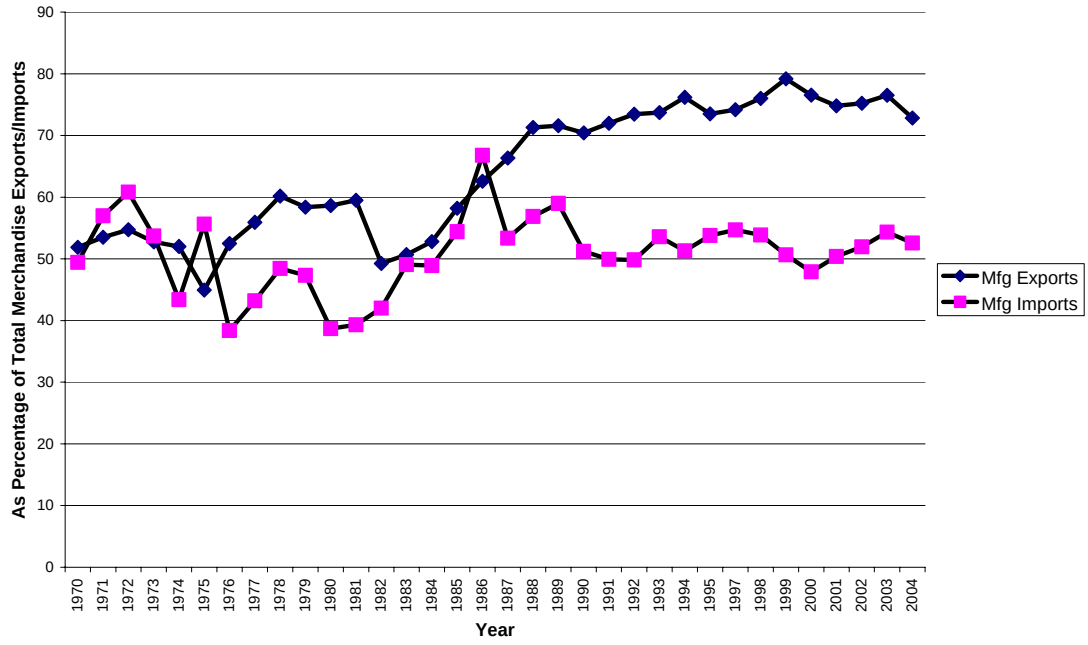
13 A more conventional trade theory approach could regard both these categories as capital-intensive.

Figure 1: Openness, exports plus imports of goods and services, and goods only as ratios of GDP



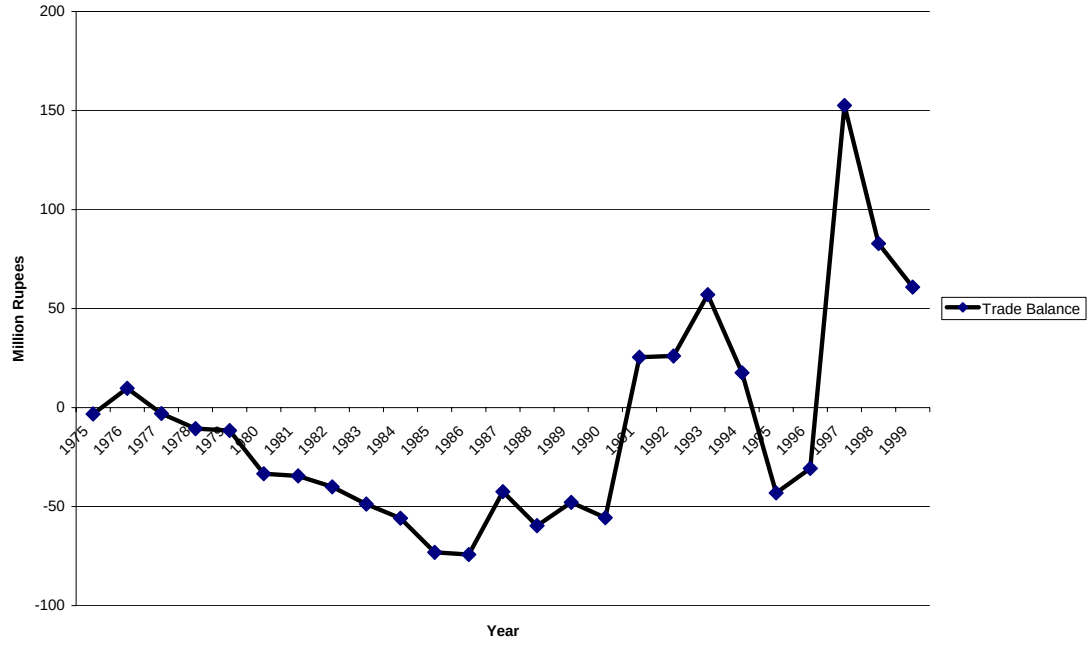
Source: World Development Indicators, World Bank.

Figure 2: Manufacturing exports and imports as shares of total merchandise exports and imports



Source: World Development Indicators, World Bank.

Figure 3: Manufacturing trade balance, India



Source: IEDB, ANU.

With respect to imports, technology intensive exports remain the dominant set of commodities in India's manufacturing import basket, followed by human capital intensive goods. There has been a slight increase in the share of human capital intensive goods in India's manufacturing imports, with no significant change in the share of technology-intensive imports in total manufacturing imports in spite of the trade liberalizations of the 1980s and 1990s which were mostly biased towards import liberalization of capital and intermediate goods.

Table 1: Structure of total manufacturing exports and imports, India

Percentage share (except total exports)	1975-80	1981-85	1986-90	1991-95	1996-99
Exports					
Agricultural resource intensive	31	24	16	15	12
Mineral resource intensive	5	5	8	5	4
Unskilled labour intensive	37	39	40	43	45
Technology intensive	10	11	13	13	15
Human capital intensive	17	21	23	24	24
Total manufacturing exports (in US$ million)	3861	5442	10270	17890	22916
Imports					
Agricultural resource intensive	16	14	10	7	10
Mineral resource intensive	24	24	22	27	11
Unskilled labour intensive	4	5	6	6	8
Technology intensive	41	40	39	39	44
Human capital intensive	15	17	24	21	27
Total manufacturing imports (in US$ million)	4575	8834	12433	16387	21019

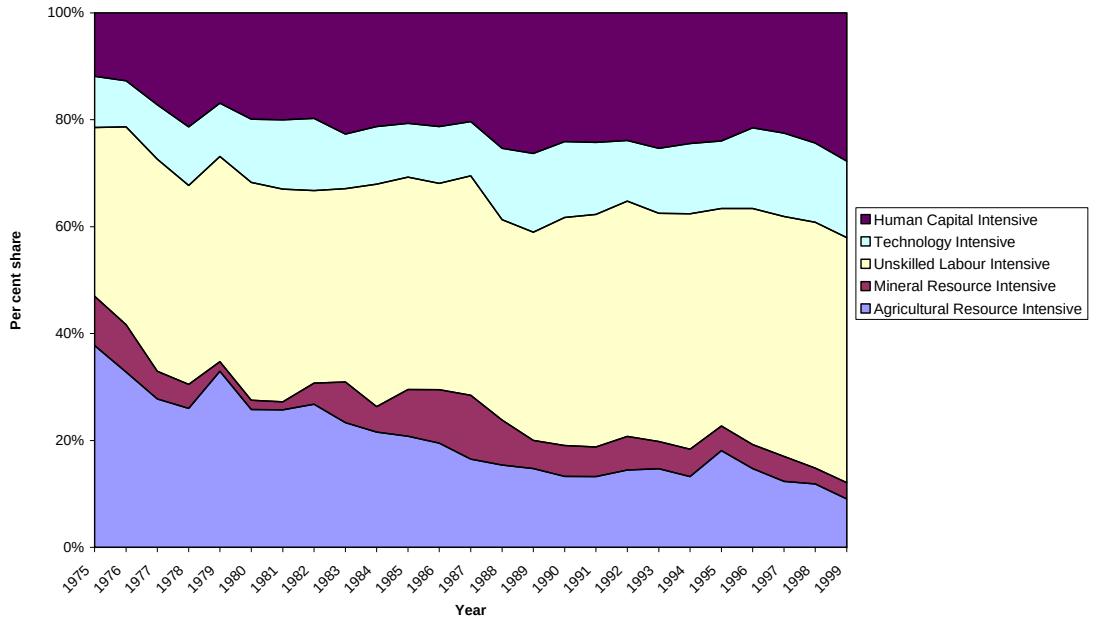
Source: own elaboration from International Economic Database, ANU.

Table 2: Structure of total manufacturing exports, Bangladesh, Kenya, South Africa and Vietnam

Percentage share (except total exports)	1976-80	1981-85	1986-90	1991-95	1996-98
Bangladesh					
Agricultural resource intensive	25.8	27.1	21.7	9.9	7.0
Mineral resource intensive	6.8	7.6	2.8	1.5	0.7
Unskilled labour intensive	63.8	62.3	72.8	84.7	89.9
Technology intensive	3.4	2.3	2.3	3.4	1.7
Human capital intensive	0.2	0.6	0.4	0.6	0.7
Total manufacturing exports (in US$ million)	287.8	423.0	981.1	2340.3	4008.2
Kenya					
Agricultural resource intensive	65.8	64.8	73.9	63.4	64.7
Mineral resource intensive	16.8	15.6	2.5	3.2	4.2
Unskilled labour intensive	4.1	5.0	7.6	15.9	15.8
Technology intensive	8.5	10.0	11.7	13.1	8.6
Human capital intensive	4.9	4.6	4.4	4.4	6.8
Total manufacturing exports (in US$ million)	285.9	283.9	319.8	384.9	403.2
South Africa					
Agricultural resource intensive	26.9	20.3	19.5	17.9	16.1
Mineral resource intensive	28.4	32.5	38.0	32.5	29.4
Unskilled labour intensive	4.8	6.5	6.6	9.4	9.9
Technology intensive	9.1	15.0	11.1	11.4	13.1
Human capital intensive	30.7	25.7	24.9	28.8	31.5
Total manufacturing exports (in US$ million)	4432.6	4704.8	6640.0	8654.8	12643.7
Vietnam					
Agricultural resource intensive	63.5	83.9	80.6	38.6	21.0
Mineral resource intensive	5.9	2.4	1.2	4.3	2.1
Unskilled labour intensive	21.4	10.2	14.2	49.7	58.7
Technology intensive	6.8	2.4	1.5	1.9	5.6
Human capital intensive	2.3	1.1	2.5	5.6	12.7
Total manufacturing exports (in US$ million)	34.6	56.2	210.8	1637.5	4941.4

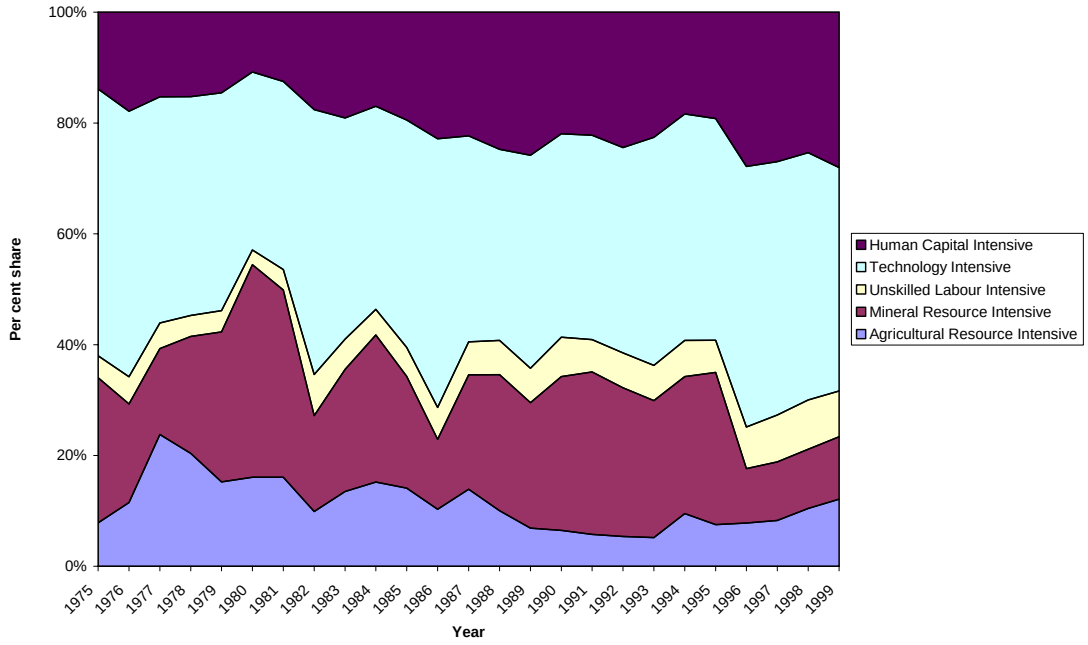
Source: own elaboration from International Economic Database, ANU.

Figure 4: Factor content of India's manufacturing exports



Source: own elaboration from International Economic Database, ANU.

Figure 5: Factor content of India's manufacturing imports



Source: own elaboration from International Economic Database, ANU.

5.1 Employment coefficients of exports and import-competing domestic production

The discussion so far has focussed solely on the composition of exports and imports, without explicit computations of their labour-intensities. However in order to examine the impact of trade on employment, we need to look at the labour-intensity of both exports and imports. To do this, we derive employment coefficients at the industry level which are then weighted by the share of each industry in exports and imports. The employment coefficients are presented in Figure 6.[14] We see that the employment coefficients of exports and imports have consistently fallen over the period. Moreover, the difference between the employment coefficient of exports and that of imports has narrowed over time. The findings suggest that a unit increase in manufacturing exports matched by an identical increase in manufacturing imports will lead a *smaller* positive effect on employment in 1996-1999 as compared to 1975-1980.

To understand what explains this puzzling phenomenon during a period when India attempted to re-align its trade regime in line with its own comparative advantage in unskilled labour intensive commodities, we look at the changes in the contribution of two sets of commodities which comprise the bulk of India's manufacturing exports. These are wearing apparel (ISIC Code 322) comprising 18 per cent of total manufacturing exports in 1996-1999 and other manufacturing goods (ISIC Code 390), which are principally jewellery, sporting goods and toys, comprising 19 per cent of total manufacturing exports in 1996-1999. These two sets of commodities can contribute to changes in the overall employment coefficient either by a change in their own individual employment coefficients or by a change in their share of total manufacturing exports. We scale the employment coefficients and export shares for wearing apparel and other manufacturing goods to 100 for the period 1975-1980. The results are presented in Figures 7 and 8. Interestingly, the employment coefficients for both sets of commodities have actually decreased over the period 1975-1999. Export shares for these two sets of commodities have, on the other hand, increased from the late 1970s to the mid 1980s and then remained stable in the case of wearing apparel. Export shares of other manufacturing goods have also increased over the period, in particular for the sub-period 1996-1999. These findings suggest that the principal reason for the decrease in the overall employment coefficient for India's exports over the period 1975-1999 is the fall in employment intensity of production, and not in the lack of specialization in labour intensive products. The fact that the employment intensity of production has fallen during a period where Indian policy-makers reformed the trade regime to remove some of the biases in incentives towards the production of capital and intermediate goods is an issue that needs to be investigated in further detail. What is instructive to note is that the employment coefficients for manufacturing exports for Bangladesh and Vietnam are significantly higher than the employment coefficients for import competing production for the same countries (Table 3). In fact, the ratio of India's employment coefficient for exports to that for import competing production is closer to those for Kenya and South Africa, a surprising finding given that India's factor endowments are closer to Bangladesh and Vietnam than South Africa and Kenya.

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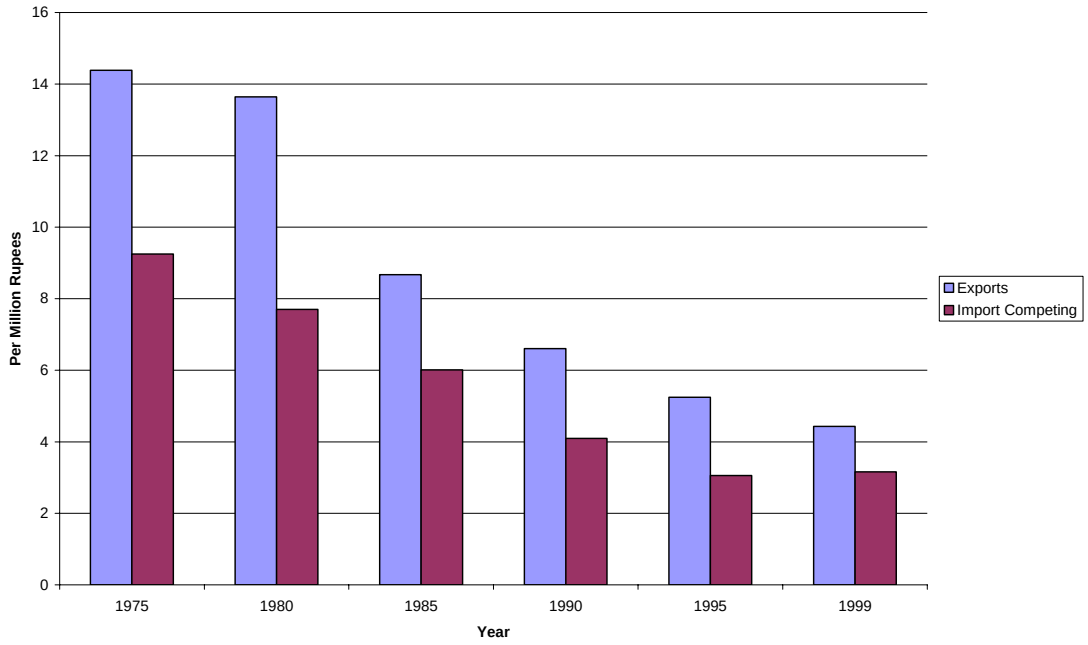
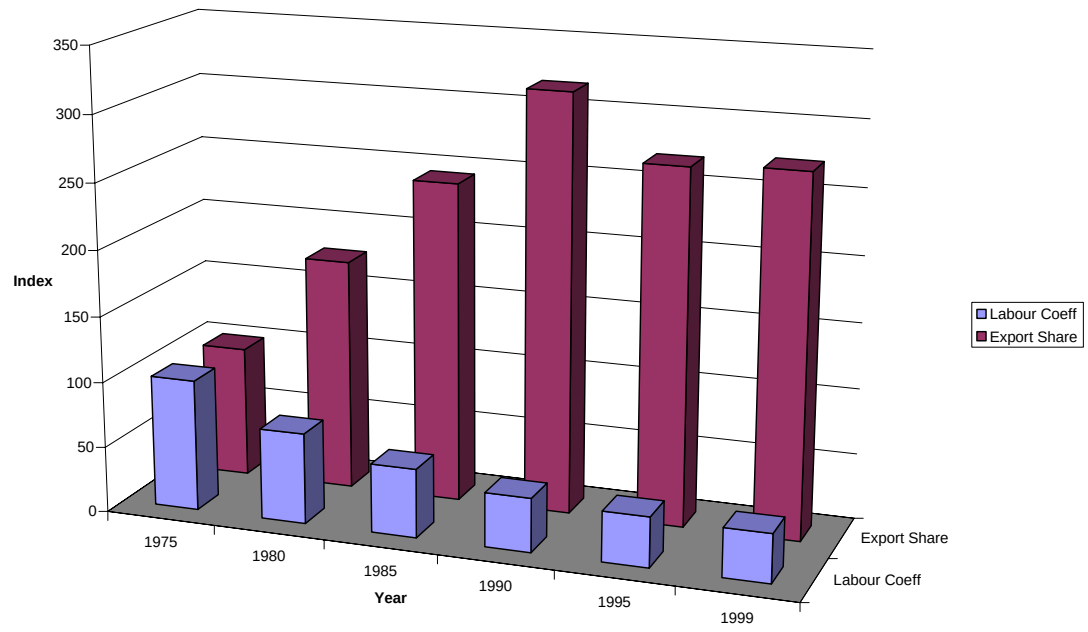
[14] To compute the employment coefficients, we use employment per constant price rupee of output rather than per rupee of value-added as the export and import figures are in gross terms.

Figure 6: Employment coefficients, exports and import-competing production



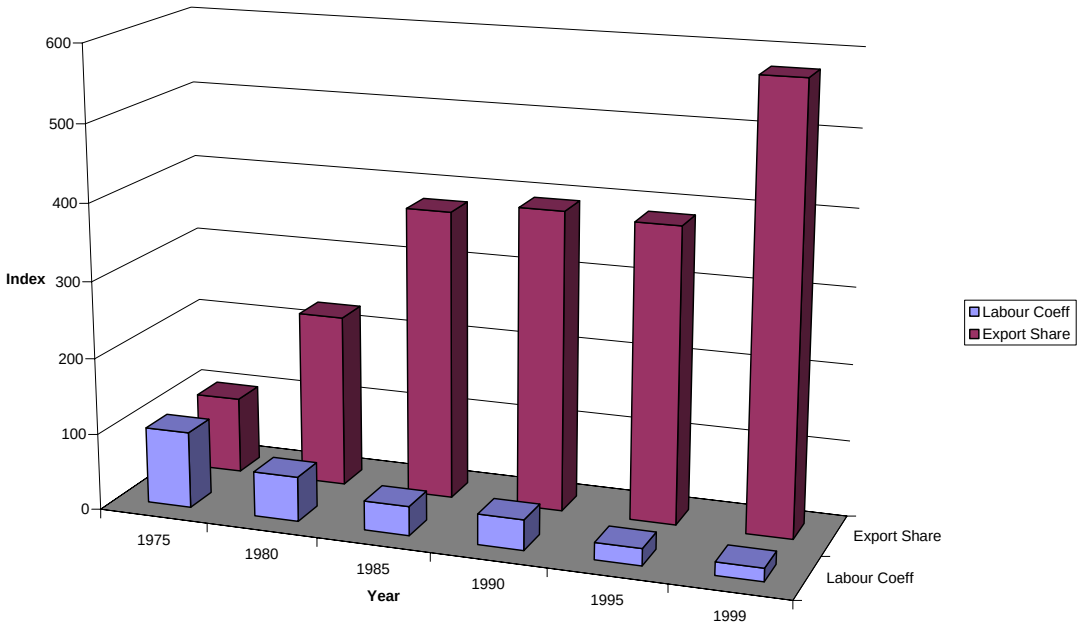
Source: own calculation from UNIDO and International Economic Database, ANU

Figure 7: Contribution of wearing apparel to change in employment coefficient



Source: own calculation from UNIDO and International Economic Database, ANU.

Figure 8: Contribution of other manufacturing goods (including jewellery, sporting goods and toys) to the change in employment coefficient



Source: own calculation from UNIDO and International Economic Database, ANU.

Table 3: Employment coefficients of manufacturing exports and import-competing domestic manufacturing production (per US$mn. of output), Bangladesh, Kenya, South Africa and Vietnam

Bangladesh (1997)			
		Exports	Import-competing
	Female	131	7
	Male	128	84
	Total	259	91
Kenya (1996)			
	Female	7	5
	Male	30	30
	Total	37	35
South Africa (1996)			
	Total	16	21
Vietnam (1998)			
	Female	156	49
	Male	56	47
	Total	214	96

Source: Jenkins and Sen (2006).

6 Decomposition of employment changes

As was seen above, there have been substantial changes for India in terms of openness in recent years, with both exports and imports growing rapidly. A first stab at estimating the effects of increased openness on manufacturing employment can be made using a growth accounting methodology which divides employment changes over a period of time into that attributable to changes in domestic demand, exports, import penetration and productivity.

The employment decomposition has been carried out for India for the period 1975-1999. The data used is the three-digit ISIC data for imports and exports from the International Economic Database at ANU, and UNIDO data on manufacturing output and employment also at the three-digit level.

Employment has increased in the period 1985-199, following a decline in 1980-1985 (Table 4). Much of the employment increase has been driven by increases in domestic demand. Increases in labour productivity all through the 1980s and 1990s have led to labour shedding for the entire 1980s and 1990s. The contribution of exports to employment growth has been greater in the period 1985-1995, than in the preceding and ensuing periods. Import penetration has led to few jobs being lost for much of the period under consideration. The analysis of the sources of employment growth in Table 4 and Table 5 reinforces the contrast between India and the two comparator Asian economies, and its similarity with the two African economies, described in the previous section. In Bangladesh, the marked increase in the growth of manufacturing employment from the late 1980s was led by the growth in exports of labour intensive manufactures. Manufacturing employment also grew in Vietnam during the 1990s and the data for the latter half of the decade indicates that, as in Bangladesh, this was driven primarily by exports, followed by the growth of domestic demand. The net effect of trade on employment was reduced by increased import penetration during this period, but was still highly positive. Kenya in contrast experienced very limited manufacturing employment growth throughout the period, with a tendency to slow down in the 1990s. Trade liberalization led to increased import penetration in the manufacturing sector without any compensating increase in employment being generated by exports. Finally, for South Africa, the rate of growth of manufacturing employment in South Africa has declined, decade on decade, since the 1970s, turning negative in the 1990s. During the first half of the 1990s, as in Kenya, trade liberalization led to increased import penetration with negative effects on employment, though exports become a more significant factor in employment generation than it had been in earlier decades.

7 Labour demand estimation

The previous section examined the direct effects of international trade on manufacturing employment via trade-induced adjustments in output. In this section, we study the indirect impact of international trade on employment via changes in the efficiency of labour use. To capture the indirect effects of trade, we estimate constant-output labour demand equations at the industry level, augmented by variables that capture trade orientation.

Table 4: Decomposition of manufacturing employment changes, India

	Total employment effect	Domestic demand	Productivity growth	Export growth	Import penetration	Net employment growth from trade
Absolute numbers (in 000's)						
1975-80	1122	1444	-263	5	-63	-59
1980-85	-333	1898	-2227	76	-80	-4
1985-90	639	1981	-1883	388	152	541
1990-95	848	2034	-1687	655	-154	501
1995-99	870	1935	-1154	15	75	90
Percentage contribution						
1975-80		128.69	-23.47	0.43	-5.64	-5.22
1980-85		-569.45	668.22	-22.83	24.06	1.23
1985-90		310.08	-294.73	60.80	23.85	84.65
1990-95		239.77	-198.87	77.23	-18.14	59.10
1995-99		222.35	-132.65	1.69	8.60	10.30

Note: We exclude other manufacturing industries from our sample of industries (ISIC Code 390).

Source: authors' calculations, from industry and trade data.

Table 5: Decomposition of manufacturing employment changes, Bangladesh, Kenya, South Africa and Vietnam

	Total employment effect	Domestic demand	Productivity growth	Export growth	Import penetration	Net employment growth from trade
Bangladesh						
1975-80	55	3	18	60	-26	34
1980-85	56	75	-49	51	-21	30
1985-90	559	277	27	247	8	255
1990-97	864	435	-316	802	-57	745
Kenya						
1975-80	39	53	-23	4	5	9
1980-85	19	45	-43	5	12	17
1985-90	25	46	-37	3	13	16
1990-94	10	7	8	5	-10	-5
1994-98	10	-26	49	-8	-5	-13
South Africa						
1970-80	354	386	-160	16	112	128
1980-90	103	94	-69	64	14	78
1990-95	-125	123	-230	108	-126	-18
1996-2001	-169	14	-255	78	-6	72
Vietnam						
1995-99	340	435	-570	699	-224	475

Note: Figures in 000's.

Source: Jenkins and Sen (2006).

The industry and trade data is obtained from the UNIDO and IEDB.[15] We have 25 industries at ISIC 3 digit level for the period 1975-1999. The exports and imports data matched to the ISIC 3 digit level is obtained from the International Economic Databank at the Australian National University.

In labour demand modelling, it is usually assumed that due to large adjustment costs related to hiring and firing of workers, employment adjusts to output and wage changes slowly over time. This implies there are lagged employment terms in equation (5) and the possible correlation between these terms and country-specific time-invariant effects (fixed effects). In this case, the preferred estimator is the Generalized Method of Moments (GMM) estimator proposed by Arellano and Bond (1991) which differences the data to get rid of country specific effects or any time invariant country specific variable (such as labour-saving technological progress that may differ across industries). This also eliminates any endogeneity that may be due to the correlation of the country specific effects and the independent variables. The estimator also allows for possible endogeneity of the independent variables, by using lags of the right hand side variables as instruments for the possible endogenous variables. Thus, the GMM estimator allows for the possibility that some of the independent variables in equation (5) – output, wages, import penetration and export orientation – may be correlated with the error term. For example, positive productivity shocks may lead industries to withstand import competition better. To test whether the Arellano-Bond GMM estimator is correctly specified, two diagnostic statistics are normally reported – tests for first and second order serial correlation. The GMM estimator is appropriately specified if the test for first order serial correlation cannot reject the null on no correlation, but the test for second order serial correlation does reject the null of no correlation by any standard levels of significance.[16]

The regression results are presented in Table 6. All the diagnostic statistics reported in the table are satisfactory in all cases. The absence of first order serial correlation is rejected and the absence of second order serial correlation is not rejected. The significance of the two lagged employment terms suggest high adjustment costs to changing employment levels – a finding that is expected, given India's restrictive labour laws in the manufacturing sector (Besley and Burgess 2004).The coefficients on real output and real wage have the expected signs and are statistically significant in all cases at the one per cent level. A one per cent increase in output leads to a 0.39 per cent increase in employment, and a one per cent increase in the real wage rate leads to a fall in employment by around 0.37 per cent. We find that the coefficients on the import penetration and export orientation variables are statistically not significant at conventional levels of significance. Thus, the evidence seems to be that neither import penetration nor export orientation has had a discernible effect on employment via the indirect route of changes in labour productivity. The results here are different than in Jenkins and Sen (2006), where trade seems to have led to a significant increase in technological progress and consequently, a fall in employment for a given level of output, for two of the countries studied – South Africa and Vietnam.

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15 The wage and output data in UNIDO is in nominal values – in absence of price data at the ISIC 3 digit level, we deflated nominal output data by the GDP manufacturing deflator.

16 We use the package STATA which does not report the Sargan test for over-identifying restrictions, when we compute the estimates with robust standard errors.

Table 6: Regression results – India[a,b]

Variables	Col. (1)
Constant	-0.009*
	(1.91)
Log L (-1)	0.47***
	(9.30)
Log L (-2)	0.13***
	(4.75)
Log Q	0.39***
	(6.11)
Log W	-0.37***
	(5.64)
IM	0.04
	(1.12)
EO	-0.005
	(0.89)
Estimation method	Arellano-Bond Dynamic Panel Estimator
First order serial correlation (p value in parenthesis)	-2.83
	(0.005)
Second order serial correlation (p value in parenthesis)	0.19
	(0.84)
Number of industries	27
Number of observations	594

Notes:

a) log L is the dependent variable.

b) *, ** and *** denote statistical significance at the 10, 5 and 1 per cent level respectively.

c) t –ratios in brackets, except where mentioned otherwise.

d) Robust standard errors; one-step ahead residuals.

8 Conclusions

This paper has examined the effect of international trade on manufacturing employment in India, comparing with four developing countries, two in Africa and two in Asia, utilizing a common set of approaches. Using the factor content approach, we find that the share of unskilled labour intensive goods in India's export basket has increased over time, but not at the same rate of growth as has been observed in Bangladesh and Vietnam. We also find that the employment coefficients of exports and imports in India have consistently fallen over the period, along with the fact that the difference between the employment coefficient of exports and that of imports has narrowed over time. This suggests that the employment impacts of trade for a given change in output may have actually less in the post-reform period than it was in the pre-reform period. The growth accounting approach suggests that some of the employment growth in the 1990s can be linked to the growth of exports. However, most of the employment increase that has occurred over the period 1975-1999 can be attributed to increases in domestic demand

and less to international trade. Finally, estimating a labour demand equation that allows for trade to affect employment via changes in labour productivity, we find that there is no clear impact of trade on employment via the latter route.

Our surprising finding is that the impact of international trade on manufacturing employment in India mirrors the two African countries for which we can undertake comparisons rather than the two Asian countries. This result seems to be in contrast to the standard predictions of the Hecksher-Ohlin theory of international trade. However, one should note that India's past industrial policies that have built up technological capabilities in domestic manufacturing along with the investment by the government in building up good quality institutions of higher education (particularly those in science and engineering) suggest that India may have a comparative advantage in certain types of human capital and technology intensive exports, in spite of its low income status (Lall 2001). Along with this, significant policy impediments remain in India's labour intensive manufacturing sector, the most important of these being fairly stringent labour laws and a reservation of certain products only for the small-scale sector (Panagariya 2007). Thus, in contrast to other Asian countries at similar levels of economic development, we find that international trade may have much less of a positive impact on manufacturing employment in India, and may not be the major source of job creation for India's large pools of surplus unskilled labour.

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