Trade, Technology and Employment:

A Case Study of South Africa

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This paper provides a comprehensive analysis of the impact of trade on employment in South Africa. Firstly, it considers the correlation between trade liberalisation and factor demand in South African manufacturing during the 1990s. Secondly, it investigates the impact of trade on labour using a Chenery (1979) style decomposition technique, following Edwards (2001a, 2001b, 2005b) and Jenkins (2002). It develops the earlier work by exploring both the indirect and the indirect effects and investigating variations in the regional impact of trade on factor demand during the 1990s. This suggests that technological change accounts for the bulk of jobs lost in manufacturing during the 1990s. To investigate, whether this reflects exogenous technological change or trade-induced technological change requires undertaking an econometric analysis and this explores the impact of trade on technological change through an induced labour demand model. This finds a strong effect of exogenous technological progress but only limited evidence that increased trade flows and trade liberalisation induced improvements in labour productivity.

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1. Introduction

Changes in trade flows have been major factors in the structural changes taking place in the developing economies. Trade liberalisation results in a reallocation of resources, including labour and capital, across sectors of the economy. Further, liberalisation has dynamic effects, through its impact on productivity within industries, which again will differ across industries and impact upon employment, wages and the return on capital. Together these static and dynamic adjustments are likely to impact upon poverty at the household level.

South Africa provides a particularly useful case study for analysing the impact of trade on labour because of the changes it has seen over the last decade or so. Since the early 1990s it has made good progress in liberalising its trade regime under its offer to the World Trade Organisation (WTO), with average nominal protection in manufacturing falling from 23% in 1994 to 8.2% in 2004 (Edwards, 2005a). This decline in protection did, however vary considerably across sectors, with relatively large decreases experienced in labour-intensive sectors such as clothing, textiles and footwear. Furthermore, trade became more important over the period, with trade flows as a share of GDP rising, firstly in response to the ending of sanctions in the early 1990s and then stimulated by the reduction in tariffs (Edwards, 2005a). At the same time, the South African economy experienced significant changes in the level and composition of employment. Aggregate employment grew, but not fast enough to reduce unemployment and there were important differences in the different sectors, with employment in manufacturing and mining falling, but service sector employment rising. There was also a rise in the skill intensity of production in all sectors, suggesting that technological change was skill-biased (Bhorat, 2005; Edwards 2002; Bhorat and Hodge, 1999).

These developments in both trade and employment have important implications for the development of the economy and the distribution of income, but the relationship between the two is not clear. An expanding literature has explored the links between trade liberalisation, structural change and employment growth in South Africa, but while advancing our understanding there are still areas that require

investigation. In particular, the specific nature of the trade labour relationship and its implications for poverty is yet to be fully explored[1].

This paper provides a comprehensive analysis of the impact of trade on employment in South Africa. Firstly, it considers the correlation between trade liberalisation, as reviewed in Section 2, and factor demand in South African manufacturing during the 1990s. Secondly, it investigates in Section 4 the impact of trade on labour demand using a Chenery (1979) style decomposition technique, following Edwards (2001a, 2001b, 2005b) and Jenkins (2002). It develops the earlier work by exploring both the direct and the indirect effects and investigates variations in the regional impact of trade on factor demand during the 1990s. This suggests that technological change accounts for the bulk of jobs lost in manufacturing during the 1990s. To investigate, whether this reflects exogenous technological change or trade-induced technological change requires undertaking an econometric analysis and Section 5 therefore explores the impact of trade on technological change through an induced labour demand model[2].

2. Trade liberalisation in the 1990s

The democratically elected government in 1994 inherited a protectionist trade regime characterised by high levels of protection, a wide dispersion of tariffs, and a complicated array of tariff types (Belli *et al.*, 1993). Although some initiatives had been made in opening the economy from the 1970s (Export Development Assistance scheme in 1970s, General Export Incentive Scheme in 1990 and the relaxation of quantitative restrictions), reform of the trade regime accelerated with South Africa's formal Offer in 1995 to the WTO. In this Offer South Africa agreed to bind 98% of all tariff lines, reduce the number of tariff rates to six, to rationalise the over 12000 tariff lines and to replace quantitative restrictions on agricultural products with tariffs.

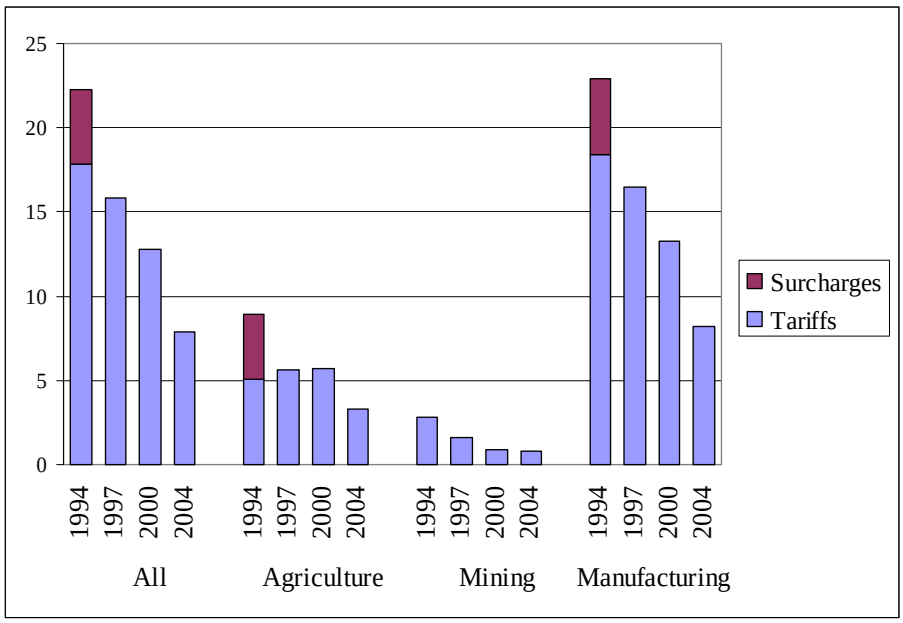
Substantial progress has since been made in liberalising the trade regime (Edwards, 2005a). The total number of HS8-digit tariff lines fell from over 11,200 in

[1] See Bell and Cattaneo (1997), Nattrass (1998), Bhorat (1999), Fedderke *et al*. (2003), Birdi *et al*. (2001), Edwards (2001a, 2001b, 2003, 2005b). An overview of many of these studies and an application of the various methodologies used in the debate is presented in Edwards (2005b).

[2] Similar approaches have been followed by Alves *et al*. (2001) and Jenkins (2002), although neither of these studies directly incorporated tariffs into their analyses.

1994 to 6,707 in 2004. The tariff structure has also been simplified, mainly between 2003 and 2004. Average nominal and effective protection rates have also fallen. This pattern of reductions in nominal and effective protection occurred in most sectors, with the largest reductions in the Beverages, Textiles, Footwear, Wearing apparel and Communication equipment sectors and the lowest in the Wood products, Paper products, Basic Chemicals and Basic iron & steel sectors. Despite these reductions in overall protection, tariff protection, when measured using scheduled rates, remains high in the Wearing Apparel, Tobacco and Footwear sectors, with average nominal and effective protection exceeding 20% and 50%, respectively. Overall, the results indicate a significant liberalization of trade in the South African economy during the 1990s. This liberalisation has, however, not been uniform across sectors, with particularly large decreases in labour intensive sectors. Nevertheless, these sectors remain highly protected (Dunne and Edwards, 2006).

Figure 1: Evolution of nominal tariff protection, inclusive of surcharges in 1994 (Per Cent)



Note: The tariff rate for 2004 reflects the weighted average (using import values) of MFN, EU and SADC rates. Average tariffs are calculated using scheduled tariff rates at the 8-digit Harmonised System level.

Having identified the pattern of tariff reductions we now move on to consider how they were associated with changes in employment and output over the period. A useful way to start such an analysis is to consider correlation coefficients using various indicators of protection. Table 1 presents the results of a correlation analysis of the change in trade and protection with the change in employment for 44 manufacturing sectors, classified according to the 3-digit Standard Industrial Classification (SIC) system.

Table 1: Correlation between change in measures of openness and protection and changes in employment for manufacturing 1994-02

Variable	Correlation
Import penetration	-0.19
Export orientation	-0.14
Openness	-0.29*
Scheduled tariff	0.08
Collection duty	0.10
Surcharge	0.08
Scheduled tariff incl. surcharge	0.11
Collection duty incl. surcharge	0.10
Share ad valorem rates	-0.26*
ERP using scheduled rates	0.06
ERP using collection rates	0.10
Observations	44

Source: Employment data and Sales data are drawn from Statistics South Africa (P0271 and P3041.2, respectively). Trade data are obtained from Customs & Excise and is based on HS8-digit data. Tariff measures are sourced from Edwards (2005a).
Note: * represents significance at 10% level. Effective rates of protection are based on a 95 sector SU table for 2000. Openness is calculated as (exports+imports)/sales. Import penetration and export orientation are calculated using nominal trade and sales values. Changes in protection using tariffs and effective rates of protection are calculated as $(t_1-t_0)/(1+t_0)$ where t is the measure of protection. When using ERP, the change is a measure of the change in value added (Edwards, 2005a).

There are few significant correlations. One significant correlation is that between openness, as measured by trade (exports plus imports) divided by total sales, and employment, indicating that sectors that have had relatively large increases in openness have also had relatively large decreases in employment. There is, however, no evidence that this is related to import penetration or export orientation, as while these variables have negative coefficients they are not significant. There are weak positive correlations between changes in employment and tariff protection, with some evidence that employment falls were mostly in sectors experiencing the greatest simplification of the tariff structure, as measured by the increase in the proportion of tariff lines at the 8-digit Harmonised System (HS) level under *ad valorem* tariffs.

4. Sources of demand for labour in South Africa

To investigate the sources structural change in factor demand in South Africa, the gross value of manufacturing production is disaggregated into demand effects arising from changes in final demand, exports, import penetration and technology using a Chenery (1979) style decomposition technique. Similar methodologies have already been applied to South Africa by Edwards (2001a, 2001b, 2005b) and Jenkins (2002), but the analysis here updates and extends these studies by considering the labour impact of regional variations in the composition of trade.

Methodology

The starting point for the decomposition analysis is the simple accounting identity for gross output X:

$$X = D + E - M \qquad (1)$$

where E is exports and D is demand (final plus intermediate demand). Imposing the assumption that exports do not include re-exports, this can be re-formulated as:

$$X = dD + E \qquad (2)$$

where d is the ratio of domestically produced goods to total demand. By manipulation changes in gross output can be decomposed into changes in demand (ΔD), export expansion (ΔE) and import penetration (ΔdD) as follows:

$$\Delta X = d\Delta D + \Delta dD + \Delta E\,. \qquad (3)$$

Total factor usage (N) is given by nX where n is the row vector of factor requirements (capital, high skilled labour, skilled labour and low skilled labour) per unit of output. The change in total factor usage can therefore be expressed as:

$$\Delta N = n\Delta X + \Delta nX = nd\Delta D + n\Delta dD + n\Delta E + \Delta nX \qquad (4)$$

where factor usage is affected by improvements in labour productivity (ΔnX) in addition to changes in demand, export expansion and import penetration.

Direct sources of labour demand

Table 2 presents the sources of change in employment for manufacturing, mining and agriculture using equation (4) (indirect effects are excluded), for the periods 1970-79, 1980-89 and 1990-2002. The last period corresponds with increased

trade liberalisation[3]. Data used for the analysis is obtained from Quantech (2004)[4]. The results for some broadly defined manufacturing sub-sectors, those that were natural resource based, labour intensive, chemical intensive and metal products intensive are also presented. In all cases, tobacco is excluded given its volatile output and trade trends.

A relatively poor employment growth in the traded sectors from the 1980s is clearly evident in Table 2, with employment falling on average 0.2% per annum during the 1980s and then almost 2% per annum between the years 1990 and 2002. More that 60% of this fall was in the agriculture and mining sectors, although manufacturing, particularly the resource-based sectors, contributed significantly during the 1990s.

Table 2: Sources of change in the structure of employment (average annual change)

	Final Demand	Exports	Imports	Net Trade	Technology	Total	Δ Factor	Share Δ Factor
1970s								
Total traded sectors	3.4%	-0.1%	0.4%	0.3%	-2.4%	1.2%	354048	100.0%
Agriculture	4.0%	-0.2%	0.4%	0.2%	-4.9%	-0.6%	-66400	-19%
Mining	1.6%	-0.4%	-1.0%	-1.3%	0.5%	0.7%	49041	14%
Manufacturing	3.8%	0.1%	1.2%	1.3%	-1.7%	3.4%	371407	105%
Natural resource	*3.9%*	*0.4%*	*1.0%*	*1.4%*	*-2.4%*	*2.9%*	*118159*	*32%*
Labour	*2.2%*	*0.2%*	*1.7%*	*1.9%*	*-1.6%*	*2.6%*	*61610*	*17%*
Chemical	*6.3%*	*-0.4%*	*2.2%*	*1.8%*	*-3.3%*	*4.8%*	*47662*	*13%*
Metal products	*4.2%*	*-0.2%*	*1.0%*	*0.8%*	*-1.0%*	*4.0%*	*136683*	*37%*
1980s								
Total traded sectors	1.1%	0.1%	0.1%	0.2%	-1.5%	-0.2%	-54712	100.0%
Agriculture	1.7%	0.6%	0.0%	0.5%	-3.4%	-1.2%	-117300	214%
Mining	0.1%	-1.3%	0.3%	-0.9%	0.5%	-0.3%	-21611	40%
Manufacturing	1.2%	0.5%	0.0%	0.5%	-1.1%	0.6%	84199	-154%
Natural resource	*1.1%*	*0.5%*	*-0.1%*	*0.4%*	*-1.0%*	*0.5%*	*27804*	*33%*
Labour	*1.3%*	*0.4%*	*0.1%*	*0.5%*	*-1.5%*	*0.2%*	*6475*	*8%*
Chemical	*5.2%*	*0.5%*	*-0.3%*	*0.2%*	*-2.5%*	*2.8%*	*41611*	*49%*
Metal products	*-0.4%*	*0.4%*	*-0.1%*	*0.3%*	*0.2%*	*0.1%*	*4682*	*6%*

[3] There were of course other changes in the global and domestic environment that will have affected trade flows, so in the empirical analysis we can only assess the consistency of the results with those expected under liberalisation and are not able to test the relationship directly

[4] Much controversy surrounds the reliability of South African statistical series, particularly those dealing with employment numbers. The Quantech data is compiled by combining a set of industry and national account indicators with a consistent input-output framework spanning three decades. In particular, the data are manipulated to ensure consistency with the Statistics SA, national accounts data and the Input-output structure of the Supply-Use tables prepared by Statistics South Africa. Sector level data for the years between the available IO tables are mostly interpolated. This may induce significant errors into the data, particularly during the period subsequent to 1996, when the last official manufacturing Census was conducted.

1990-02								
Total traded sectors	0.9%	0.6%	-0.5%	0.1%	-3.0%	-1.9%	-716483	100.0%
Agriculture	1.1%	1.3%	-0.3%	1.0%	-3.6%	-1.5%	-158277	22%
Mining	-0.3%	-0.6%	0.0%	-0.7%	-2.4%	-3.4%	-276221	39%
Manufacturing	1.4%	0.8%	-0.8%	0.0%	-2.9%	-1.5%	-281985	39%
Natural resource	*1.3%*	*0.4%*	*-0.2%*	*0.3%*	*-3.9%*	*-2.4%*	*-157971*	*56%*
Labour	*0.2%*	*0.5%*	*-0.8%*	*-0.3%*	*-1.3%*	*-1.4%*	*-51963*	*18%*
Chemical	*3.1%*	*1.1%*	*-0.6%*	*0.5%*	*-3.9%*	*-0.3%*	*-6380*	*2%*
Metal products	*1.7%*	*1.3%*	*-1.6%*	*-0.3%*	*-2.4%*	*-1.0%*	*-60023*	*21%*

Note: Percentage values reflect the average annual change in employment within each aggregated sector due to the various sources of demand.

It is clear from the decomposition results, that changes in domestic demand and technology have been the dominant sources of demand for labour. During the 1970s domestic demand raised employment by 3.4% per annum, although this declined to 1.1% per annum during the recession years of the 1980s. During the latter part of the 1990s, a recovery in domestic demand for manufacturing raised employment, but this was offset by lower growth in demand for agricultural and mining products.

Technology, as reflected in reductions in the labour required per unit output (technology) was particularly significant in the 1990s, where it exceeded all other sources of employment demand. This labour shedding was strongest in agriculture, but also very strong in mining and manufacturing during the 1990s. The coincidence of improved labour productivity and a more open economy during the 1990s suggests some causal relationship, but it is important to remember that the period also saw the election of a new government and the implementation of new macroeconomic policies and labour legislation, so it is difficult to draw any such conclusion.

Looking at the effect of trade on employment growth, we find a small and declining contribution of net trade, raising employment growth by 0.3% per annum during the 1970s, 0.2% in the 1980s, and 0.1% per annum in the 1990s. In all periods, trade in mining had a negative effect, largely a result of the decline in gold exports. The contribution of exports and import penetration towards employment growth also changed over time closely following the changes in South Africa's industrial policy. During the 1970s import substitution was an important source of growth in employment (0.4% per annum) and exceeded the contribution of export expansion (-0.1% per annum), its influence declined absolutely and relative to exports during the 1980s and 1990s in response to the liberalisation of the economy and the expansion of manufacturing exports from the mid-1980s. During the 1990s firms were unable to retain market share in the face of cheaper imports, and rising import penetration

reduced employment growth (-0.5% per annum). The net trade effect, however, remained positive, but small.

These structural shifts correspond closely with other economies that have liberalised their trade. In almost all countries surveyed in Edwards (2001b), the shift away from an import substitution regime towards a more open regime is accompanied by both a loss in output growth due to import penetration and a rise in output growth due to exports. South Africa is no exception to this pattern.

Considering the results for manufacturing more closely[5], Table 3 and Figure 1 present the decomposition results for total labour, skilled labour, less skilled labour and capital stock (machinery & equipment). They clearly show the decline in manufacturing employment growth and the rising capital intensity of production over time. While formal sector employment growth declined, growth in capital stock was positive in all periods and employment growth was also strongly biased towards high skilled labour. So again the dominant source of the decline in and skill bias of employment growth is technological change. Skill-biased technological change was pervasive across the manufacturing sectors, with all but 2 of the 27 sectors experiencing rising skill intensities of production. These results are not only consistent with other studies of South Africa[6], but also studies of other developed and developing economies, for example Berman *et al*. (1994) and Berman and Machin (2000). This suggests that the changes in South Africa are partly driven by global skill-biased technological change.

Table 3: Sources of factor growth in manufacturing, average annual change

	Final Demand	Exports	Imports	Net Trade	Technology	Total	Δ Factor
1970s							
Total employment	3.8%	0.1%	1.2%	1.3%	-1.7%	**3.4%**	371,407
Skilled	4.1%	0.1%	1.3%	1.4%	-0.1%	**5.4%**	151,428
Less skilled	3.7%	0.1%	1.2%	1.3%	-2.3%	**2.7%**	219,979
Capital	5.5%	-0.2%	3.0%	2.8%	3.6%	**11.9%**	63,472
1980s							
Total employment	1.2%	0.5%	0.0%	0.5%	-1.1%	**0.6%**	84,199
Skilled	1.4%	0.5%	0.0%	0.5%	1.0%	**2.9%**	126,700
Less skilled	1.1%	0.4%	0.0%	0.4%	-1.9%	**-0.4%**	-42,501
Capital	2.3%	0.7%	0.0%	0.7%	-0.6%	**2.4%**	28,535
1990-2002							

[5] This analysis draws extensively from Edwards (2005b).
[6] See Bhorat and Hodge (1999) and Edwards (2002)

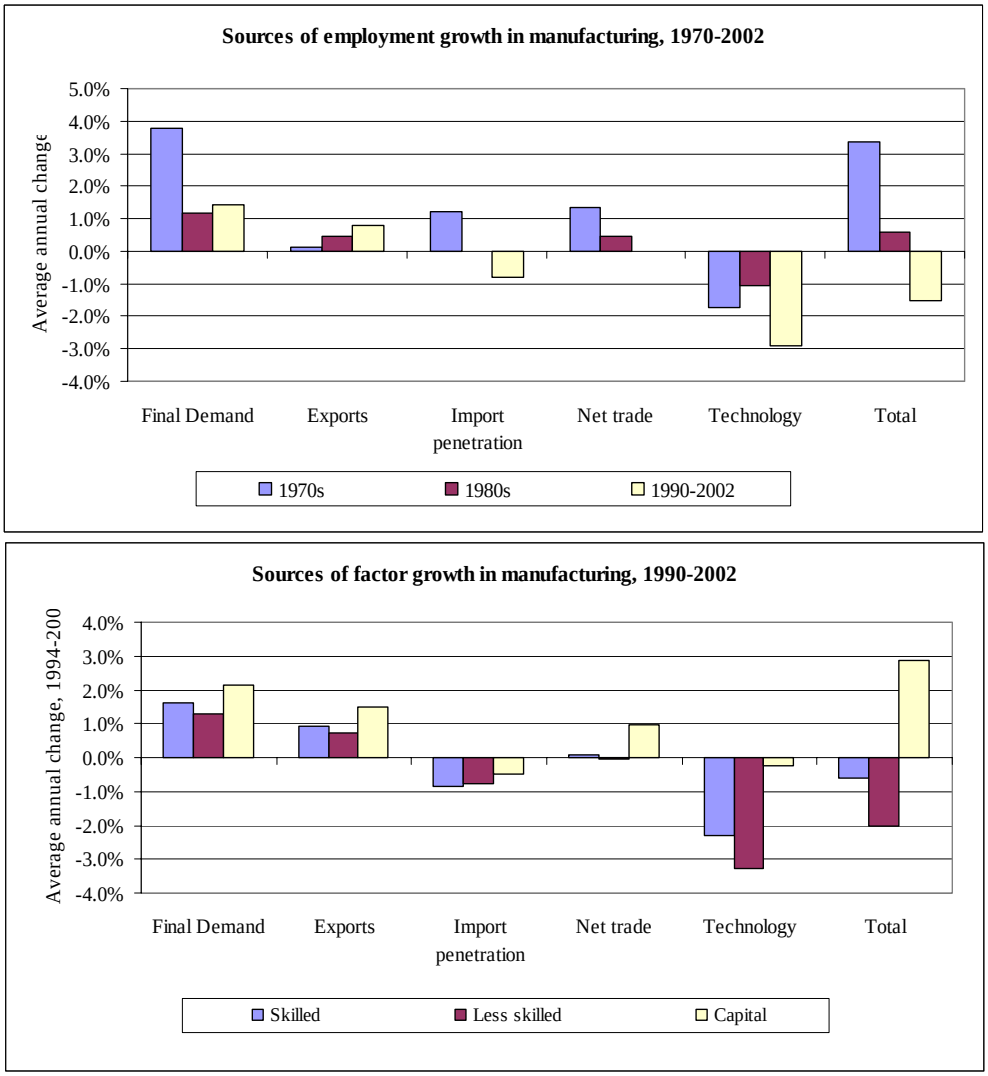
Total employment	1.4%	0.8%	-0.8%	0.0%	-2.9%	**-1.5%**	-281,985
Skilled	1.6%	0.9%	-0.8%	0.1%	-2.3%	**-0.6%**	-40,106
Less skilled	1.3%	0.7%	-0.8%	0.0%	-3.3%	**-2.0%**	-241,880
Capital	2.1%	1.5%	-0.5%	1.0%	-0.2%	**2.9%**	50,371

Note: Skilled labour consists of managers, professionals, technicians, clerks, skilled service workers, skilled agricultural workers and artisans. Less skilled labour consists of all remaining occupations.

A similar pattern is apparent for the effect of manufacturing trade on factor demand, with liberalisation concurrent with a decline in factor growth, through import substitution and an increase through export expansion. The net effect was a decline in employment growth from 1.3% per annum in the 1970s to no growth in the 1990s. This result is partly biased by the recession years prior to 1993 and taking the period 1994-2002 net trade did raise manufacturing employment growth by 0.3% per annum. Nevertheless, neither export growth, nor growth in net trade within manufacturing, has been sufficient to have a substantial impact on unemployment during the 1990s. One reason for this has been the relatively poor manufacturing export growth during this period (Alves and Edwards, 2005).

There was, however, substantial variation across factors and sectors. Net trade was biased in favour of skilled labour during the 1980s and the 1990s, particularly from 1994, when it raised skilled employment growth 0.5% per annum compared to 0.2% per annum for less skilled labour. Edwards (2001a; 2005b) shows that this bias has been driven by relatively high export growth within skill intensive sectors, rather than high import penetration in less skill intensive sectors. Further, net trade had a very large positive impact on the demand for capital in all decades from 1970. As shown in Figure 1, it raised demand for capital by 1.2% per annum between 1990 and 2002, mainly the result of positive net trade effects in natural resource-based and chemical products intensive sectors. As was found in earlier research (Bell and Cattaneo, 1997; Edwards, 2001b), the structure of net trade has shifted towards more capital intensive sectors.

Figure 1: Sources of factor growth in manufacturing, 1970-2002



To get more idea of the structural change taking place in employment, Table 4 allocates sectors according to whether net trade increased or decreased employment for the periods 1990-02 and 1994-02. Interestingly, in both periods more sectors experienced a rise than a decline. However, many of the sectors that experienced declines (textiles, wearing apparel, footwear) are also relatively labour intensive, meaning they account for a disproportionate share of the decline in total manufacturing employment. Sectors experiencing large gains in employment due to net trade between 1994 and 2002 are iron & steel, motor vehicles and basic chemicals.

Table 4: Sectors experiencing rising or falling employment from net trade

1990-02		1994-02	
Decline	**Rise**	**Decline**	**Rise**
Communication equipment	Printing & publishing	Communication equipment	Glass products
Other transport	Non-ferrous metals	Other transport	Food
Footwear	Plastic products	Footwear	Plastic products
Professional & scientific	Other chemicals	Professional & scientific	Beverages
Machinery & equipment	Other manufacturing	Wearing apparel	Printing & publishing
Textiles	Wood products	Metal products	Leather products
Rubber products	Beverages	Textiles	Wood products
Wearing apparel	Paper products	Non-metallic minerals	Non-ferrous metals
Metal products	Electrical machinery	Rubber products	Other manufacturing
Glass products	Leather products		Paper products
Non-metallic minerals	Motor vehicles		Other chemicals
Food	Coke & petroleum		Furniture
	Basic iron & steel		Coke & petroleum
	Furniture		Machinery & equipment
	Basic chemicals		Electrical machinery
			Basic iron & steel
			Motor vehicles
			Basic chemicals
Employment in 1994			
728174	696072	461668	962578
Share employment in 1994			
51%	49%	32%	68%
Δ employment			
-210963	-71022	-76782	-75788
Share Δ employment			
75%	25%	50%	50%

Note: Sectors ranked in ascending order. The first industry is that with the largest negative or lowest positive percentage change in employment.

So far the analysis has been based entirely on the direct effects of trade, technology and domestic demand on factor demand. Changes in final demand do, however, affect the demand for intermediate inputs, which in turn has spill-over effects on other sectors. Thus the net effect, once indirect effects are included, is often larger. Indirect effects are, however, often ignored as the direct effects dominate the overall impact and the relative impact across the various sources of growth is largely unaffected Edwards (2001a, b). In addition, the estimation of indirect effects using input-output tables often requires strong assumptions of excess capacity and fixed production coefficients (Jenkins, 2002)[7].

Nevertheless, some insight into the total effects (direct plus indirect) of net trade on factor demand (ΔN_{NT}) can be obtained by multiplying the trade variables by the Leontief inverse for a particular year as follows:

[7] Input-output tables, valued in real prices, for the end-points of the various sub-periods are required to estimate the direct and indirect effects on employment from final demand, trade and technological change. See Edwards (2001a, b).

$$\Delta N_{NT} = nR(\Delta E) + R(d\Delta A)X \qquad (5)$$

where R is the Leontief inverse. A Supply-Use table for 2000, provided by Statistics South Africa (2003), was used to calculate R, which captures the effects of inter-industry interactions and does not include the indirect effects arising from changes in income.

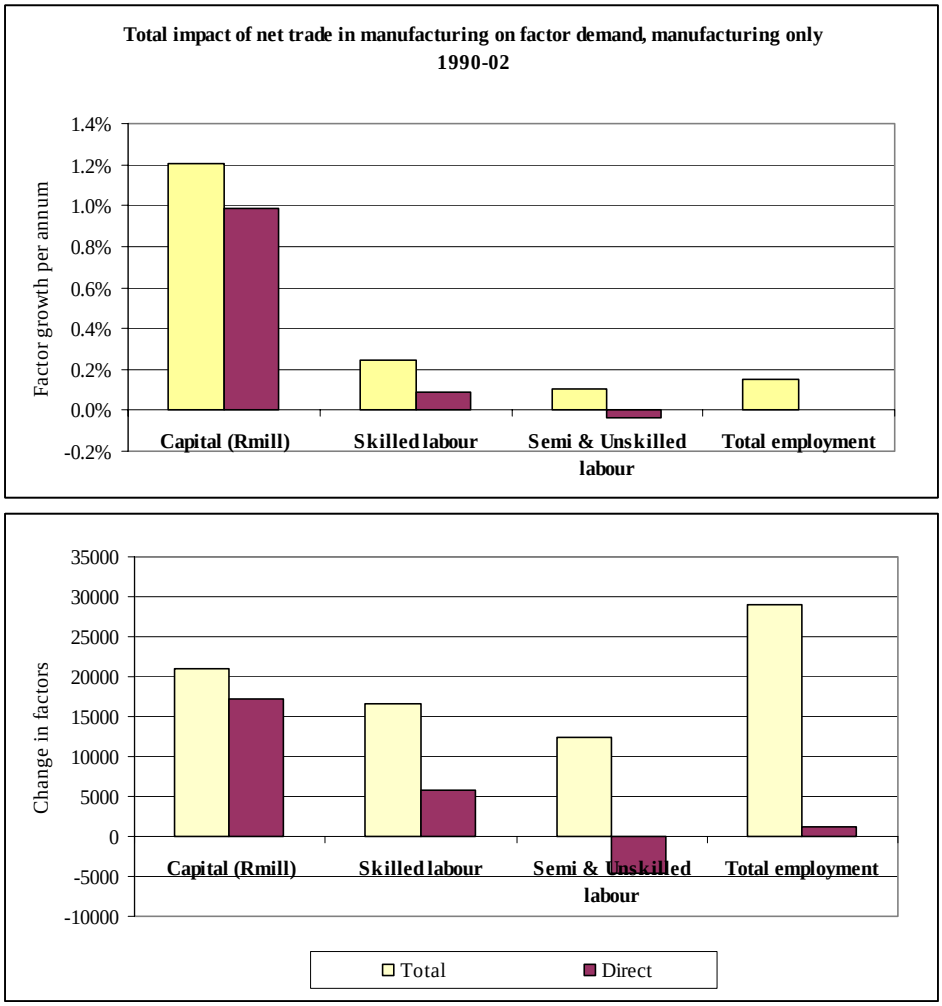
Figure 2 presents the direct and total effects of net trade on demand for capital, skilled labour, semi and unskilled labour and total employment between 1990 and 2002. This shows that including the indirect effect raises demand for all factors. The total employment impact, which is zero for the direct effect, becomes positive once indirect effects are included (0.2% per annum) and is equivalent to 29, 000 jobs being created during this period. The indirect effect on demand for capital is also positive, but is proportionately smaller than that of labour. Figure 3 shows the total effects of net trade on the manufacturing sub-sectors.[8] Accounting for the indirect effect reduces the negative impact of net trade on labour demand in labour intensive and metal products sectors, and raises the positive impact in chemical and natural resource-based products.

The positive indirect effects on employment arise from the important backward linkages between chemical and resource-based products and the rest of the economy. In the case of metal products, the positive indirect effects reflect the relatively high proportion of these products used in machinery & equipment, iron & steel and motor-vehicles, all of which experienced positive growth in net trade. Other than the metal products sector itself, these sectors are the 3 most important downstream industries for metal products (based on the Leontief inverse). In the case of labour intensive sectors, we find that the large negative direct effect on textiles is partially offset by a large improvement in the net exports of vehicles, basic chemicals and furniture. These sectors are the 2, 7th and 4th most important downstream industries for textiles, the 1st and 3rd being clothing and footwear.

Overall, these results suggest that strong export growth in the capital-intensive resource-based and chemical products sectors may nevertheless have positive employment effects through their backward linkages.

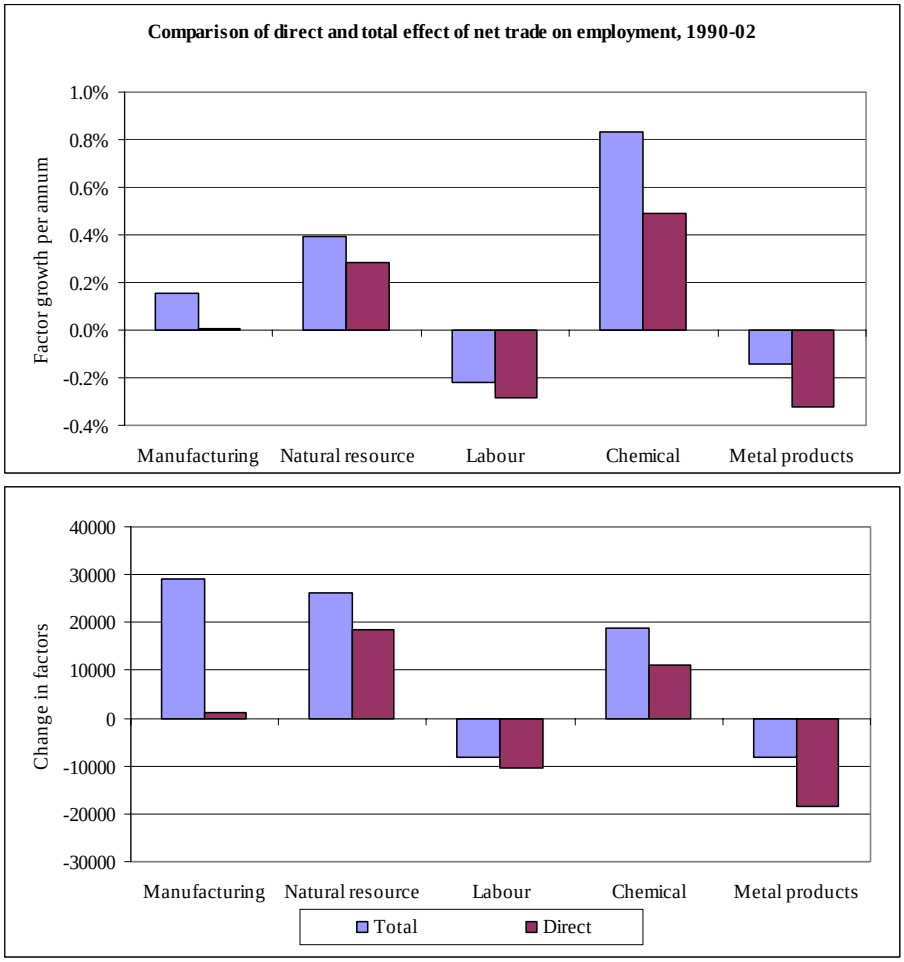
[8] **Error! Reference source not found.** in the Appendix provides further details.

Figure 2: Total and direct effect of net trade on factor demand in manufacturing, 1990-2002



Note: The total for each sector reflects the direct effect plus the effect all other sectors have on output in that sector, i.e. manufacturing effect includes the impact from changes in primary sectors.

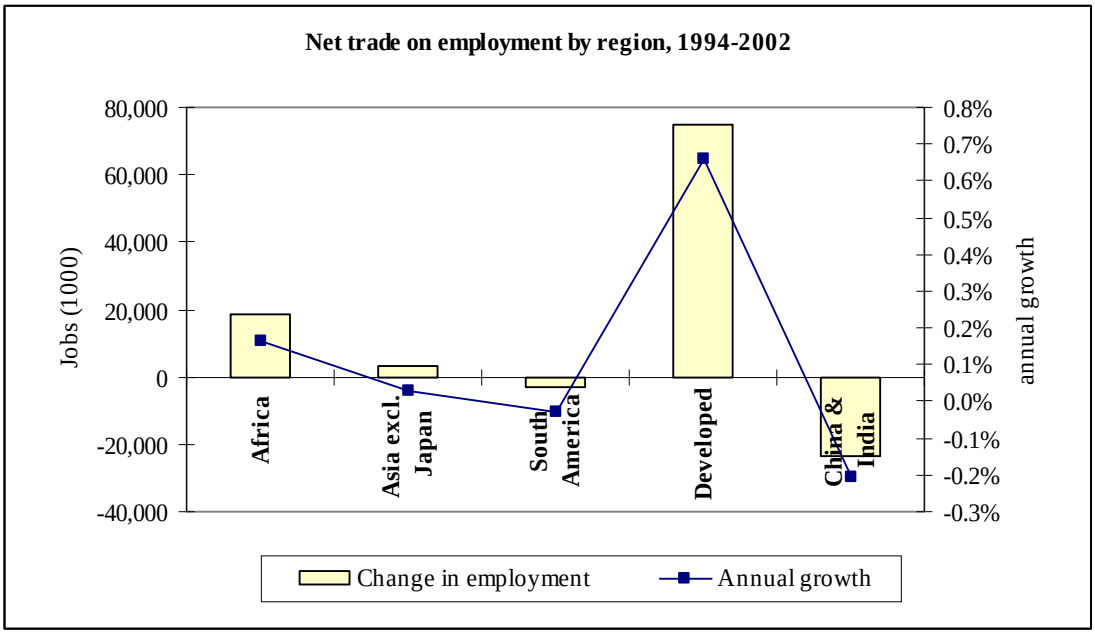
Figure 3: Comparison of direct and total effect of net trade on employment in manufacturing sub-sectors, 1990-2002



Another important issue is the impact of regional trade flows on factor demand. South Africa is a middle-income economy and its pattern of trade differs significantly across regions. Standard tests of comparative advantage reveal South Africa to be abundant in unskilled labour relative to high- and middle-income economies, but skill abundant relative to low-income economies. In most cases, South Africa is also seen to be capital abundant, which largely reflects its abundance in natural resources (Alleyne and Subramanian, 2001; Edwards, 2005b).

Data on regional trade flows were obtained at the HS8-digit level from Customs & Excise. The data were then aggregated to the SIC based sectors presented and deflated to give real values using the implicit export and import price deflators derived from Quantech (2004). This dataset shows trends in total exports and imports that differ marginally from the previous analysis. Export growth during the 1990s is stronger, while import growth is more moderate.

Figure 4: Direct effect of net trade in manufacturing on employment by region, 1994-2002



Using this data the direct effects of net trade on employment by region from 1994-2002 were estimated and are shown in Figure 4, with Table 5 giving a breakdown into broad manufacturing sub-sectors. Wide variations in the impact of regional trade are evident. Net trade with developed economies raised manufacturing employment by 0.66% per annum (75 000 jobs), with a relatively large contribution by the metal products sector (mainly motor vehicles), while net trade with China and India and South America reduced manufacturing employment. The decline in employment from trade with China and India is concentrated in labour intensive sectors, particularly textiles, wearing apparel and footwear. Trade with Africa has also been an important source of growth of manufacturing employment (0.16% per annum) and is concentrated in the natural resource-based and chemical products. This is consistent with South Africa's comparative advantage in these products.

Table 5: Employment impact of regional trade by manufacturing sub-sector, 1994-2002

	Africa	Asia excl. Japan	South America	Developed	China & India
Change in employment					
Manufacturing	18,422	3,051	-3,034	74,925	-23,440
Natural resource	4,004	101	-863	18,758	78
Labour	368	1,569	-159	13,593	-11,935
Chemical	3,539	-1,064	299	8,713	-855

Metal products	10,315	1,908	-2,280	33,027	-10,535
Average annual growth					
Manufacturing	0.16%	0.03%	-0.03%	0.66%	-0.21%
Natural resource	0.10%	0.00%	-0.02%	0.47%	0.00%
Labour	0.02%	0.07%	-0.01%	0.62%	-0.54%
Chemical	0.25%	-0.07%	0.02%	0.61%	-0.06%
Metal products	0.29%	0.05%	-0.06%	0.92%	-0.29%

Note: The total impact of net trade on employment is 69 924 jobs created (0.61% growth per annum). This is roughly double the employment impact using Quantech (2004) over the same period.

Thus regional trade has a non-uniform impact on total employment as well as employment across sectors. Trade with large labour abundant economies such as China and India negatively affect employment within labour intensive sectors, while trade with developed economies appears to have a large positive impact on employment in most sectors.

Overall, the decomposition analysis indicates that employment lost due to import penetration is counteracted by employment gained through export expansion. The dominant source of the decline in employment appears to be skill-biased technological change. However, important structural shift in trade towards natural resource-based and chemical products are evident. These structural shifts reflect the effect of a relative abundance in natural resource endowments and relatively low declines in protection on these products. Further, the continued dominance of these products in total trade may reflect the past history of state support as well as continued support into the 1990s (Roberts, 2005). In contrast, labour intensive products have been negatively affected by relative large declines in protection as well as rapid import penetration, particularly from China & India.

A serious limitation of these decomposition studies is that they fail to account for the interaction between the various sources of demand (Baldwin, 1995) and the impact of supply side factors including the labour market[9]. A more important limitation for the purpose of this study is that trade liberalisation and import penetration indirectly affect employment and factor remuneration via technological

[9] For example, the negative impact of technology on employment during the 1990s may reflect labour shedding in response to real wage changes and the enactment of new labour legislation since 1994. The very strong growth in capital combined with improvements in labour productivity driven largely through labour-shedding also suggests that much of the productivity improvement is due to capital/labour substitution (Edwards and Golub, 2003). See Edwards (2005b) for a discussion of some of these limitations.

change.[10] The next section explores the impact of trade-induced technological change on labour using an induced-labour demand model.

[10] Wood (1994), for example, argues that competition causes firms to shed labour and upgrade their capital stock to improve labour productivity. Further, he argues that many of the imported products may be noncompeting products and domestic employment coefficients will understate the labour content of these imports. Hence he concludes that "*The conventional method of calculation, using domestic input coefficients, is bound to* ***understate*** *the impact of trade on factor markets*" (Wood, 1994: 73). There are numerous other problems with the methodology. Estimates are based on average labour coefficients of broad industrial sectors composed of many different firms. Shifts in demand affect entry and exit of low productivity firms or products which may affect measures of productivity. The approach also lacks theoretical foundations and is not a strict application of the Stolper-Samuelson theorem that draws a relationship between product prices and factor payments (Leamer, 2000). In addition, the methodology does not capture the employment created around the retail of imported products.
There is some evidence that trade induces technological change in South Africa (Belli *et al.*, 1993; Fallon and Pereira de Silva, 1994; Hayter *et al.*, 1999; Jonsson and Subramanian, 2000), but the magnitude of the effect on the level and composition of employment has not been fully ascertained. Jenkins (2002), for example, estimates that rising import penetration led firms to rationalise their use of labour leading to an estimated reduction in total employment in manufacturing of 100 000 between 1990 and 2001. Edwards (2003) uses firm level data and finds some evidence that trade-induced technological change reduced employment, but the effect was small.

5. Labour demand and trade-induced technological change

In analysing the impact of trade on employment there are a number of theoretical starting points, depending on the nature of this technology. In the standard Heckscher-Ohlin model, which is commonly used to assess the impact of trade on labour, technological change is simply considered to be exogenous. This means that its effect, whether Hicks neutral or skill biased, will dependent on how different its impact is across industries or sectors (Findlay and Grubert; 1959; Leamer, 1996; Haskel and Slaughter, 1998)[11]. A number of papers have moved beyond assuming exogeneity. Wood (1994) argued that in order to compete against cheaper imports, firms raise productivity through unskilled labour saving technical progress, or "*defensive innovation*" as he refers to it. Thoenig and Verdier (2003) formalised this view and argued that openness triggers predation, meaning that firms will invest in skill-intensive techniques to limit the threat of imitation by foreign competitors. A model of endogenous skill biased technological change was developed by Acemoglu (2002), where openness raises the relative price of skill-intensive products and hence the return to investment in skill-biased technology. Other studies have suggested that trade can affect technological change by disciplining oligopolistic firms, diffusing technology through the transmission of blueprints and proprietary knowledge to exporters, learning from observation and the imitation of foreign technology, the transfer of skill-biased technology imbedded in imported intermediate and capital goods and the availability to domestic firms of a wider range of intermediate inputs.[12]

Given such a range of possible impacts that trade can have on technological change, it is important to start any empirical analysis from a relatively simple theoretical model. This will provide a consistent framework that makes the choice of variables clear and the relations between them explicit, with a clear identification of paths of causation. Variables that reflect different hypotheses of the impact of trade on technology can then be introduced in a consistent manner.

Starting from the simple Cobb-Douglas production function:

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[11] See Berman, Bound and Griliches (1994) and Berman and Machin (2000) who analyse the impact of global skill-biased technological change. Pervasive skill-biased technological change raises the relative price of skill intensive products and thus raises the relative wage of skilled labour, while still allowing for a rise in the skill-intensity of production.

[12] See Tybout (2001) for a review of these and evidence at the firm level.

$$Q_{st} = A^{\chi} K_{st}^{\alpha} L_{st}^{\beta} \qquad (6)$$

where: Q is real output; K is capital stock; L is labour; S is sector α and β are factor share coefficients; χ allows for factors affecting productive efficiency. Taking this production function and maximising subject to a budget constraint allows the derivation of a labour demand function where the log of labour is a function of the relative cost of labour (w) and capital (c), and output.

$$\ln L_{st} = \delta_0 + \delta_1 \ln\left(w_i / c\right) + \delta_2 \ln Q_{st} \qquad (7)$$

Following Greenaway *et al.* (1999) technical efficiency can then be considered to be dependent on trade in the following way:

$$A_{st} = e^{\lambda_0 T_s} M_{st}^{\lambda_1} X_{st}^{\lambda_2} \qquad (8)$$

where M is import penetration and X is export penetration. This gives an estimating equation of the form:

$$\ln L_{st} = \delta_o^* - \mu_0 T - \mu_1 \ln M_{st} - \mu_2 \ln X_{st} + \delta_1 \ln\left(w_s / c\right) + \delta_2 \ln Q_{st} \quad (\mu_i, \delta_i > 0) \qquad (9)$$

Thus labour is determined by output and relative factor process, a trend to pick up exogenous technical progress and imports, exports, which affect labour demand through their impact on technology. Trade-induced technological change is revealed by negative coefficients on the trade variables, which indicate that trade has induced a reduction in the amount of labour per unit output (improved labour productivity).

This model is, however, a static long run version and tells us nothing about the dynamics of the processes. To operationalise the model a general first order model is applied to the industry level time series and the data is allowed to determine the dynamics. Taking the general first order model:

$$y_{jt} = \alpha_j + \beta_1 x_{jt} + \beta_2 x_{jt-1} + \lambda y_{jt-1} + \gamma T + u_{jt} \qquad (10)$$

where T is a time trend. This can be reparameterised to an equivalent form which gives the dependent variable as a growth rate and the lagged level terms provide the long run coefficients.

$$\Delta y_{jt} = \alpha_j + \beta_1 \Delta x_{jt} + \beta_2 x_{jt-1} + \lambda y_{jt-1} + \gamma T + u_{jt} \qquad (11)$$

This means we estimate the following dynamic model:

$$\Delta \ln L_{st} = \alpha_0 - \alpha_1 T - \alpha_2 \Delta \ln M_{st} - \alpha_3 \Delta \ln X_{st} + \alpha_4 \Delta \ln \left(w_s / c \right) + \alpha_2 \Delta Q_{st} + \alpha_5 \ln M_{st-1} - \alpha_6 \ln X_{st-1} + \alpha_7 \ln \left(w_s / c \right)_{t-1} + \alpha_8 Q_{st-1} \quad (12)$$

where *s* is the industry subscript and *t* the time subscript. We can interpret the lagged levels as representing long run effects and the changes as giving the short run dynamics.

We estimate static and dynamic versions of this model using two different data sets. The dynamic model (equation 12) is estimated on data for 28 industrial sectors classified according to the 3-digit Standard Industrial Classification system, obtained from the South African Standardised Industrial Database (Quantech, 2004), with values measured in 1995 prices, for the period 1970-2002. The static model is estimated using more disaggregated data for 44 industrial sectors, obtained from Statistics South Africa, Customs and Excise and Edwards (2005a).[13]

To use the data in a way that considers the variations across industries as well as over time, we pool the data and use panel data techniques to estimate the labour demand equations. The starting point is the commonly used one way fixed effects method, which takes account of individual industry effects and is equivalent to introducing a separate dummy variable for each industry. There are a number of issues that arise in doing this. Firstly, the fixed effects model was developed for static models and we are estimating a dynamic model. In fact this is only a problem if we have a short time series as the lagged dependent variable will introduce bias, but this will get smaller as T, the number of time periods, gets larger. So for this study the fixed effects results should be reasonable.

When estimating the model we are attempting to measure the impact of four types of technological change. The first of these is exogenous technological change, which is represented by the time trend. The second is defensive innovation, as described by Wood (1994), which arises from companies competing with imported commodities and having to introduce new technologies. It is captured by the inclusion of a variable for import penetration or a direct measure of tariff protection (nominal

[13] See notes to Table 2 for the various sources.

protection, effective protection and anti-export bias). A third type is trade induced technology transfers, which arises from firms imitating foreign technology and using capital goods that contain foreign technology (Pissarides, 1997). It is captured by the level of imported intermediate inputs. Fourthly, there is export orientated technological change, where firms adjust in response to gaining access to foreign markets through exports and having to compete with more technologically advance products. This is captured by the export orientation variable.

There are, of course, other forms of technological change, such as skill biased technological change arising from use of computers, etc. While some of these effects are captured by the time trend, lack of adequate data (computer usage, R&D expenditure and patents by industry) prevents a closer interrogation of these effects and further exploration is left for a later study. We do, however introduce a variable to capture the composition of the capital stock, namely machinery and equipment capital stock as share of total capital stock.

Table 6 provides the estimation results using the dynamic model over the period 1970-2002. Initial estimation results indicated a number of outliers/extreme values that had to be dealt with. This led to the introduction of a number of dummy variables for Basic Chemicals and Non Ferrous metals in 1998 (Dbchem98 and Dnmet98), for Coke for the years 1998-2002 (Dcoke9802) and for the years 2000, 2001 and 2002 (d00, d01 and d02). With these included the results show the estimated labour demand function to be well defined, with the coefficients having the expected signs. The variables are all in logs and if preceded by a Δ have been differenced.

Looking at the results, log output has a positive growth (short run) and levels (long run) effect, log relative wages a negative short run and long run effect (elasticity = -0.81) and the coefficient on the lagged log employment, the adjustment term is significant and negative. We can also note that the returns to scale, which can be computed from the coefficients is close to 1.

Table 6: ECM Results 1970-2002 Fixed Effects

	Coef.	t	Coef.	t	Coef.	T
Employment(t-1)	**-0.031**	-2.4	**-0.036**	-2.8	**-0.045**	-3.3
Output(t-1)	**0.031**	2.9	**0.041**	3.6	**0.046**	4.0
Relative wage(t-1)	**-0.032**	-3.4	**-0.035**	-3.7	**-0.036**	-3.6
Import penetration(t-1)			-0.007	-1.1	-0.008	-1.0
Export orientation(t-1)			**0.009**	2.9	**0.009**	2.8
ΔOutput	**0.297**	14.0	**0.296**	13.7	**0.296**	13.5
ΔRelative wage	**-0.115**	-8.3	**-0.118**	-8.6	**-0.113**	-7.9
ΔImport penetration			**0.029**	2.7	**0.028**	2.6
ΔExport orientation			0.001	0.1	0.001	0.2
M&E K(t-1)					**-0.021**	-2.8
Intermediate import(t-1)					**0.036**	2.6
ΔM&E K					-0.013	-0.6
ΔIntermediate import					0.016	0.9
Trend	**-0.002**	-6.5	**-0.002**	-7.1	**-0.002**	-7.2
Dbchem98	**0.187**	3.6	**0.189**	3.7	**0.197**	3.8
Dnmet98	**-0.145**	-2.5	**-0.149**	-2.6	**-0.143**	-2.5
Dcoke9802	**-0.058**	-2.1	-0.052	-1.8	-0.050	-1.8
d00	-0.009	-0.9	-0.010	-0.9	-0.010	-0.9
d01	**-0.034**	-3.0	**-0.034**	-3.1	**-0.034**	-3.0
d02	0.006	0.6	0.007	0.6	0.005	0.5
Constant	0.044	0.4	0.035	0.4	0.120	1.2
Long run						
Output	**0.99**		**1.12**		**1.03**	
Relative wage	**-1.01**		**-0.95**		**-0.81**	
Import penetration			-0.20		-0.17	
Export orientation			**0.26**		**0.21**	
M&E K					**-0.48**	
Intermediate import					**0.82**	
Trend	**-0.06**		**-0.07**		**-0.06**	
Return to scale	1.011		0.892		0.970	

Notes: All variables in logs. M&E K is log of machinery and equipment capital stock as share of total capital stock.

Exploring the impact of trade on technological change, we find a significant negative impact of exogenous technological change on labour demand per unit output, as represented by the time trend, across all specifications. Exogenous technological change has therefore raised labour productivity. Rising shares of machinery & equipment in total capital stock are also found to reduce labour per unit output (improve productivity) in the short run and long run.

The results using trade flows are less satisfactory. There is evidence of a positive short run effect of import penetration, but the long run effect is insignificant, although of the correct sign (negative). We therefore find no evidence of defensive innovation in response to increased import competition. We also find no evidence of trade-induced technological transfers through imported intermediate inputs. In

contrast, rising import penetration in intermediate inputs appears to raise labour demand per unit output (i.e. a decline in labour productivity) in the long run. Similarly, the coefficient on export orientation is positive in the long run, suggesting that exports have reduced technological change. This is in contrast to the results for the UK by Greenaway *et al*. (1999).

Table 7: Total Employment, Arellano-Bond Procedure 1970-2002

Le	Coef.	t		LR
Le			0.934	
LD	**0.945**	14.0		
L2D	-0.011	-0.2		
Lq			0.056	0.847
D1	**0.295**	6.4		
LD	**-0.187**	-3.6		
L2D	-0.052	-1.6		
Lw			-0.045	-0.682
D1	**-0.128**	-5.7		
LD	**0.097**	3.5		
L2D	-0.014	-0.7		
Lm			-0.007	-0.102
D1	0.020	1.2		
LD	**-0.055**	-3.5		
L2D	**0.029**	2.5		
Lx			0.015	0.225
D1	0.001	0.1		
LD	0.009	1.3		
L2D	0.005	0.9		
Lim			0.002	0.027
D1	-0.015	-0.8		
LD	0.030	1.6		
L2D	-0.013	-0.7		
Lks			-0.006	-0.094
D1	**0.130**	3.3		
LD	**-0.327**	-4.4		
L2D	**0.190**	4.4		
Dbchem98				
D1	**0.210**	12.0		
Dnmet98				
D1	**-0.138**	-13.2		
Dcoke9802				
D1	-0.029	-0.7		
d00				
D1	-0.014	-1.0		
d01				
D1	**-0.049**	-3.7		
d02				
D1	-0.005	-0.4		
_cons	**-0.002**	-3.2		0.000

The unsatisfactory results may arise from a number of data limitations and other estimation issues. As noted earlier, estimates of dynamic model using fixed effects can lead to lagged dependent variable bias, particularly if T is small. Further, wages and trade volumes may be endogenous. While import competition may induce productivity improvements, these improvements in turn affect the volume of imports. The endogeneity of trade volumes will bias estimates. A direct measure of international competition, such as tariffs is preferable.

We therefore re-estimate the dynamic model using the Arellano and Bond (1991) estimation procedure to deal with potential problems associated with lagged dependent variable and endogeneity biases. We find some evidence of significant negative impact on labour demand of imports, but the results are sensitive to specification.

A further concern when using the fixed effects method to estimate a dynamic model is the possibility that the response may differ across sectors. The fixed effects model assumes a common response across sectors. To deal with this possibility we re-estimated the labour demand function using the Mean Group Estimator (MGE) of Pesaran and Smith (1995). This method essentially estimates a regression for each equation and then takes the mean of the coefficients. The results showed considerable variation across the industries, and the average industry coefficient proved very sensitive to outliers. Future work will need to consider the 'outlier' industries in more detail to explain why we get the results we do.

Table 8 : ECM Results, Mean Group Estimator

	Coeff	t	MIN	MAX	COV
le1	**-0.518**	-7.5	-1.06	0.09	-0.13
lq1	**0.207**	4.1	-0.22	0.84	0.24
lw1	-0.013	-0.5	-0.24	0.24	-1.83
lm1	-0.054	-1.3	-0.56	0.42	-0.78
lx1	-0.012	-0.6	-0.20	0.23	-1.71
Dlq	**0.282**	6.4	-0.13	0.69	0.16
Dlw	**-0.076**	-2.6	-0.38	0.38	-0.38
Dlm	0.012	0.5	-0.26	0.35	1.95
Dlx	-0.008	-0.6	-0.11	0.12	-1.70

lks1	-0.078	-1.9	-0.63	0.43	-0.53
lim1	-0.018	-0.4	-0.49	0.43	-2.71
Dlks	0.000	0.0	-0.51	0.42	811.72
Dlim	-0.037	-1.2	-0.28	0.19	-0.80
Tr	0.000	-0.1	-0.03	0.03	-17.41
d00	-0.006	-0.3	-0.30	0.21	-3.46
d01	-0.032	-1.7	-0.24	0.16	-0.59
d02	-0.015	-0.6	-0.29	0.20	-1.58
_cons	3.479	5.1	-3.56	9.75	0.20

Notes: Min: minimum coefficient value; Max: maximum coefficient value;
COV: coefficient of variation

The results may also reflect our use of aggregated industry data and we could therefore be missing compositional changes over time, within the industries/sectors, both in terms of companies and products. Productivity could improve from trade if low productive firms exit (in face of import competition), productive firms enter (in terms of exports) and or large firms that tend to be more productive grow relative to small firms (or small firms close relative to large firms)[14]. The positive coefficient on exports could therefore reflect a shift in the composition of exports towards low value added, labour intensive products within each industry.

To summarise the results over the different methods Table 9 below gives the long run coefficients for the different estimation methods. The second column gives the fixed effects, the third the Arellano-Bond, the fourth the mean group estimator. The mean group estimator results when extreme value observations (sectors 8,9 and 18) were dropped are also reported,

[14] Pavcnik (2002) for example finds that in Chile (1973-79) most of the productivity gains came from market share re-allocation and entry/exit of firms, not improved productivity within firms. Tybout and Westbrook (1995) find that the market share reallocation effects were relatively small in Mexico (1984-89).

Table 9: Summary of Long Run Coefficients

Summary long run				MGE excluding	
				18	8.9
	FE	A-B	MGE		
Lq	**1.031**	0.847	0.571	0.616	0.359
Lw	**-0.807**	-0.682	-0.047	-0.121	-0.039
Lm	-0.170	-0.102	-0.175	-0.180	-0.130
Lx	**0.211**	0.225	-0.028	0.001	-0.009
Lim	**0.816**	0.027	-0.051	-0.131	0.105
Lks	**-0.482**	-0.094	-0.220	-0.158	-0.224
Tr	**-0.056**		0.000	-0.011	-0.004

The results show some consistency across the methods, though with limited significance for the trade variables in the A-B and MGE. The MGE results are, as would be expected the smallest coefficients and show some sensitivity to the omission of the extreme values. The signs of the coefficients are consistent apart from lx and lm, which are negative only for the MGE results. In terms of the effects of the trade variables the A-B and MGE do not strengthen the case for their having significant impacts on employment, through technology.

5. Conclusion

Understanding the relationship between trade and employment is clearly important for South Africa, given its history, present path of development and its problems of unemployment, inequality and poverty. It also represents a valuable case study with lessons for other developing economies, given its considerable progress in liberalising its trade regime, in negotiations with the WTO, since the early 1990s and the increasing importance of trade over the period. The South African economy experienced significant changes in the level and composition of employment, with employment growth unable to reduce unemployment. There is also evidence of a rise in the skill intensity of production in all sectors, suggesting that technological change was skill-biased and of particularly large decreases in tariffs in labour intensive sectors, although these sectors do still remained heavily protected. A simple investigation of the correlations between tariff reductions and changes and

employment across manufacturing industries found little evidence of association, but did suggest increased openness was correlated with falls in employment.

Investigating the sources of the demand for employment, using a decomposition analysis, showed domestic demand and technology to have been the dominant sources of the demand for labour, with variation across sectors. The pattern of structural change followed the usual pattern for liberalising economies with a shift away from import substitution being accompanied by a loss of output in import competing sectors and a rise in output in export sectors. Employment created through export growth was, however, matched by employment lost through import penetration, with the net effect of trade on employment, between 1994 and 2003, close to zero. The evidence also pointed to the majority of employment being attributable to skill-biased technological change.

An attempt was made to consider the indirect effects of trade on employment and there was evidence that strong export growth in capital intensive, resource based and chemical products sectors may have had positive employment effects through their backward linkages. These evident structural shifts in trade towards natural resource-based and chemical products reflect the effect of a relative abundance in natural resource endowments and relatively low declines in protection on these products. Further, the continued dominance of these products in total trade may reflect the past history of state support. In contrast, labour intensive products would appear to have been negatively affected by relatively large declines in protection as well as rapid import penetration, particularly from China and India.

Finally an induced labour demand model was estimated to analyses the impact of trade on employment through trade. While the results show some variation, there is a strong trend effect of exogenous technological progress reducing labour demand given levels of output, i.e. improvements in labour productivity. There is limited evidence that increased trade flows and trade liberalisation induced improvements in labour productivity. Future work could extend the analysis to cover other sources of technological change, such as skill biased technological change arising from use of computers and possibly military spending. It would also be worthwhile using tariff data directly as a measure of liberalisation[15]. Using aggregated industry data may

[15] This was not possible with this data set.

obscure compositional changes over time, within the industries/sectors, both in terms of companies and products.[16] Further work using firm level data would, therefore, be extremely valuable.

Overall, the findings of the paper are of concern because of their likely impact on poverty. Any further trade liberalisation is likely to continue and to remain biased towards reducing labour demand in lower skilled and labour intensive industries, suggesting it is unlikely to increase employment for the poorer members of South African society and so will have little direct effect on poverty. At the same time the growth in trade in trade is likely to have little net impact on employment, with labour intensive products being negatively affected by relatively large declines in protection as well as rapid import penetration, particularly from China and India. On the other hand, there is some evidence that backward linkages from export growth are providing positive employment growth and the study has not analysed the effect of increased trade on employment within the wholesale and retail industries. Growth in these and other service sectors may alleviate the decline in the relative demand for labour within the manufacturing sector. What is clear is that the South African Government cannot rely upon the growth in trade to produce significant increase in employment, particularly for lower skilled workers, and so reduce poverty.

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