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### **Labour Demand and Trade in South Africa: A Dynamic Panel Analysis**

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## **ABSTRACT**

This paper contributes to the debate over the effect of trade on the demand for labour in the manufacturing sector in South Africa. Previous work in the area has decomposed employment to find the likely contribution of trade effects, has investigated the correlation between employment and trade, and has used fixed effects panel data models. This paper develops the earlier work, by estimating a labour demand equation using dynamic panel data method of Arellano and Bond (1991). This leads to results that are consistent with the findings of decomposition analysis that trade has had a positive effect on employment 1972-93, but that there has been a negative effect since 1993, the period of trade liberalisation. There is no evidence that the effects of trade are distributed unevenly between skills, when proxied by racial groups. Overall, the results show the importance of trying to model the dynamics of the processes at work and suggest that further work at the level of the company as well as the industry is likely to be important.

## **1. INTRODUCTION**

A perturbing feature of the South African economy is its deficient aggregate labour demand. The resulting unemployment, with rates estimated to be as high as 34%, is arguably a key determinant of many of the social problems that potentially endangers the stability and future economic performance of South Africa. The nation does have an internationally high poverty rate, with Borhat and Leibbrandt (1999) estimating that nearly one-half of the labour force are actually living in poverty.

Those investigating the policies that can be used to derive the desired extra labour demand commonly focus on the importance of trade. This can partially be attributed to the rise in the importance of South Africa's export markets. In the face of declining domestic demand and surplus industrial capacity, the manufacturing export-GDP ratio rose from 38% to 59% between the 1992 and 1997. The tendency is therefore to indicate that these trends should be further encouraged to derive greater labour demand. Fields (2000), for example, promotes the examples of the East Asian 'tiger economies' to illustrate the significance of export-led growth for the South African economy. To develop the export markets it is then suggested that outward-orientated trade and industrialization policies should be adopted. This includes policies to reduce skill shortages and to promote productivity, together with disciplined macroeconomic policy and deregulation to eliminate any labour market inflexibilities.

Given this policy prescription, the South African acceptance of trade liberalisation in the 1990s does seem an appropriate reaction. Such liberalization presumably puts stronger pressure on the government to maintain sound macroeconomic policies. Theoretically, it will also lead to improvements in economic performance. It can be argued, for instance, that the deregulation will lead to economic growth, as resources are increasingly allocation according to productivity criteria and according to the nation's comparative advantage. Employment creation could also occur, given the elimination of distortions such as the overvaluation of exchange rates which result in an increase in the capital intensity of production [ILO (1996)].

The empirical analysis into the effect of trade reform is, however, mixed. Whilst tiger nations such as South Korea and Taiwan have seen dramatic growth, these countries have also seen trade flows directly influenced by the government. The implication from such examples is that industrial development and aggregate labour demand can be influenced by effective selective government intervention, such as credit allocation to develop productive capacity. Further work into the impact of trade on the South African economy is therefore required.<sup>1</sup> This is particularly relevant as there is evidence from Borhat (2000) that the impact of trade has already changed with the introduction of trade liberalization. Whilst he does find evidence in support of positive employment effects from trade between 1970 and 1995, the analysis also suggests that these positive effects have since been eliminated by trade liberalization.

Given the importance of the change in South African trade policy and the impact of the changes in trade policy, the paper investigates the impact of trade on employment by applying the econometric technique used by Greenaway *et al.* (1999). A dynamic

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<sup>1</sup> See Roberts (1988) for a review of the literature and an initial analysis of the impact of trade liberalisation of the South African economy.

panel labour demand model is estimated and the results are used to test the robustness of Borat's conclusions. In order to do this the paper is structured in the following manner. Section 2 of the paper provides background information of the South African labour market. Section 3 then reviews the main theoretical arguments used in predicting the impact of trade on employment. The methodology applied is then presented in Section 4 and the subsequent results are then given in Section 5. Our policy conclusions are then given in Section 6. In particular, this section provides further insights into the impact of trade liberalization for South African employment.

## **2. THE SOUTH AFRICAN LABOUR MARKET**

This section presents some of the basic attributes of the South African labour market and indicates the severe problems that are faced. An important characteristic of the South African economy, as indicated by Table 1, is severe unemployment. This unemployment is the result of a failure to derive the required labour demand that is needed to keep up with all demographic changes. Figure 1 (see end) illustrates inadequate employment creation, with only a minor upward trend in employment levels since the 1970s.

**Table 1: Unemployment rates 1993**

	Individual Level Unemployment		Cluster Level Unemployment	
	Narrow Defn	Broad Defn	Narrow Defn	Broad Defn
Homeland	18.6	48.5	14.9	39.8
Non-Homeland	10.7	20.7	9.2	17.5
Rural	14.0	40.8	9.3	28.2
Urban	12.5	23.9	11.5	20.6
All South Africa	13.1	31.2	10.7	23.3

Source: Kingdon and Knight (1999)

The analysis into aggregate employment and unemployment levels will, however, miss some of the main changes in the characteristics of the South African labour market. For example, the substantial economic restructuring that has occurred has led to dramatic sectoral shifts in employment. Figure 2 (see end) illustrates these uneven employment changes by comparing two randomly chosen sectors. Overall there has been substantive structural change in the South African economy. Primary sectors such as agriculture and mining have witnessed huge employment losses. In comparison, most other sectors have seen workforce increases. This is particularly the case for the service sector, with large proportionate increases in areas such as financial and business services. In contrast, the secondary sector and ultimately the manufacturing industry have performed weakly. Employment gains have been slow and too insubstantial to make up for the losses in primary sector employment. It is due to this heterogeneity in employment trends that the analysis into labour demand effects should be at the sectoral level, rather than at an aggregate level. Panel analysis, rather than aggregate analysis, is therefore required to understand the impact of trade flows on employment.

Sectoral differences are not the only important source of unevenly distributed employment creation. South Africa has also seen a move away from unskilled towards the skilled, as illustrated by Figure 3 (see end). The analysis into labour demand must also take this into account, particularly given that trade effects can have important effects on the composition of industrial production.

### **3. TRADE THEORY AND EMPLOYMENT**

The case for trade liberalisation focuses on the economic benefits derived from the efficiency gains associated with deregulating markets. Assuming that free markets are efficient, it can be argued that the removal of trade protection and tariff levels will lead to country's producing and exporting according to their comparative advantage. Sectoral shifts in employment can be expected; whilst export sectors will see employment gains, sectors where foreign produced goods can substitute for the relatively more expensive domestic product will see job losses. Positive dynamic effects can also be predicted as the more intensive competitive environment eliminates firms' market power, leading to the production of cheaper, higher quality products.

Such reforms can create incentives to reallocate resources to those activities associated with higher productivity. The productivity improvements in the economy can then lead to higher growth and feed into employment creation. The International Labour Organisation (1996) also refer to the additional employment creation from the enforced adoption of sound macroeconomic policy, with the removal of distortions such as the underpricing of capital and the overvaluation of exchange rates that tend to intensify the capital intensity of production.

The relevance of this theoretical approach to the case of South Africa, however, is disputed. For instance, Borat's (2000) findings indicate that, whilst there has historically been a positive employment effect derived from trade, the introduction of trade liberalization actually eliminates this beneficial effect. This finding is quite distinct from other empirical analysis, which in general indicates that growth in trade from liberalisation will not have a substantial impact on employment. For instance, Sapir and Schumacher (1985) show that a balanced increase in EU trade with other OECD countries will have only a minor impact on employment. The empirical analysis does generally support the hypothesis that increased import penetration from trade liberalization will lead to a more efficient use of labour and therefore lead to some employment losses. An example of such analysis is Greenaway *et al.* (1999) who undertake a dynamic panel employment function analysis of the UK. In conjunction with the efficiency effect of import penetration, they also find a similar effect for exports. Increased trade therefore leads to employment losses as firms strive for more efficient production.

While Greenaway *et al.* (1999) focus on the developed world, specifically the UK, the nature of the South African economy, suggests their findings may be relevant. The South African economy is a dual economy and the more advanced sectors do share characteristics with the developed. For example, there are substantial differences in the labour intensity of the import and export sectors. Whilst exports tend to be

relatively capital intensive, imports tend to be instead relatively labour intensive. Thus one might expect the same finding as for the developed economies that a balanced expansion of South Africa's trade with developing nations would lead to job losses.

Bhorat's (2000)'s findings are based upon the Katz and Murphy (1992) decomposition technique and, as it is admitted, there are weaknesses with this approach. First, it is assumed that wages are constant. The approach therefore cannot take into account the importance of wage changes for changes in labour demand. Second, the long-term multiplier effects on employment are ignored. This indicates that the analysis is at best medium-term in nature and may not indicate the long-term impact of any export improvements on employment.

Our investigation into the robustness of Bhorat's findings is particularly relevant as it is possible to refer to theoretical analysis that would predict a positive effect of increased trade on labour demand. Given markets approaching perfect competition, it should be expected that the increased competition associated with trade liberalization would lead to firms finding efficiency gains. However, this efficiency argument for free trade is less persuasive when the assumptions of perfect competition do not hold. The consideration of imperfect competition and market failure can imply quite distinct effects from trade liberalization, with new trade theories [such as provided by Krugman (1987)] no longer indicating the unambiguous optimality of free trade. These theories indicate that, with imperfect markets, trade reform will not necessarily lead to industries responding to the incentive effects caused by trade reform.<sup>2</sup> Moreover, as referred to in Devarajan and Rodrik (1989), in those industries that are benefiting from economies of scale, trade liberalization could lead to employment losses through a process of deindustrialisation. Given the widespread market failure associated with developing nations, such theories could have particular application to economies such as South Africa. Whilst government policy failure can exist that indicate the need of trade policy reform, the existence of market failures do suggest that laissez-faire trade reforms are not necessarily desirable.

An additional feature that has yet to be considered is the distinction between static and dynamic trade effects. These dynamic effects could well enhance the static efficiency benefits from trade liberalization and have therefore received substantial attention in economic analysis. Thus, analysis has focused on the potential productivity growth caused by increased trade. Reasons cited for such a link include the impact of increased competition on x-inefficiency [Caves and Krepps (1993)], a reduction in the bargaining power of unionized labour [Borgas and Ramey (1994)] and the relocation of inefficient labour-intensive activities abroad [Feenstra and Hanson (1996)]. Such analysis indicates the benefits of adopting outward-orientated support trade policies, rather than inward-orientated protection policies. Empirical analysis of developed economies does suggest that increased trade can induce a positive productivity effect. For instance, Cortes and Jean's (1996) study of the impact of trade growth in France, Germany and the US does find that the growth in trade led to a subsequent increase in labour productivity.

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<sup>2</sup> As summarised in Lall (1995)

The nature of dynamic trade effects for developing nations is, however, less certain. An additional issue that must be considered is the nature of diffusion of technology and new technology from developed nations to the poorer nations. For instance, provided there is not immediate and costless diffusion, the expertise required for the competitive production of goods using new techniques will be generated over time via 'learning-by-doing'. The process by which this occurs is therefore vital for our analysis, as it can now imply a distinction between static and dynamic comparative advantage. For example, if 'learning-by-doing' is stimulated by the general activity in the economy, allowing increased trade will ensure the dynamic effect of trade liberalization enhances the static efficiency gains. However, it might be argued that initial comparative advantage will be a function of past production, with the successful diffusion of production techniques. The impact of trade for comparative advantage will then be determined by which sectors of the economy are affected by 'learning-by-doing'. For example, increased competition in import substitution sectors can restrict 'learning-by-doing' processes as firms fail to compete successfully. Trade intervention can then be welfare improving as this allows development in sectors that do not initially have a static comparative advantage, allowing efficiency gains and subsequent long term employment creation.

It can be argued that diffusion is particularly important for South Africa. As shown by Tsikata (1999), South Africa does have a low share of exports that have unskilled labour as the dominant factor input. All Asian economies studied, in comparison, have a significantly higher proportion of unskilled labour intensive exports. This might suggest that South Africa is failing to take advantage of its abundant labour supply, perhaps due to a labour market characterized by wage inflexibility. However, the position of South Africa in the world market puts it in a difficult spot. Whilst its labour-intensive sectors are open to wage competition from low wage countries such as China and India, its capital-intensive sectors are exposed to competition from the highly productive developed nations. This has important repercussions for our analysis into trade effects. For example, Wood (1994) suggests that globalisation leads to a restructuring in economic activities according to the productivity of the activities involved. Hence, low productivity activities will reallocate to low wage economies where cheap labour is abundant and skill-intensive activities will reallocate to developed economies. South Africa is not placed easily in either type of economies and will therefore find increased competition from both. The reaction to this squeezing must be technological innovation and capital upgrading. This again illustrates the importance of allowing dynamic comparative advantage to dictate policy. Indeed, further analysis into the manufacturing sector's poor employment performance illustrates that this is largely due to the poor performance of relatively labour intensive sectors. The restructuring of the economy is largely due to technology change and trade policy should be constructed to take this into account.

Bhorat's (2000) findings do indicate the importance of technological change for the South African economy. For example, the above analysis into static efficiency gains focuses on 'between sector' employment shifts, as liberalization leads to increased activity in exporting sectors and reduced production in import substitute sectors. However, Bhorat (2000) indicates that trade effects in South Africa have not been skills neutral and 'within sector' employment changes should also be considered. More precisely, it is the more highly skilled occupations that have benefited the most from the impact of trade flows. An important source of this 'within sector'

employment change is technological change. As more capital-intensive production techniques are adopted, the skill mix required can alter in favour of more skilled workers. Given the protection of such markets, imports tend to be complementary to domestic production, rather than merely goods that are substitutes to domestically produced goods. Thus, these goods supported domestic production and, instead of leading to job losses, allow growth in production and hence labour demand in these sectors.

Bhorat's (2000) analysis then suggests that the policy change to trade liberalization has ultimately changed the impact of trade flows. It is argued that firms react to the liberalization policy by finding the required efficiency gains to remain competitive, involving replacing labour with capital. However, it might be argued that trade liberalization is effectively a continuation of the policy of the evolution of trade policy, as tariffs on inputs are reduced. This view is supported by Fedderke and Vaze's (2000) comparison of the average tariff rates between the two periods 1988-1993 and 1994-1998. Whilst average tariffs have fallen, they find that approximately half of South Africa's GDP is in sectors where effective protection had actually increased. The tariff reductions therefore have focused proportionately more on production inputs, rather than on output. As South African imports much of its intermediate goods, a lowering of import tariffs will reduce input costs and therefore can enhance competitiveness. The trade liberalization policy is then effectively an outward-orientated trade policy, with the changes in tariffs used to enhance productivity growth and induce dynamic comparative advantage. As technological advancement is required to ensure South Africa's economy can successfully compete with the developed nations, the economy will require a greater focus on skilled labour.

#### 4. METHODOLOGY

We test Bhorat's findings by repeating Greenaway et al.'s (1999) analysis on South African sectoral data. The impact of trade on employment is therefore analysed by utilizing a dynamic panel regression labour demand analysis. This is used by Greenaway *et al.* (1999) to estimate the magnitude of any employment losses from trade-induced improvements in the efficiency of labour. We suggest that during trade protection the nature of trade will be such that it will promote the diffusion of technology and lead to employment creating efficiency gains. Imports, as suggested by Bhorat (2000), will then be complementary to production.

The model is based on a simple Cobb-Douglas production function:

$$(1) \quad Q_{st} = A^c K_{st}^a L_{st}^b$$

where:

$Q$  is real output

$K$  is capital stock

$L$  is labour

$S$  is sector

$a$  and  $b$  are factor share coefficients

**c** allows for factors affecting productive efficiency

This can be rewritten as:

$$(2) \quad Q_{st} = A^c \left( \frac{\mathbf{a}L_{st} w_i}{\mathbf{b} c} \right)^{\mathbf{a}} L_{st}^{\mathbf{b}}$$

where:

**c** is the user cost of capital

Taking logarithms and rearranging this can then be written as:

$$(3) \quad \ln L_{st} = \mathbf{d}_0 + \mathbf{d}_1 \ln \left( \frac{w_i}{c} \right) + \mathbf{d}_2 \ln Q_{st}$$

where:

$$\mathbf{d}_0 = -(\mathbf{c} \ln A + \mathbf{a} \ln \mathbf{a} - \mathbf{a} \ln \mathbf{b}) / (\mathbf{a} + \mathbf{b})$$

$$\mathbf{d}_1 = -\mathbf{a} / (\mathbf{a} + \mathbf{b})$$

$$\mathbf{d}_2 = 1 / (\mathbf{a} + \mathbf{b})$$

Given the first-order condition that the marginal product of an input should equal its real price, the following log-linear labour demand relationship can therefore be derived:

$$(4) \quad \ln(L) = c + \frac{1 + \mathbf{s}(v-1)}{v} \ln(Q) - \mathbf{s} \ln(w/p) - (1 - \mathbf{s}) I t$$

To include trade effects Greenaway *et al.* (1999) assume technical efficiency to be dependent on trade and therefore the parameter **A** is taken to equal:

$$(5) \quad A_{st} = e^{I_0 T_s} M_{st}^{I_1} X_{st}^{I_2}$$

where: **M** is import penetration and **X** is export penetration

This therefore implies:

$$(6) \quad \ln L_{st} = \mathbf{d}_0^* - \mathbf{m}_0 I - \mathbf{m}_1 \ln M_{st} - \mathbf{m}_2 \ln X_{st} + \mathbf{d}_1 \ln \left( \frac{w_s}{c} \right) + \mathbf{d}_2 \ln Q_{st}$$

where:

$$\mathbf{d}_0^* = -(\mathbf{a} \ln \mathbf{a} - \ln \mathbf{b}) / (\mathbf{a} + \mathbf{b})$$

$$\mathbf{m}_1 = \mathbf{m}_1$$

$$\mathbf{m}_2 = \mathbf{c} / (\mathbf{a} + \mathbf{b})$$

In recognition of the problems of measuring inter-firm variations in the user cost of capital, we follow the traditional demand for labour literature in implicitly normalising this to unity and thus using the real wage terms to capture the relative factor price effects.<sup>3</sup>

The following model is then to be estimated:

$$(7) \quad \ln L_{st} = \mathbf{r}_s - \mathbf{m}_0^T - \sum_i \mathbf{m}_1^T \ln M_{s,t-j} - \sum_i \mathbf{m}_2^T \ln X_{s,t-i} + \sum_i \mathbf{d}_{0j} \ln L_{s,t-i} \\ + \sum_i \mathbf{d}_1 \ln w_{s,t-i} + \sum_i \mathbf{d}_2 \ln Q_{s,t-j} + \mathbf{e}_{st}$$

The employment equation is differenced so as to transform out the industry specific fixed effects, and the following dynamic equation is estimated:

$$(8) \quad \Delta \ln L_{st} = -\mathbf{m}_0 - \sum_i \mathbf{m}_1 \Delta \ln M_{s,t-j} - \sum_i \mathbf{m}_2 \Delta \ln X_{s,t-i} + \sum_i \mathbf{d}_{0j} \Delta \ln L_{s,t-i} \\ + \sum_i \mathbf{d}_1 \Delta \ln w_{s,t-i} + \sum_i \mathbf{d}_2 \Delta \ln Q_{s,t-j} + \Delta \mathbf{e}_{st}$$

Due to the correlation with the unobserved fixed effects in the residual, the differencing can result in biases on the lagged employment changes coefficients. Arellano and Bond's (1991) Generalised Method of Moments (GMM) estimation technique is therefore adopted. This uses lags of the endogenous variables [(t-2) and earlier] as instruments. Our estimates will be unbiased and consistent if our estimates of (8) are free of second and higher order serial correlation. A Sargan test is also used to check the validity of the chosen instrument set.

## 5. DATA

The data used is three digit SIC industry level data provided by the IDC. To analyse whether trade liberalisation has led to a change in the impact of trade on labour demand we study two time periods; namely, 1972-1992 and 1972-1997. Any distinction between the results from these periods will indicate the implications of trade liberalization. The chosen periods also allow us direct comparison of our results using the Greenaway *et al.* (1999) approach and Borhat's findings. It is from 1993 to 1997 that his analysis finds substantial changes in the impact of trade on employment. In particular, it is this period where he suggests that the liberalisation programme led to high job losses for relatively unskilled workers. We also follow Borhat's analysis and distinguish relative skill levels by distinguishing between racial groups. We therefore run white and black labour demand models in order to investigate whether Borhat's findings are repeated.

In our analysis we have chosen to exclude the agricultural and mining sectors. These sectors have specific features that may bias our understanding of the impact of trade on the secondary sectors and service sectors. In particular, a dominant feature of these sectors is the significant proportion of informal workers. Moreover, they have

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<sup>3</sup> See Hammermesh (1993)

suffered from instability, with the performance of agriculture dependent on rainfall and the success of mining dependent on gold prices. Instability is also illustrated by the job losses experienced in these sectors. For instance, some 1.2 million jobs were lost in agriculture between 1970 and 1995. We instead focus on the industries that have seen growth and have partially absorbed the unemployment created by the decline in primary sector employment.

## **6. RESULTS**

The results of our GMM estimation of our labour demand model are presented in Tables 2 and 3. In our aggregate analysis provided in Table 2, output and wage have the expected impacts on labour demand for both time periods. Output increases labour demand in both the short run and the long run, whilst wages are found to have a negative impact. With regards our statistical tests, we find no evidence of second-order serial correlation. The Sargan test for instrumental validity also indicates that the instrument set and the residuals are not correlated.

Table 3, however, indicates that the labour demand models do not behave as predicted when the data is decomposed according to race. The white worker labour demand model leads to a positive long-term wage effect. Such findings indicate the key differences still prevalent in terms of the white and black labour markets in South Africa. Any future investigation into South African labour demand must take into account such differences.

The coefficients on the import and export terms in Table 2 finds some evidence in support of Borhat's analysis. The shortened time period from 1972-1993 finds positive long-term effects on labour demand from import and export penetration. This is the period that excludes the main effects of trade liberalisation and indicate that trade effects have boosted South African employment. However, using data up to 1997 eliminates the positive effect of import penetration on employment. Whilst the long-term impact of export penetration is still positive, the import term is now negative. These findings are in support of the stance that trade has historically supported domestic production. However, with the introduction of trade liberalisation this impact has been reversed as firms attempt to find efficiency gains to compete with their international competitors.

**Table 2: Employment Equations (excluding Agriculture and Mining)**

	1972-1997		1972-1993	
	Coefficient	t ratio	Coefficient	t ratio
$\Delta L_{t-1}$	1.028	15.6	1.040	13.9
$\Delta L_{t-2}$	-0.163	3.31	-0.198	5.1
$\Delta W_t$	-0.475	16.4	-0.503	19.3
$\Delta W_{t-1}$	0.483	10.7	0.431	10.5
$\Delta W_{t-2}$	-0.078	1.77	-0.025	1.19
$\Delta Q_t$	0.034	1.71	0.027	1.72
$\Delta Q_{t-1}$	0.006	0.217	-0.033	1.02
$\Delta Q_{t-2}$	0.020	0.89	0.039	1.52
$\Delta M_t$	0.013	2.34	0.010	1.86
$\Delta M_{t-1}$	-0.008	1.93	-0.010	1.5
$\Delta M_{t-2}$	-0.006	1.23	0.011	2.5
$\Delta X_t$	-0.004	0.917	-0.003	0.88
$\Delta X_{t-1}$	0.004	1.19	0.003	0.76
$\Delta X_{t-2}$	0.002	0.625	0.002	0.62
Constant	-0.002	2.96	0.006	3.42
Sargan test	28.24		30.24	
AR(1)	-3.730**		-3.696**	
AR(2)	1.526		1.596	

Notes:(\*\*) significant at 1% and (\*) significant at 5%

**Long run coefficients**

	Import Penetration	Export Penetration
1972-1997	-0.012	0.017
1972-1993	0.067	0.013

As referred to above, Borhat (2000) finds substantial differences between skill groupings and concludes:

“It is evident though that the employment gains from trade flows were not evenly distributed by skills groupings. The labour demand increases experienced by semi-skilled and skilled workers far outweighed those of unskilled individuals.”

Our findings, however, are not in support of this conclusion. Following Borhat, we proxy skills differences by decomposing our data into white and black workers. Table 2 illustrates that there are no substantial differences in the long-term impact of import penetration between these workers. Over the whole time period, the coefficient on the import term is negative for both types of workers. Moreover, the findings suggest that the negative effect is larger for the more highly skilled white workers. However, the labour demand model for white workers does not behave as predicted by neoclassical labour market theory, as there is no significant wage effect on labour demand. This might reflect wage inelasticity of the demand for highly skilled labour, but until

further investigation has been undertaken the findings should therefore be treated with caution.

**Table 3: Manufacturing Employment Equations: A racial distinction**

	White Workers		Black Workers	
	Coefficient	T ratio	Coefficient	T ratio
$\Delta L_{t-1}$	0.963	39.4	0.963	36.5
$\Delta L_{t-2}$	-0.105	3.95	-0.100	3.97
$\Delta Q_t$	0.205	12.7	0.224	18.7
$\Delta Q_{t-1}$	0.131	16.4	0.141	14.6
$\Delta Q_{t-2}$	0.002	1.96	0.002	2.15
$\Delta W_t$	-0.022	0.82	-0.219	10.2
$\Delta W_{t-1}$	0.055	1.77	0.180	9.06
$\Delta W_{t-2}$	0.014	0.66	-0.005	0.35
$\Delta M_t$	0.077	6.64	0.076	7.99
$\Delta M_{t-1}$	-0.120	12.9	-0.117	14.6
$\Delta M_{t-2}$	0.034	4.0	0.034	3.88
$\Delta X_t$	-0.012	2.43	-0.018	3.81
$\Delta X_{t-1}$	0.022	3.73	0.021	3.16
$\Delta X_{t-2}$	-0.027	5.23	-0.024	4.11
Constant	-0.001	2.14	-0.001	1.72
Sargan test	38.01		39.49	
AR(1)	-2.282*		-2.251*	
AR(2)	1.651		1.752	

Notes: (\*\*) significant at 1% and (\*) significant at 5%

**Long Run Coefficients**

	Import Penetration Long Run Coefficient
White workers	-0.065
Black workers	-0.055

**7. CONCLUSIONS**

This paper has investigated the effect of trade on the demand for labour in the manufacturing sector in South Africa. It has developed the method of analysis used in previous studies by applying a dynamic panel analysis similar to that of Greenaway *et al.* (1999), a study of the UK economy. The decomposition analysis by Borat (2000) suggested that increased trade did increase labour demand and create employment, but with the onset of more intense trade liberalisation in the 1990s this relationship changed. The results suggest that increased import penetration leads to reductions in derived labour demand, suggesting that trade liberalisation will provide an incentive to domestic firms to find efficiency gains. Jenkins (2002) found a similar result but with a fixed effects model.

South Africa's economy, as noted, is quite unlike the usual developing nation. It has a substantial skills base and its production is composed of a large proportion of modern goods that require high levels of relatively skilled labour. The end of apartheid and the elimination of economic sanctions led to an increased migration of skilled labour in and out of South Africa. It can be argued that this does allow acceleration in the diffusion of know-how from developed nations. Thus, it might be expected that South Africa should be affected in a similar manner to the developed nations. Indeed, given that we find a negative long-term impact of import penetration on labour demand, our findings have some similarity to Greenaway *et al.*'s (1999) analysis of the UK. However, our analysis of 1972-1992 does indicate the potential benefits of continued active trade policies. The positive influence of import penetration on our derived labour demand is compatible with Borat's view that the imports during this period were complementary to domestic production.

We do not, however, find evidence to support Borat's analysis into uneven skill gains from trade. Repeating his use of racial groups to proxy skill differences and our labour demand models, shows a difference in the wage effects between the two groups, with black workers having a significant negative estimate and white workers an insignificant one. This might reflect the continued increase in demand for skilled labour leading to unresponsiveness to changes in labour. This is, however, the only substantive difference in the coefficient estimates.

Overall, this study has provided a valuable contribution to understanding the relation between trade and employment in South Africa. It has used a well defined theoretical model to derive an estimating equation that provides a conditional measure of the impact of trade on labour demand. In addition, it not only provided a panel data analysis of the relation, but it has also attempted to deal with the time series properties of the industry level employment relations, through the use of dynamic panel data models. In doing this it has found results consistent with earlier work with different methods. There seems to be a negative impact of import penetration on employment demand, a result that seems to have become evident in the trade liberalisation period, but only a small positive effect of exports. There also seems to be a difference between the wage effects across the skill groups (proxied by race) but little else. The implications are that the continued growth in trade is unlikely to increase labour demand to any substantial degree, though having said that the negative impact is unlikely to be great. It is likely that the results reflect a reduction in x-inefficiency in companies in industries opening up to international competition. It is clearly important to develop the research in the area and to try to understand better the dynamic processes at work. This suggests more investigation of the properties of the industrial panel data, but also a move to consider the processes at work within the companies that make up those industries

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