The Impact of Trade
and Structural Changes on Sectoral Employment in South Africa.

Haroon Bhorat[1]

[1] Senior Researcher, Development Policy Research Unit (DPRU), School of Economics, UCT. All comments can be directed to the author at bhorat@hiddingh.uct.ac.za

Executive Summary

This paper describes formal employment trends in the South African economy since 1970, through using both survey and time-series data. In addition, the study tries to understand the forces that have shaped these employment trends. The descriptive statistics reveal that the primary sectors have shed close to 1.5 million jobs in the period 1970-95. The marginal net employment growth that occurred was to be found primarily in the service sectors. Noticeably, net employment creation in manufacturing was 400 000 jobs over this period. These sectoral trends are matched by occupational trends, which show a significant rise in the demand for highly skilled workers at the expense of unskilled workers. The racial dimension to this is that non-African workers have gained from these labour demand trends, while African workers have lost out significantly.

Utilising an established methodology, the second component of the paper is to try and assess what factors have caused these employment trends which have disproportionately favoured skilled workers. The results of the analysis show that the key cause of the shift toward high-end workers has by and large been technological change within the individual sectors. The rising capital intensity in sectors, coupled with greater computerisation, has prompted the need for more high-end workers. Interestingly though, the results suggest that when examining lower skilled workers, the importance of technological factors remains, but diminishes. Instead, for those at the bottom end, the altering shares in national output of different sectors had a more significant role in understanding relative employment shifts.

The third and final segment of the paper attempts to estimate the impact of trade flows on labour demand, using both survey and time-series data. The results illustrate that the correlation between international trade and employment has been positive. The employment of all workers, by occupation, race and education level, grew as a result of the flows of exports

and imports in the economy between 1970 and 1995. However, these gains were not skills, race and education-neutral. Specifically, employment expansion for skilled individuals, or those who had high educational qualifications or workers who were non-African, was appreciably greater than for individuals who did not fit into either of these cohorts. In short, workers at the bottom gained from international trade but gained significantly less than their counterparts at the top end. The time series evidence for manufacturing yields slightly different outcomes. The results here suggest that in the period 1970-1988, unskilled workers gained more than skilled employees did from international trade. However in the subsequent period, and particularly in the 1993-97 period, the reverse effect occurred. In these later years then, there were high job losses for those in unskilled categories, while skilled workers gained significantly.

1. Introduction

Changes in the industrial structure and trade flow movements, together with their attendant industrial and trade policy ramifications, have been two key elements of South African economic performance over the last 25 years. It is the intention of this study to assess and empirically determine the impact of these two changes on a part of the domestic economy that is very often regarded as critical to long-term growth prospects, namely the labour market. The common theme in this paper is to link, utilising an established methodology, the alterations in the economy's trade regime along with its process of sectoral development to its impact on the demand for labour. One of the important contributions of this paper is to conceive of labour demand in a more detailed fashion, by taking account of employment levels according to different occupations and skill levels, as well as by a select set of socio-economic characteristics such as race and gender. This lends more credibility and indeed more sensitivity to the analysis.

The study has three key components. Firstly, it will provide an overview of employment trends at the sectoral level, focusing not only on aggregate changes but also shifts that have occurred according to occupation and a set of socio-economic characteristics in the period under analysis. Secondly, the study will uncover the specific forces driving these employment trends across the sectors. Here, we will distinguish primarily between within-sector and between-sector employment shifts, a distinction that will be made clear later. Finally, the impact of trade flows on the demand for labour will be isolated. Again, the analysis will be both skills-sensitive, data permitting, as well as being tied closely to export and import volumes at the sectoral level.

2. Formal Employment Trends Between 1970 and 1995

The two time periods of the analysis, 1970 and 1995, were chosen for a number of reasons. Firstly, it was important to include the former TBVC states and the census in 1970 was the last census that contained them and the 1995 October Household Survey (OHS95) is the latest comprehensive survey

that includes them. Secondly, the CSS quarterly updates on employment could not be used because of their inadequate handling of employment in the service sector[2]. Thirdly, this time period captures the entire shift to the greater usage of microelectronics in production, which represents the most significant technological development in recent times. Lastly, these two surveys provide very detailed labour market information that is lacking in the standard time-series sources.

The figures used here represent those in formal employment only. The reasons for excluding informal employees include the fact that for 1970, the contribution of informal employment would have been negligible anyway, while for 1995 the survey does a very poor job of uncovering this segment of workers (Bhorat, 1999)[3]. Furthermore, current evidence on the informal sector, albeit flawed, indicates that its participants are involved largely in survivalist activities, and view it is as a second-best form of employment (Bhorat & Leibbrandt, 1998). Given this nature of the sector, and that the focus of the study is to understand the shifting labour demand needs of firms in the hiring of full-time, long-term employees - the exclusion of the informal sector is warranted.

2.1   Changing Formal Employment Trends in the South African Economy

Table 1 below presents a first overview of these employment trends at the sectoral level. The data is presented according to occupational groups. We were confined by the data reporting in the two surveys and hence all descriptive statistics are at the main sector level. The occupational

---

[2] See appendix 2 in Hodge (1998) for a detailed analysis of the inadequacies of service sector employment figures in the CSS quarterly updates.

[3] Indeed, the OHS95 includes domestic workers as part of the informal sector, a critical error that ultimately renders the informal sector data useless. Relatedly, we exclude domestic workers, who although incorrectly categorised, were well recorded in the 1995 survey. There would have been a large number of such workers in 1970, but given that they were very unlikely to have been captured, domestic workers have been omitted from all calculations.

classification system suffered from the same problems, in addition to trying to match the narrower definitions in the 1970 survey with the more detailed divisions provided in OHS95. The data show that between 1970 and 1995, formal employment increased by 17.6% or from about 7.5 million employees to about 8.9 million. The economically active population in 1970 was 8 114 248 and in 1995 was 12 741 868[4], which represents a 36% increase. What this means is that the labour absorptive capacity of the formal economy, at not even half this increase in the size of the labour force, has been wholly inadequate in providing jobs for all the new entrants into the labour market. This is, of course, then manifested in the growing numbers of unemployed, from an estimate of about 570 000 in 1970 to close on four million in 1995.

In addition to the overall poor employment performance of the formal economy, the employment gains that were made were unevenly distributed amongst the different sectors of economy. It is powerfully evident from the table that the two primary sectors, agriculture and mining, have suffered huge employment losses over this 25-year period. Indeed, in agriculture 1.2 million jobs were shed, while in mining the number is about 211 000. The only other sector to witness a decline in employment was the construction industry, where employment fell by approximately 10%.

---

[4] This figure is based on the number of unemployed according to the expanded definition and those in formal employment during this period.

Table 1: Formal Employment Trends By Sector and Occupation: 1970-1995

Occup.	Agric.	Mining	Manuf.	Utilities	Cnstm	Wholes	Trspt	Finance	Comm	Total
Prof/Semi-P/Tech	1450	7806	34014	2384	9615	13077	11091	25408	251557	**356402**
95	3631	21791	105672	16255	22289	62891	66626	184918	983988	**1468061**
% ch	*150.4*	*179.2*	*210.7*	*581.8*	*131.8*	*380.9*	*500.7*	*627.8*	*291.2*	***311.9***
Adm/Exec/Mnger	910	2380	29145	267	11155	40547	6996	11493	12165	**115058**
95	6672	13125	82567	2506	22274	162562	31982	54037	52243	**427968**
% ch	*633.2*	*451.5*	*183.3*	*838.6*	*99.7*	*300.9*	*357.1*	*370.2*	*329.5*	***272.0***
Clr & Sales	3330	17593	119226	3507	15148	318230	49915	110006	95680	**732635**
95	12709	37953	130009	10368	15858	276252	61316	221146	297206	**1062817**
% ch	*281.7*	*115.7*	*9.0*	*195.6*	*4.7*	*-13.2*	*22.8*	*101.0*	*210.6*	***45.1***
Service	4919	25448	31721	2646	6985	94736	16886	26609	1033398	**1243348**
95	17809	37076	79610	7246	6952	595741	41831	105612	738796	**1630673**
% ch	*262.0*	*45.7*	*151.0*	*173.8*	*-0.5*	*528.8*	*147.7*	*296.9*	*-28.5*	***31.2***
Farm/Fish/For	2443353	4525	5198	456	1086	2733	864	390	63866	**2522471**
95	1019352	3538	8521	0	469	11615	2871	1629	107790	**1155785**
% ch	*-58.3*	*-21.8*	*63.9*	*-100.0*	*-56.8*	*325.0*	*232.3*	*317.7*	*68.8*	***-54.2***
Prd wrk & oper/Art	13163	585365	585470	18096	265197	102933	68887	3415	37268	**1679794**
95	21657	229466	690781	39279	255473	196518	57980	20680	93359	**1605193**
% ch	*64.5*	*-60.8*	*18.0*	*117.1*	*-3.7*	*90.9*	*-15.8*	*505.6*	*150.5*	***-4.4***
Labourer	8331	14101	166007	17935	150640	71959	78949	3879	76083	**587884**
95	19448	70498	233245	8888	82980	118860	26809	7970	69302	**638000**
% ch	*133.4*	*400.0*	*40.5*	*-50.4*	*-44.9*	*65.2*	*-66.0*	*105.5*	*-8.9*	***8.5***
Transport	6293	22159	47493	1226	14297	61601	102353	8322	22645	**286389**
95	137159	52469	119386	8072	21334	93466	184082	30091	134312	**780371**
% ch	*2079.5*	*136.8*	*151.4*	*558.4*	*49.2*	*51.7*	*79.9*	*261.6*	*493.1*	***172.5***
Unspec	211	974	7677	241	1379	2019	2283	409	2944	**18137**
95	407	3395	6510	1466	1197	4942	2881	2215	79673	**102686**
% ch	*92.9*	*248.6*	*-15.2*	*508.3*	*-13.2*	*144.8*	*26.2*	*441.6*	*2606.3*	***466.2***

Total	2481960	680351	1025951	46758	475502	707835	338224	189931	1595606	7542118
95	1238844	469311	1456301	94080	428826	1522847	476378	628298	2556669	8871554
% ch	-50.1	-31.0	41.9	101.2	-9.8	115.1	40.8	230.8	60.2	17.6

All other main sectors reported increases in their workforce. The largest percentage increase in employment was in the financial and business services sector, followed by wholesale & retail trade. In absolute terms, both these sectors gained about 1.2 million employees. In addition, the other two service sectors, transport and community, and social and personal services, both yielded significant increases in their employment numbers. Indeed, while the secondary sector (manufacturing, utilities and construction) does show a net rise in employment levels, the major uptake in employment has been in the service sectors. Put differently, while the secondary sector gained some 430 000 jobs in this period, the figure for the four service sectors stands at about 2.4 million.

The poor employment performance of the secondary sector, and in particular the manufacturing industry, is worrying. For a key sector to gain only 400 000 jobs over 25 years clearly indicates an undynamic if not a struggling industry. Many details are hidden by the aggregate figures, but given that the sector's share of GDP has also remained fairly constant over the period, it is suggestive of an industry in trouble. While there are certain firms and even certain sub-sectors within manufacturing that are dynamic and will remain so, it is evident that in the long run the industry as a whole is unlikely to be the major source of either economic growth or, more importantly here, job creation.

2.2   The Influence of Between- and Within-Sector Forces on Employment

The employment data above suggest that a key structural shift has taken place in the South African economy over the last 25 years. The economy has moved away from a dependence on the primary sectors, which have been in secular decline over the last two and a half decades, while

simultaneously witnessing a rapid rise in the growth of the service sector. It is the growth in output in the latter sectors and the declining or stagnant output performance of the former main sectors, that in part explain this labour demand shift. Specifically, the share of the primary sectors in national GDP declined by between three and four percent, while that of services rose by as much as six percent between 1970 and 1995. This is a trend that is likely to continue, and one which will establish a new South African productive base, increasingly characterised by the tertiary sectors and far less by the primary or even the secondary sectors. The following section will examine and estimate the extent to which these output patterns, manifest in what are known as *between-sector* employment shifts, help to explain the overall sectoral employment trends observed.

Another part of the explanation for these employment shifts can be gleaned from the total occupational employment shifts outlined in the table above. It is evident that the distribution of employment gains by occupation was also uneven. The occupations that reported the largest increases were professionals, followed by managers and then transport occupations. Indeed, these three occupation categories account for an increase of close to 2 million jobs in the 25-year period. On the other hand, the number of workers in lower-skilled occupations, namely farming, production work and labourers, either declined or increased only marginally. The most spectacular decrease was in farming occupations where the number of jobs halved over this period. This fact matches with the decline in the sector's share in GDP noted above. The number of labourers only increased by about eight percent over the period (amounting to a paltry 50 000 jobs), and meant that the share of labourers in total employment declined. It is evident then, that the aggregate employment shift since 1970 has not been skills-neutral. The structure of the labour demand shift shows clearly that skilled workers at the high-end of the job ladder have benefited most from output growth, while those in unskilled positions at the bottom-end have benefited least, and in some cases dramatically lost out, from the path of output expansion in the domestic economy.

It is important, however, to try and understand the labour demand shifts that have been occurring within each sector. This provides a more sensitive analysis of the changing structure of labour demand. Hence, while it is important to look at between-sector employment shifts to explain labour demand changes, it is also necessary to interrogate the degree to which changing preferences for certain labour types *within* each sector explain labour demand trends.

- Primary Sectors

Within agriculture, while the large decline in the share of those in the unskilled farming occupations explains most of the labour demand trends, there were significant shifts at the higher end of the job ladder. We therefore see from Table 1 a large percentage rise in the number of employees in the top three skilled occupations, albeit off a small base, within agriculture. A notable increase within this sector was for transport workers, whose share rose by over 2 000%, representing some 130 000 new jobs. For mining, similar trends are observed, as the decline in the share of production workers explains a large part of the overall employment losses in the sector. However, countering this trend again is an increase in the share of higher skilled workers, notably in the professional and managerial categories. These within-sector employment shifts are a result of a number of factors, including technological change that is non-neutral in its factor demand impact, as well as lower prices on non-labour inputs such as capital equipment or computer services. Hence, in the mining industry, for example, capital-labour ratios between 1970 and 1995 increased by 416%, while in agriculture the ratio went up by about 170%. The importance of these within-sector labour demand shifts, relative to between-sector shifts, will be estimated in the following section to allow for a more nuanced analysis of the weighted contribution of these two forces in explaining labour demand trends.

- Secondary Sectors

In the secondary sectors, within-sector employment shifts are also apparent. Hence, in manufacturing, for example, the share of the top two occupations have increased dramatically since 1970, while that of production workers declined, and the share of labourers remained constant. Note, as with agriculture, the large increase in the share of transport employees in this sector. Even in construction, where absolute employment numbers fell by about 46 000, the skilled occupations made gains. The number of managers and professionals in this sector therefore increased by at least 100% since 1970, while it was primarily labourers that bore the brunt of the job losses.

- Services

Within the service sectors, the same trend is observed. Managers and professionals saw their numbers increase by a minimum of 291% over this period. In all four sectors apart from community & social services, the share of service staff increased. The share of labourers again declined, and in the case of two sectors the actual number employed fell. This is a stark reminder that even within the clutch of the four fastest growing sectors of the economy, there was a high attrition rate for those at the bottom end. While the absolute numbers are small, it is interesting to note that for production workers, the results are mixed. Hence, in the retail and transport sectors, their share of employment fell, while in finance and community services it increased. The majority of these workers in community services are employed in government, either at the central or local level. The share and absolute number of transport workers again increased across all sectors, ranging between a 52% and 493% rise over the period.

It must be remembered that the service sectors on the whole are more skills-intensive than the secondary sectors or indeed the primary sectors. Hence, any growth in these sectors was going to result in a skewed preference for those individuals with a greater quantum of human capital. However, it cannot be doubted that the onset of the microelectronics revolution, epitomised by greater computer usage, has spurred on this

preference within services for higher skilled individuals. The fact that the capital-labour ratios in the service sectors rose by as much as 117% strongly supports this notion. Simply put, the forces driving within-sector labour demand preferences witnessed a sharp increase in the employment of the most skilled workers, matched by an alarming decline in the demand for unskilled employees.

2.3   Labour Demand Flows By Race, Class and Gender

The table below examines changes in employment by the four race groups and by gender. It is evident that the total employment gains since 1970 had a differential impact on the four racial groups in the society. More specifically, the results show that the employment of non-Africans increased at a rate of between 48% and 108%, while formal employment of African workers basically remained constant through this period. This result reflects, perhaps most strongly, the poor labour absorptive capacity of the formal sector - that over 25 years the largest cohort of workers saw its share in employment decline drastically. In terms of numbers of jobs gained, the breakdowns show this racial cleavage vividly: Africans gained about 1800 jobs, Coloureds 447 000, Asians 177 000 and Whites over 760 000 jobs.

A perusal of the figures within each main sector reveals that the key cause of the poor employment performance for Africans was the high losses in the primary sectors. Again, the issue here is whether the decline in the sectors' contribution to GDP (between-sector) or factor non-neutral technological change (within-sector), reflected in rising capital intensity in these two sectors, best explains the overall employment losses. There were, however, notable gains for Africans in the service sectors, with the largest increase reported in wholesale & retail. For Coloured, Asian and White workers, their increased employment was driven by the service sectors. Within mining, rising capital intensity is reflected in increased hiring of non-African workers, who are on average likely to be more skilled than their African counterparts. This represents a clear example of the differing skill requirements arising from technological change.

Table 2: Formal Employment Trends by Sector, Race & Gender, 1970-1995

	Agric	Mining	Manuf	Electric	Cnstrct	Wholes	Trnsprt	Finance	Comm	Total
African	2259895	609790	513795	29915	289758	309859	138434	36549	1088716	**5276711**
95	930227	352996	814171	48566	239162	792128	248738	200877	1648017	**5274882**
% change	*-58.8*	*-42.1*	*58.5*	*62.3*	*-17.5*	*155.6*	*79.7*	*449.6*	*51.4*	***0.0***
Coloured	116835	7164	166105	2460	78589	77074	27559	6863	159535	**642184**
95	220111	12725	231437	7140	85472	203221	43439	47412	238884	**1089841**
% change	*88.4*	*77.6*	*39.3*	*190.2*	*8.8*	*163.7*	*57.6*	*590.8*	*49.7*	***69.7***
Asian	7317	720	64448	204	9142	50833	7286	2864	22342	**165156**
95	2167	3581	96796	1114	12442	105466	19096	29865	72432	**342959**
% change	*-70.4*	*397.4*	*50.2*	*446.1*	*36.1*	*107.5*	*162.1*	*942.8*	*224.2*	***107.7***
White	97913	62677	281603	14179	98013	270069	164945	143655	325013	**1458067**
95	86339	100009	313897	37260	91750	422032	165105	350144	597336	**2163872**
% change	*-11.8*	*59.6*	*11.5*	*162.8*	*-6.4*	*56.3*	*0.1*	*143.7*	*83.8*	***48.4***
Male	1593046	673713	810811	45026	463980	512540	309839	115196	584753	**5108904**
95	988866	450366	1027576	82176	399399	867872	398773	346030	1338261	**5899319**
% change	*-37.9*	*-33.2*	*26.7*	*82.5*	*-13.9*	*69.3*	*28.7*	*200.4*	*128.9*	***15.5***
Female	888914	6638	215140	1732	11522	195295	28385	74735	1010853	**2433214**
95	249978	18945	428725	11904	29427	654975	77605	282268	1218408	**2972235**
% change	*-71.9*	*185.4*	*99.3*	*587.3*	*155.4*	*235.4*	*173.4*	*277.7*	*20.5*	***22.2***
Total	2481960	680351	1025951	46758	475502	707835	338224	189931	1595606	**7542118**
95	1238844	469311	1456301	94080	428826	1522847	476378	628298	2556669	**8871554**
% change	*-50.1*	*-31.0*	*41.9*	*101.2*	*-9.8*	*115.1*	*40.8*	*230.8*	*60.2*	***17.6***

The gender results show that the employment of both males and females increased. However, note that the percentage increase for female workers was greater. In addition, the share of male workers actually fell, while that of females increased over the period. The increased preference for women over men in the workplace is again a reflection of the rise in the service sectors, where the proliferation of desk work is more gender-neutral than in

the case of the heavy industries such as mining and segments of manufacturing. An indirect conclusion from the table is that of upward occupational mobility amongst women, which is in part shown in the finance sector numbers. More specific data for females by occupation shows that their share in managerial positions increased from 8.4% in 1970 to 18.4% in 1995.

The final table in the descriptive section examines the changing sectoral preferences for workers categorised by education levels. The table makes it plain that the overall 17.6% gain in employment was not evenly distributed by the different educational qualifications. Hence, the largest increase was for individuals with tertiary education whose demand rose by a huge 2 028% over the period. This was followed by those with completed secondary education, whose demand increased by over 350%. Interestingly, the completion of secondary education is an important predictor of employment, relative to those individuals who have not attained a matriculation certificate. For the latter individuals then, their employment rose by far less, at 53%.

Table 3: Formal Employment Trends By Education

	Agric	Mining	Manuf	Electric	Cnstrct	Wholes	Trnsprt	Finance	Comm	Total
None	1584594	368642	170476	14383	147909	80993	59213	14075	440254	**288054**
95	290289	34103	68516	3899	34839	57472	20012	6343	100508	**61598**
% change	*-81.7*	*-90.7*	*-59.8*	*-72.9*	*-76.4*	*-29.0*	*-66.2*	*-54.9*	*-77.2*	***-78.6***
Sub A-Std 5	704927	212122	356954	14864	171843	205838	82303	18804	579433	**234708**
95	618016	130227	258428	18028	128100	209750	76306	26135	308849	**177383**
% change	*-12.3*	*-38.6*	*-27.6*	*21.3*	*-25.5*	*1.9*	*-7.3*	*39.0*	*-46.7*	***-24.4***
Std 6-9	166472	84834	403834	13754	133088	331764	165914	68002	398602	**176626**
95	232159	175512	611518	23220	149096	631071	187669	134598	556187	**270103**
% change	*39.5*	*106.9*	*51.4*	*68.8*	*12.0*	*90.2*	*13.1*	*97.9*	*39.5*	***52.9***
Matric	23124	13124	84599	3087	19805	83950	29345	77359	138046	**472440**
95	61551	96124	358707	30054	62502	466611	127883	278060	686847	**216833**
% change	*166.2*	*632.5*	*324.0*	*873.6*	*215.6*	*455.8*	*335.8*	*259.4*	*397.5*	***359.0***
Tertiary	2843	1629	10088	670	2856	5291	1448	11690	39271	**75786**
95	36829	33345	159132	18879	54289	157943	64508	183162	904278	**161236**
% change	*1195.5*	*1947.1*	*1477.4*	*2716.8*	*1800.6*	*2885.2*	*4353.6*	*1466.8*	*2202.7*	***2027.5***
Total	2481960	680351	1025951	46758	475502	707835	338224	189931	1595606	**754211**
95	1238844	469311	1456301	94080	428826	1522847	476378	628298	2556669	**887155**
% change	*-50.1*	*-31.0*	*41.9*	*101.2*	*-9.8*	*115.1*	*40.8*	*230.8*	*60.2*	***17.6***

However, the biggest losers in this sample were those individuals with primary or secondary schooling. The demand for their labour decreased by at least 24%. Common economic wisdom has often held that primary schooling was key to both employment and higher earnings. The results here (and those elsewhere in fact) powerfully suggest that primary schooling is a necessary, but no longer sufficient, human capital base for even gaining employment. The results also make it plain that those with no education have been the most severely disadvantaged in the labour market over the last 25 years.

Ultimately, South Africa's labour demand patterns show a high and more than likely increasing demand for individuals with incomplete secondary education or more. The real winners will be those with completed secondary and individuals with tertiary education. In contrast, there is differential access to both employment and higher earnings for individuals with primary schooling or less, as their share of employment has fallen drastically since 1970.

The within-sector data is also interesting. The first strong trend in the data is that irrespective of the sector, including those intensive in the use of unskilled labour, the demand for those with no education fell over the sample period. Indeed, the sectors with the largest attrition rates were precisely those with large shares of low-level workers, namely mining and agriculture. The same trend is observed for primary education, although in utilities and retail trade, the shares of employment fell while the absolute numbers rose.

The incomplete secondary results provide an extremely useful understanding of labour demand patterns. It is clear that in the primary sectors, in manufacturing and in construction there was an increase in the relative demand for these workers as their shares increased over the period. On the other hand, in the remaining sectors, particularly finance and transport, there was a significant decline in the share of employment of these workers. The differing skill requirements of these two sets of main sectors would seem to be driving this difference. Hence, in the former set there would be a leaning towards semi-skilled over skilled workers in pure absolute share terms, and thus, while there was a move away from primary and no education workers, those with some secondary schooling were still in demand. In the service sectors though, the skills profile is much more biased toward high-skilled workers, and therefore incomplete secondary education in fact becomes an obstacle to employment here.

In the service sectors, we see the demand switch occurring when examining the matric and tertiary categories. Here there are overall percentage increases in the employment of workers with these educational qualifications

– ranging from 259% for matriculants in finance to 2 203% for those with degrees in the community services sector. Note that for the less skills-intensive sectors, the demand for these higher educated individuals also increased.

3. Decomposing Between- and Within-Sector Employment Shifts

The above descriptive statistics provide a wealth of detail on the broad patterns in labour demand. In various ways, and to differing degrees, the data suggest that the labour demand specifications of individual firms and sectors as a whole have shifted toward individuals with greater levels of human capital. The fact that we can observe the labour demand outcome, namely a higher demand for skilled and semi-skilled workers, is only half the puzzle solved. The other, perhaps more important, half of the puzzle is to try and determine the relative importance of the factors that have shaped this labour demand trajectory.

As alluded to above, it is useful to think of labour demand patterns as being driven at the sectoral level by two forces – *within-sector shifts* and *between-sector shifts*. Within-sector employment shifts are those changes in labour allocation that come from within the industry itself. Between-sector changes are relative employment shifts occurring between sectors in the economy. Sources of within-sector shifts include technological change in a sector that may create the need for a certain skill type over another. A change in the price of a non-labour factor, such as capital equipment or computers, may also result in an altered preference for certain labour types. Outsourcing of non-core functions, although hard to measure, is another form of within-sector shifts that may result in changing labour preferences. Between-sector employment changes are principally explained through the altering shares in aggregate output of the sector under consideration. Through a growing or declining share in production of a sector, labour demand at different skill levels may alter. Within this, the share of domestic output that changes due to trade flows can also affect the degree of between-sector shifts. Finally, the

shifts in product demand across industries may also play a role in explaining between-sector labour allocations. Hence a growing share of the product market by a specified sector may result in altered preferences for certain skills.

Clearly, the employment patterns observed in the tables above can be readily explained by both these factors. The issue, though, is to estimate the relative strengths of these two forces in explaining the employment trends observed in Tables 1 through to 3 above. In order to achieve this, we utilise a basic decomposition technique drawn from Katz and Murphy (1992). While the details of this decomposition technique are provided in Appendix 2 below, the technique proceeds along the following lines of reason: assume that total employment in the economy has changed from one period to the next. This total employment shift will in turn be represented in primarily two ways. Firstly, because sectors are growing (or shrinking) they will hire more (or less) workers. Secondly, firms may find that internal changes lead them to hiring more or less employees. In addition, we can work from the assumption that we are not only interested in total employment shifts, but also shifts in employment that have occurred by occupation, race, gender and so on. In this way, we are able to determine, for example, what has happened to the demand for skilled professionals in the economy. We can easily, of course, determine the total change in the demand for their services. However, what the decomposition technique offers, is the ability to determine which of the above two factors – the between-sector versus the within-sector – has been the primary cause for this employment shift. Simply put, the decomposition allows one to answer the following prototype question: were between-sector or within-sector forces more important in explaining the overall rise in the demand for skilled professionals in the period 1970 to 1995?

It should be noted, though, that there are a number of drawbacks with the decomposition approach. Firstly, it assumes that wages are constant in all employment shifts recorded. Hence, we record quantity shifts only, without recourse to the possible impact of wage changes on labour demand. Secondly, the technique, and indeed all decomposition techniques, suffer

from their static analysis. In other words, the analysis may show, for example, that technological change resulted in a decrease in employment of certain groups or occupations in the period under study. However, it doesn't (or cannot) take account of the indirect input-output effects of such a change. These indirect effects may in the long run, via higher national economic growth, for example, in fact cause an increase in the demand for these labour types. This is the most fatal critique of the decomposition technique, but yet one that is not easily solved by better alternative techniques currently available.

3.1.   Employment Shifts By Occupation, Race and Education Level

The tables below present the results of the decomposition approach outlined above. It should be noted that here, and indeed in the rest of the paper, the underlying assumption is of a perfectly elastic labour supply function. This also explains the assumption of constant relative wages. In essence then, we measure the sectoral dynamics of a shift in the labour demand function along the labour supply curve of any given occupation or socio-economic group.

Table 4 below presents the decomposition results by occupational classification between the two periods, 1970 and 1995. The total demand shift index reiterates, in a more robust form, the rise in the demand for skilled workers. Hence, the highest total relative demand shift is for the clerical & sales occupations, followed by managers and then by individuals in professional positions – all of whose relative demand increased by over 15% or more in the period. The poorest performers are farm workers, production workers and labourers respectively.

Table 4: Industry-Based Relative Demand Shift Measures by Occupation, 1970-95

Shift	Between	Within	Total	Share of within
Prof/Semi-P/Tech	0.87	14.61	15.48	94.38
Adm/Exec/Mnge	0.36	18.44	18.80	98.10
Clr & Sales	2.91	20.46	23.37	87.56
Service	2.78	11.85	14.63	81.02
Farm/Fish/For	-8.78	-25.65	-34.44	74.49
Prd wrk & oper	-0.34	-1.21	-1.55	78.04
Labourer	0.64	6.88	7.52	91.55
Transport	0.51	11.26	11.77	95.66
Unspec	0.03	10.25	10.28	99.73

The more important result from the table is the contribution of the between- and within-sector shifts to overall relative demand for the given occupation. There is a clear and strong indication that, across all nine occupational categories, the within-sector component dominates over between-sector shifts in explaining the profile of relative demand in the South African economy. The last column of the table displays the percentage share of the within-sector component in explaining the overall shift. Particularly in the case of the skilled occupations, the within-sector component is the major source of the labour demand shifts observed over the last 25 years in South Africa.

Interestingly, while the within-sector component is more important for farm workers and production workers, its dominance is less striking. This could reflect the importance of the decline in the primary sectors' contribution to GDP in accounting for high attrition rates at the bottom end. Table 4 above confirms that these two occupations are the largest segment of the workforce

in agriculture and mining respectively. However, the results suggest that the employment gains at the top end, observed in the primary sectors, was primarily a result of the high adoption rates of capital, marked by rapid rise in the capital-labour ratios in these sectors. The within-sector dominance for all skilled occupations is therefore captured partly by the classic form of machinery substituting for labour. It is, though, also more generally manifest in the onset of the microelectronics revolution alluded to above. Hence, the proliferation of computer usage across all sectors of the economy, but within services in particular, is the key mechanism for the growth in the demand for higher skilled individuals. The analysis also suggests that the rise in the output share of the service sectors, over and above the primary and secondary in the last 25 years, is in fact a less important determinant of the observed employment flows for skilled workers in this sector.

The table below provides the decomposition results by race and gender. Hence, the subscript *k* from equation (1) (see Appendix 2) above now represents the race or gender of the employed formal sector worker. The first interesting result is that for Africans it is not within-sector, but rather between-sector relative demand shifts that explain the overall demand trends for this group of workers. The between-sector shifts that have occurred in the economy therefore account for about 70% of the labour demand patterns observed for African workers. Given that the majority of African workers are unskilled, this is a race-specific outcome extending the evidence for farm labourers and production workers in the previous table, on the importance of between-sector shifts. It suggests that when examining the high attrition rate for unskilled African workers, the key cause has been the decline in certain sectors, matched by the rise in certain sectors since 1970. Put differently, the decline in the primary sectors, which are intensive in the employment of unskilled African workers relative to other race groups, combined with the rise in the service sectors, which are in general intensive in the use of skilled non-Africans, is the dominant explanation for the loss of jobs amongst African employees. Indeed, Table 2 above confirms that the major employment trend for African workers was the large job losses in the two primary sectors. The results illustrate that it is only for Africans where both production method

changes (within-sector shifts) and structural change (between-sector shifts) have caused a decline in their labour demand. All non-African workers have in turn gained from these two changes in the domestic economy. Note that the overall demand for labour in this instance increases monotonically by race group.

Table 5: Industry-Based Relative Demand Shift Measures by Race and Gender, 1970-95

Group	Between	Within	Total	Share of within
African	-4.54	-2.10	-6.64	31.68
Coloured	0.50	5.02	5.52	90.97
Asian	0.37	13.80	14.16	97.42
White	3.31	11.61	14.92	77.80
Male	-1.15	-0.56	-1.71	32.69
Female	1.12	2.27	3.39	66.88

In summary, while the take-up of skilled workers, in this case proxied by non-Africans, is a result of technological changes within firms, the loss of unskilled African workers is largely a function of the altered sectoral output shares in the domestic economy. This is not to say, though, that technological change has not been relevant in explaining the drop in unskilled employment. Indeed, the table shows that 32% of the explanation for the decline in the demand for Africans is due to firms and sectors showing a preference for capital over labour. The decline in the demand for African workers in the primary sectors was firstly a function of the poor output performance of these sectors relative to others in the economy, and secondly, a lesser function of the high capital-labour substitution rates in these sectors.

The gender results show that overall, the relative demand for males has fallen by 1.7%, while that for females has increased by over three percent. The male results reflect the decline in the primary sectors where most of the workers are men, and are shown by the larger between-sector component. While the rise in the service sectors did increase the preference for female labour, it was essentially changing technology or within-sector shifts that explained the greater demand for these workers. Female workers have gained partly as production methods place a greater emphasis on pre-production planning and design, as well as the fact that the job gains from the information technology revolution are gender-neutral.

The final decomposition is according to differing education levels. The only two education categories to witness a decline in demand for their labour are those with no education and individuals with primary schooling. This is a further indication of the movement away from unskilled individuals in the economy. In turn, relative employment demand increased by at least 10.9% for those individuals with incomplete secondary education or more. It is important to note, when trying to link firms' demand needs to skills development policies, that the attainment of a matric, relative to incomplete secondary education, significantly alters the demand for a worker across all sectors of the economy. As is to be expected the two largest relative demands are for individuals in the two highest education cohorts.

Table 6: Industry-Based Relative Demand Shift Measures by Education Level, 1970-95

Educn. Group	Between	Within	Total	Share of within
None	-4.80	-9.11	-13.92	65.48
Sub A-Std 5	-0.11	-0.24	-0.34	68.96
Std 6-9	2.82	8.13	10.95	74.22
Matric	1.48	17.67	19.16	92.26
Tertiary	0.23	18.05	18.28	98.75

In the matric and tertiary categories, it has been production method changes within the individual main sectors that have driven the increased demand for their labour. Over 90% of the increase in the demand for these high-skilled workers in the last 25 years is a function of the rising capital-labour ratios in the different sectors. Once again then, while the dominance in the services sector is an explanation for the demand for high-level workers, it is primarily technological change within sectors that explains the altered trajectory of firms' labour demand preferences.

For the remaining education cohorts, within-sector shifts are also dominant, although between-sector shifts do play a larger role. Hence, for those with primary education or no schooling, structural change in the economy explains between 31% and 34% of the total relative demand shift for these workers. Note that even in the case of those with incomplete secondary education, over 20% of the total shift can be explained by the between-sector component.

Utilising an established labour demand decomposition technique then, the above has derived some important results in terms of our understanding of the cause of employment flows at the sectoral level. It is clear, firstly, that demand has shifted away from unskilled individuals to those in semi-skilled and skilled occupations – a result easily imputed from the race and education breakdowns as well. In addition, the key cause of these shifts has by and large been technological change within the individual sectors. The rising capital intensity in sectors, coupled with greater computerisation, prompted the need for more high-end workers. Interestingly though, the results suggest that when examining lower skilled workers, the importance of within-sector shifts remains, but diminishes. This suggests that for those at the bottom end, the altering shares in national output of different sectors had a more significant role in understanding relative employment shifts, when compared with those at the top end where employment shifts were overwhelmingly shaped by within-sector factors.

4. Labour Demand Shifts From International Trade

An extension to the above decomposition is to consider the effect that trade flows may have on labour demand. It has often been argued, for example, that imports of final demand commodities in substituting for higher-priced local goods, may lead to employment losses in the affected domestic industry. In turn, growth of exports in the home country may lead to employment gains in the growing sector. Examples of the impact on employment levels from trade flows include the US economy. Here, large trade deficits in the 1980s spurred by high imports of cheap East Asian products had the impact of significant job losses for production-level workers. More specifically, a large number of female high-school drop-outs in the clothing industry lost their jobs during this period, as these firms closed down under pressure from the cheap East Asian substitutes.

The major challenge in looking at the impact of trade flows on the SA labour market is to unravel the specific impact that tariff liberalisation as opposed to a range of other factors such as the exchange rate and domestic demand play in influencing employment patterns. This line of enquiry is constrained by data. Instead, what this study attempts to do is to look at the impact of the change in trade flows on labour demand. How, for example, does increasing product trade deficits influence labour demand? The limitation of the study is that it will not be able to answer what really caused the increase in these trade deficits. Instead, the aim of this section is to look at annual data from 1970 to 1997 in order to investigate the link between changing trade patterns and labour demand.

As with the previous section, the Katz and Murphy (1992) decomposition technique will be utilised. While the reasoning and technique are similar to that discussed above, there are a few important differences, which are presented in detailed form in Appendix 2. Essentially, though, the technique proceeds from the assumption that labour, as a factor of production, is required to produce goods and services. Given this, changes in output or production levels will induce changes in the demand for labour. The extension to this is to conceive of net exports as constituting tradable output

that utilises domestic labour. It is, of course, possible to isolate the value of net trade in national output. Having done this, we simply measure the contribution of labour, identified by occupation, race and so on, to this traded output. We then arrive at results that reflect what labour types are positively or negatively affected by the movements in net trade in the economy.

As with the first decomposition, the two drawbacks are that we assume wages constant, and that the long-term multiplier effects on employment are not considered. The latter is particularly important for this trade decomposition, as the technique cannot predict whether continued growth in net exports may in fact benefit those skill groups that initially lost out from the change in trade volumes. This is, of course, a key component of the debate around the costs and benefits of trade liberalisation. Yet, while not providing such a dynamic long-term analysis, the decomposition yields results that point to the short- and medium-term labour demand trajectory that trade flows are likely to engender.

4.1. Employment Shifts by Occupation and Sector from Trade

In trying to gain a more sensitive analysis of the impact of trade flows on employment shifts, the model represented by equation (4) above is the one utilised here. It allows one to assign a differential impact on employment by occupation from exports as opposed to imports. Table 7 below presents the results of the trade flow decomposition by occupation. The underlying sectoral data that informed this calculation are drawn from only three sectors, namely agriculture, mining and manufacturing. The reasons for this are firstly, that trade data on the remaining sectors, particularly in services, are hard to come by and notoriously poor for both 1970 and 1995. Secondly, despite the omission of the remaining sectors, the three included constitute the dominant share of South African exports and imports in the period under study. The export and import data, as well as the output data, would have been ideally represented in real value terms. However, at present no optimal price deflators exist for exports and imports, with the latter

being particularly problematic. The solution opted for, albeit a second-best one, was to use nominal values for exports, imports and GDP by sector. Given that we are interested only in the *ratios* of the trade variables to GDP, this was viewed as an acceptable route to take. It is envisaged that not much detail would be lost through this approach.

Table 7 illustrates that for the economy as a whole, trade flows had a positive impact on the demand for labour at all occupational levels. This is a crucial result, as it suggests that the movement of imports and exports together had the effect of *increasing* the demand for labour in the economy. This is contrary to evidence for other economies, particularly those in the developed world. This is a point expanded on below. The table below shows that the expansionary trade-employment effect operated at all skill levels in the economy. This effect ranged from a relative demand increase of 3.4% for production workers to a 122.7% increase for managerial occupations.
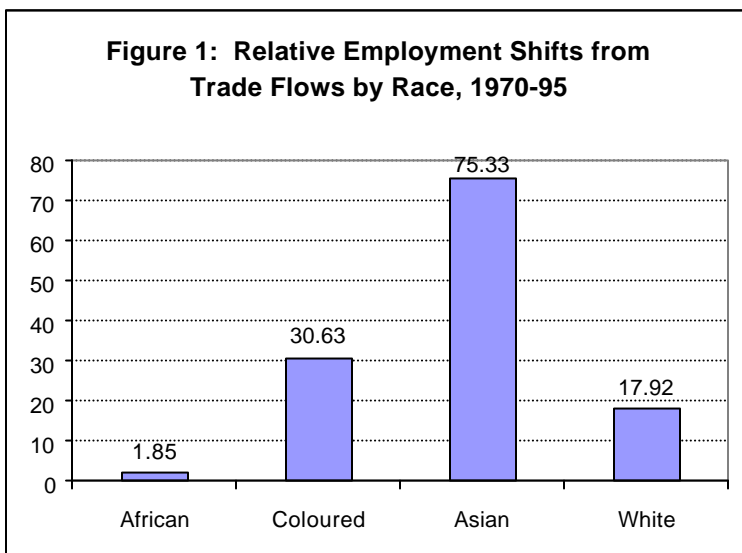
Table 7: Relative Employment Shifts from Trade Flows by Occupation, 1970-95

Occup/ Sector	% Change
Prof/Semi-P/Tech	110.75
Adm/Exec/Mnge	122.71
Clr & Sales	63.75
Service	96.27
Farm/Fish/For	11.26
Prd wrk & oper/Art	3.38
Labourer	52.80
Transport	88.08
Unspec	178.01

It is evident, though, that the employment gains from trade flows were not evenly distributed by skill groupings. The labour demand increases

experienced by semi-skilled and skilled workers far outweighed those of unskilled individuals. For example, the gain to production workers and farm labourers, who constitute the bulk of the unskilled in the economy, amounted to between three and 10 percent of the gains realised by those in managerial occupations. Even between semi-skilled and skilled workers there appears to be a difference. The percentage increases for those in the top two occupations are fairly closely lumped together, while for those in the semi-skilled categories (clerical & sales; service) the gains are within a close range but significantly below professionals and managers. Ultimately then, while international trade has contributed to employment growth across all occupations in the economy, it has been growth disproportionately favouring (disfavouring) skilled (unskilled) workers in the labour market.

Figures 1 and 2 proceed with the trade flow decompositions by race and education level. Again, it should be evident that similar results to the one above are derived. Hence, the race figures show that, in percentage change terms, the demand for employment of all race groups rose due to international trade. The increase, though, was again unevenly distributed, as non-African workers gained by 18% or more, while the relative demand for African employees rose by less than two percent over the period. The highest relative demand increase was for Asian workers, at 75.3%. Indeed, the discrepancy between African and non-African workers is shown in the fact that the gains from trade to Asian workers was 40 times greater than that for African individuals.

Figure 1: Relative Employment Shifts from Trade Flows by Race, 1970-95

Race	Value
African	1.85
Coloured	30.63
Asian	75.33
White	17.92

It is interesting to note that amongst non-Africans, White workers in fact gained less than their Asian and Coloured counterparts. This result places in sharper focus the skills-biased gains from trade observed in the occupation table above. Thus, while Table 7 above shows that unskilled workers gained less than skilled and semi-skilled workers from trade, this table suggests that African workers were the least advantaged by movements in the economy's export and import volumes.

The educational divisions in the figure below suggest the same trends, namely that the impact of trade flows was to increase the demand for labour at all levels. Hence, from no education to tertiary education, it is evident that imports and exports together resulted in a rise in the demand for workers with different educational qualifications. The employment gains from trade, however, increase markedly for those with a matric or tertiary education. For individuals with no education, primary education or incomplete secondary education the gains to employment from international trade ranged between six percent and ten percent. Note also that the gains from trade for

those with no education or primary education are almost indistinguishable. This adds further evidence to the general view that additional labour market opportunities offered by gaining primary education, relative to no education, are almost non-existent.

Figure 2: Relative Employment Shifts from Trade Flows by Education Level, 1970-95
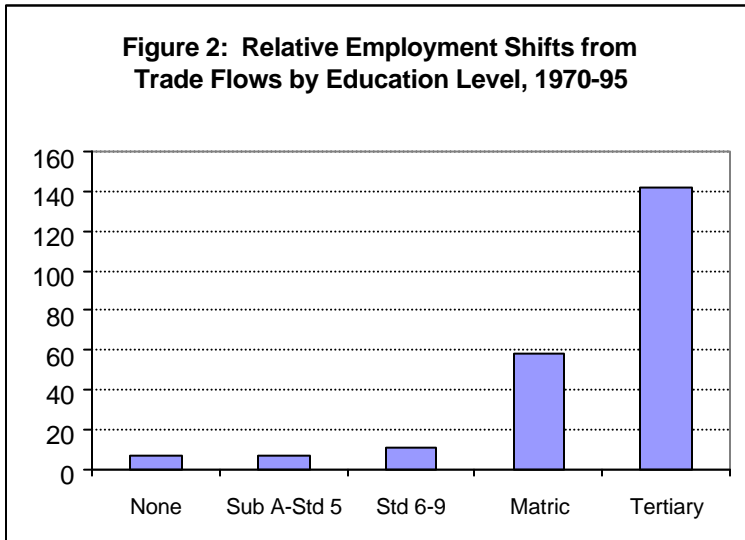
While incomplete secondary education offers greater employment gains, the significant gains from trade arise when individuals attain a matriculation certificate. Hence, individuals with a matric saw their employment opportunities from international trade rise by about 58%, close to six times the figure for those who had not completed secondary schooling. In addition, workers with a degree experienced a 142% increase in the demand for their services, which in itself is a marked increase from the gains accruing to matriculants. This data suggest that international trade favoured all workers but that preferences magnified as one moved to higher education levels. In particular, the largest wedge in these labour demand gains was to be found

between those with completed secondary education as opposed to individuals with less than a matric. As with the race and occupation data, import and export flows, while favouring all groups of workers, did not favour them equally. Higher skilled workers, or in this case, higher educated workers gained substantially more from international trade.

From the above it is evident that the gains from international trade to employment have been positive. All workers, by occupation, race and education level, can be said to have gained from the flows of exports and imports recorded in the economy between 1970 and 1995. However, it is evident that these gains were not skills, race and education-neutral. Specifically, the employment gains for skilled individuals, or those who had high educational qualifications or workers who were non-African, were appreciably greater than for individuals who did not fit into either of these cohorts. In short, workers at the bottom gained from international trade but gained significantly less than their counterparts at the top end.

The positive results across all skill levels are different from the experience of many countries, particularly developed economies. As the introduction to this section suggested, the USA, for example, reported significant job losses in certain industries as a result of trade flows in the 1980s. The contrast, it would seem, with the South African results is that of the nature of import demand. The high propensy of import complements to domestic production in South Africa, as opposed to import substitutes to domestic consumption in the USA, in all probability explains this difference in results. Hence, in the USA, the proliferation of imports directly challenged local industries, and caused many to close down, so resulting in the reported employment losses. In South Africa, however, at least until more recently, the majority of imports were complementary to domestic growth and in fact supported, rather than supplanted, domestic production. A rise in import volumes therefore was a proxy for a rise in domestic activity during this period, so resulting in a greater demand for labour. If one combines this fact with the rise in export volumes that was witnessed in all the three sectors utilised for the decompositions, then the positive employment effects are not surprising at all.

The above reasoning and, indeed, the results, may alter if the nature of imports has changed with the onset of tariff liberalisation. This phase-down of protection on local goods may see a growth in the supply of imports in the domestic market. The employment effects, all things being constant, would be negative as domestically produced goods are replaced in the local market. It is the part intention of the next section to interrogate this fact, and through using time series data within manufacturing, to determine the employment effects from trade flows following the period of intensive tariff liberalisation from 1994 onwards.

4.2. Employment Shifts from Trade within Manufacturing

Time series data drawn from the WEFA data set were utilised for this section. The data is based on 24 sub-sectors within the manufacturing industry, at the 3-digit SIC level. The sample was for the period 1970 to 1997. As with the previous section, the import and export data, as well as the GDP figures used were in nominal terms. The employment data are significantly different from that used above. Three skill categories were defined - namely highly skilled, skilled and unskilled. No time series data exists on employment by specific occupation, and this is the only available alternative. Employment figures by race have been used as a proxy for skill but are of course a less optimal option than these skill category divisions.

Apart from the first time period, the results in Table 10 below are broken down into five-year periods. It is immediately evident that the annual data covering manufacturing only reveal employment patterns different to those obtained with the national two-period coverage in the above section. Hence, while the total figures suggest a positive employment effect in manufacturing due to trade from 1970 through to 1987 - it is clear that for the last two periods, 1988-92 and 1993-97, trade flows had the impact of decreasing overall manufacturing employment levels.

Table 10: Relative Employment Shifts from Trade Flows within Manufacturing, 1970-1997

Period	Highly skilled	Skilled	Unskilled	TOTAL
1970-72	8.11	9.42	16.89	30.63
1973-77	13.17	14.63	20.56	34.60
1978-82	0.10	2.29	10.80	28.87
1983-87	-4.83	-2.22	6.12	25.41
1988-92	-18.28	-21.27	-33.24	-57.93
1993-97	4.98	0.92	-14.37	-49.32

Indeed, the employment losses from trade since the late 1980s outweighed, in percentage change terms, the gains in employment within the sector in the previous years. Essentially, the period from the late 1980s marks the beginning of South Africa's tariff liberalisation programme, with the last four or five years representing the start of the formal GATT-linked tariff phase-down process. This changing tariff regime clearly had the impact of significantly reducing total manufacturing employment levels.

These overall employment losses, however, hide important labour market details about which types of skills were affected relative to others. The data shows that in the period 1970-82, all workers across all skill groups gained. The percentage increase in employment ranged from 0.1% for highly skilled workers in 1978-82 to about 21% for unskilled workers in the mid-1970s. What is evident though, is that in each of these first three time periods, unskilled workers in fact gained more from trade flows than skilled or highly skilled workers in manufacturing did. This is a result counter to what has been reported above. What this suggests is that the period of high protection and significant limits on import substitutes in manufacturing, created the conditions for the growth of sectors that were intensive in the use of labour. Specifically then, flows of trade in the period benefited labour-intensive industries in manufacturing, resulting in a large rise in the demand for unskilled workers relative to skilled or highly skilled employees. Rising trade flows during this period meant, in the case of import demand in particular, that domestic

production was also increasing. Hence, the benefit of these trade flows would seem to have gone disproportionately to labour-intensive producers, and this is manifest in a demand for unskilled workers that was greater than the preference for skilled or highly skilled workers. Ultimately, in the period of high protection within the manufacturing industry, while trade flows caused employment levels to increase, this increase was unevenly distributed with the primary winners being those at the bottom end of the job ladder.

From the late 1980s, this distribution of employment gains by skills was fundamentally altered. In the period 1988-92, all skill groups lost from trade flows, but the losses were skewed towards unskilled employees. While the latter saw its employment due to trade fall by 33%, the figure for highly skilled workers was about half of this, at 18%, and that for skilled workers about 21%. From the total employment reduction of 58% during this period, unskilled workers bore the brunt of this early tariff adjustment period. The last period in the above table, though, is indicative of the changing employment effects from trade. The total employment loss of 49% in this case, was solely borne by unskilled workers as their employment fell by about 14%. On the other hand, skilled and highly skilled workers gained, with highly skilled workers experiencing a five percent increase in their employment from trade flows during this period.

Data for the period 1992-95 certainly shed light on the reasons for these labour substitution outcomes. Hence, imports and exports, as a percentage of GDP, increased significantly during this period. The export-GDP ratio rose from 38% in 1992 to 59% in 1997 – a 55% growth over the six-year period. Imports to GDP in turn rose dramatically from 66% to basically the same value of manufacturing GDP in 1997 – constituting a 52% growth. The export figures reflect firms searching and finding new global markets for their manufactured products, while the import numbers are manifest partially in complements to local production, but more so in the proliferation of cheaper import substitutes made available for domestic consumption, which serve as a direct and serious threat to domestic manufacturers.

Clearly then, the onset of tariff liberalisation since the late 1980s meant that import substitutes were displacing final domestic goods and placing extreme pressure on previously protected manufacturing industries. This would explain the losses at the bottom end of the ladder and, indeed, also some of the attrition at the top end. The last period in the analysis suggests that firms in the industry have responded to liberalisation by opting for efficiency and price gains through a leaner and more skilled work force. The search for efficiency and price gains had meant a replacement of capital for labour, as well as to cease competing in product markets purely on the basis of cheaper labour costs. The growth in exports then, meant a high demand for skilled workers in search of these new markets, combined with the discarding of those at the bottom end, a step viewed as necessary to exact efficiency gains within firms. The higher import demand figures in this post-election period resulted in extreme pressure on domestic manufacturers and the key consequence was therefore substantial job losses for workers in unskilled jobs. The fact that it was primarily labour-intensive sectors that bore the brunt of this surge in imports, no doubt is the key reasoning behind the high attrition rate for unskilled workers.

The labour demand trajectory in this last period within manufacturing suggests that trade flows affected unskilled workers negatively, while skilled and highly skilled workers gained from the liberalisation efforts. This trend can be expected to continue and the short-term consequences of trade liberalisation will therefore be greater levels of joblessness amongst the unskilled. The take-up of employment due to trade flows are not in these low-skill jobs, and the result will be a bulging of the already large mismatch between employers' needs and skills of the unemployed. In short, the tariff liberalisation programme has created, and will continue to create, an enhanced demand for skilled and highly skilled workers, but at the same time will result in significant unemployment at the bottom end of the job ladder.

The first decomposition and, indeed, work elsewhere (Bhorat & Hodge, 1999) have illustrated the importance of within-sector forces in shaping labour demand. In turn, the trade flow decomposition maps trade volume changes

to employment patterns. There is, however, undoubtedly a strong linkage between these two factors and the mechanisms through which they together influence labour demand outcomes. It is therefore necessary to determine to what extent changing exports and imports in economy, in and of themselves, resulted in the search by firms for technological and production method changes. In other words, greater competitive pressure from the late 1980s may have been the cause for the large within-sector changes witnessed in the first decomposition, and hence the labour demand patterns observed in the 1990s. In undertaking such analyses, we will arrive at a far more comprehensive understanding of the impact of trade flows in shaping sectoral growth patterns, and how this, in turn, is able to affect employment patterns. While this study is not able to comprehensively answer this question, it remains a crucial area for future more focused research on the linkage between trade liberalisation and the labour market.

Ultimately though, the above results suggest that short- and medium-term adjustment policies aimed at ameliorating the labour market consequences of trade liberalisation must take into account the degree and nature of this mismatch between firms' labour demand specifications and employees' human capital endowments. This means that very specific and well-targeted labour market *cum* industrial policy initiatives are required. It is clear that a policy stance that expects the process of liberalisation to eventually create the conditions for long-term productive employment for these victims of the adjustment process, based on the available evidence, is almost certainly erroneous.

5. Policy Conclusions

It should be evident from the above that, in general, the employment performance of the formal sector over the last 25 years has been dismal. The poor job-creating record of the formal economy is, of course, the key reason for the present high levels of unemployment in the society. The study has shown that this poor employment performance has primarily affected unskilled workers in sectors that disproportionately employ these individuals. In

addition, it was evident that African workers lost out relative to other race groups, and low-education workers were the primary losers in this period. In essence then, while unemployment levels increased, new jobs were created, but they were created in skills and in occupations not matched by those losing their jobs.

The paper isolated two possible causes for explaining the employment losses and the new employment patterns in the economy, namely within-sector and between-sector forces. These decomposition results showed that across all occupations, within-sector forces are the dominant explanation for the demand for each of the occupations identified. This implies that factors such as technological change within firms, or the relatively lower price of capital to labour have been some of the major explanations for the changing preference of firms from lower-skilled workers to higher-skilled employees. However, there is an important caveat to this result. The decomposition for lower-skilled workers showed that structural change, or between-sector shifts, are more important in understanding labour demand shifts than in the case of higher-skilled workers. This result is strongest in the race decompositions, where the between-sector contribution for Africans is in fact bigger than the within-sector. This suggests that in the lower skill groups, while within-sector influences are crucial, the fact that the economy has experienced a structural shift becomes a much more important determinant of the employment changes. Essentially, the decline in the primary sectors, relative to the service industry, bears a disproportionate responsibility in explaining the job losses at the bottom end of the job ladder, relative to within-firm or within-sector forces.

The influence of trade flows on employment indicates that between 1970 and 1995 all occupations, race groups and education cohorts gained in employment terms from export and import movements in the economy. However, there was a differentiation again, as those in higher skill groups or in higher education categories gained significantly more than those in the bottom echelon did. Nationally then, while all were winners from trade flows, individuals at the top end captured the largest share of these employment

gains. The time-series evidence for manufacturing only was perhaps more telling. Here the early years of heavy protectionism in fact offered greater gains for unskilled workers relative to skilled employees. From 1988 onwards, and particularly in the 1993-97 period though, the situation was reversed. Hence, the onset of an intensive tariff liberalisation programme had the effect of inducing high job losses for those workers in the unskilled categories, while skilled workers gained. As the liberalisation programme continues it cannot be doubted that this labour demand pattern will continue. In this environment the future and long-term job generating capacity of the economy will be skewed towards those with high levels of human capital, and thus more comprehensive state policies will be required to deal with the job losses experienced in the economy.

References

Bhorat, H (1999), The October Household Survey, unemployment and the informal sector, *The South African Journal of Economics*, Vol. 67(2), June.

Bhorat, H & J. Hodge (1999), Decomposing Shifts in Labour Demand in South Africa, *The South African Journal of Economics*, forthcoming, Vol. 67(3) September 1999.

Bhorat, H & M. Leibbrandt (1998), Poverty amongst the Self-Employed, *Studies in Economics and Econometrics*, 22(3).

ILO (1998), *Studies on the Social Dimensions of Globalisation: South Africa.* Draft. November 1998. Geneva.

Katz & Murphy (1992), Changes in Relative Wages, 1963-1987: Supply and demand factors, *The Quarterly Journal of Economics*, February.

Appendix 1

Table XX: Shares in Formal Employment By Sector and Occupation: 1970-1995

Occup	Agric.	Mining	Manuf.	Utilities	Cnstm	Wholes	Trspt	Finance	Comm	Total
Prof/Semi-P/Tech										
Share, 70	0.1	1.1	3.3	5.1	2.0	1.8	3.3	13.4	15.8	4.7
Share, 95	0.3	4.6	7.3	17.3	5.2	4.1	14.0	29.4	38.5	16.5
% ch	401.7	304.7	118.9	238.9	157.0	123.5	326.5	120.0	144.1	250.2
Adm/Exec/Mnger										
Share, 70	0.0	0.3	2.8	0.6	2.3	5.7	2.1	6.1	0.8	1.5
Share, 95	0.5	2.8	5.7	2.7	5.2	10.7	6.7	8.6	2.0	4.8
% ch	1368.9	699.5	99.6	366.5	121.4	86.4	224.6	42.1	168.0	216.2
Clr & Sales										
Share, 70	0.1	2.6	11.6	7.5	3.2	45.0	14.8	57.9	6.0	9.7
Share, 95	1.0	8.1	8.9	11.0	3.7	18.1	12.9	35.2	11.6	12.0
% ch	664.6	212.7	-23.2	46.9	16.1	-59.7	-12.8	-39.2	93.9	23.3
Service										
Share, 70	0.2	3.7	3.1	5.7	1.5	13.4	5.0	14.0	64.8	16.5
Share, 95	1.4	7.9	5.5	7.7	1.6	39.1	8.8	16.8	28.9	18.4
% ch	625.3	111.2	76.8	36.1	10.4	192.3	75.9	20.0	-55.4	11.5
Farm/Fish/For										
Share, 70	98.4	0.7	0.5	1.0	0.2	0.4	0.3	0.2	4.0	33.4
Share, 95	82.3	0.8	0.6	0.0	0.1	0.8	0.6	0.3	4.2	13.0
% ch	-16.4	13.3	15.5	-100.0	-52.1	97.5	135.9	26.3	5.3	-61.0
Prd wrk & oper/Arti										
Share, 70	0.5	86.0	57.1	38.7	55.8	14.5	20.4	1.8	2.3	22.3
Share, 95	1.7	48.9	47.4	41.8	59.6	12.9	12.2	3.3	3.7	18.1

% ch	229.6	-43.2	-16.9	7.9	6.8	-11.3	-40.2	83.1	56.3	-18.8
Labourer										
Share, 70	0.3	2.1	16.2	38.4	31.7	10.2	23.3	2.0	4.8	7.8
Share, 95	1.6	15.0	16.0	9.4	19.4	7.8	5.6	1.3	2.7	7.2
% ch	367.7	624.8	-1.0	-75.4	-38.9	-23.2	-75.9	-37.9	-43.2	-7.7
Transport										
Share, 70	0.3	3.3	4.6	2.6	3.0	8.7	30.3	4.4	1.4	3.8
Share, 95	11.1	11.2	8.2	8.6	5.0	6.1	38.6	4.8	5.3	8.8
% ch	4266.6	243.3	77.1	227.2	65.5	-29.5	27.7	9.3	270.2	131.7
Unspecified										
Share, 70	0.0	0.1	0.7	0.5	0.3	0.3	0.7	0.2	0.2	0.2
Share, 95	0.0	0.7	0.4	1.6	0.3	0.3	0.6	0.4	3.1	1.2
% ch	286.4	405.3	-40.3	202.3	-3.7	13.8	-10.4	63.7	1589.0	381.3
Total										
Share, 70	100	100	100	100	100	100	100	100	100	100
Share, 95	100	100	100	100	100	100	100	100	100	100

Table XX: Shares in Formal Employment By Race, Gender & Sector: 1970–1995

	Agric.	Mining	Manuf.	Utilities	Cnstrn	Wholes	Trspt	Finance	Comm	Total
African										
Share, 70	91.1	89.6	50.1	64.0	60.9	43.8	40.9	19.2	68.2	70.0
Share, 95	75.1	75.2	55.9	51.6	55.8	52.0	52.2	32.0	64.5	59.5
% change	-17.5	-16.1	11.6	-19.3	-8.5	18.8	27.6	66.1	-5.5	-15.0
Coloured										
Share, 70	4.7	1.1	16.2	5.3	16.5	10.9	8.1	3.6	10.0	8.5
Share, 95	17.8	2.7	15.9	7.6	19.9	13.3	9.1	7.5	9.3	12.3
% change	277.4	157.5	-1.8	44.3	20.6	22.6	11.9	108.8	-6.5	44.3
Asian										
Share, 70	0.3	0.1	6.3	0.4	1.9	7.2	2.2	1.5	1.4	2.2
Share, 95	0.2	0.8	6.6	1.2	2.9	6.9	4.0	4.8	2.8	3.9
% change	-40.7	621.0	5.8	171.4	50.9	-3.6	86.1	215.2	102.3	76.5
White										
Share, 70	3.9	9.2	27.4	30.3	20.6	38.2	48.8	75.6	20.4	19.3
Share, 95	7.0	21.3	21.6	39.6	21.4	27.7	34.7	55.7	23.4	24.4
% change	76.7	131.3	-21.5	30.6	3.8	-27.4	-28.9	-26.3	14.7	26.2
Male										
Share, 70	64.2	99.0	79.0	96.3	97.6	72.4	91.6	60.7	36.6	67.7
Share, 95	79.8	96.0	70.6	87.3	93.1	57.0	83.7	55.1	52.3	66.5
% change	24.4	-3.1	-10.7	-9.3	-4.5	-21.3	-8.6	-9.2	42.8	-1.8
Female										
Share, 70	35.8	1.0	21.0	3.7	2.4	27.6	8.4	39.3	63.4	32.3
Share, 95	20.2	4.0	29.4	12.7	6.9	43.0	16.3	44.9	47.7	33.5
% change	-43.7	313.7	40.4	241.6	183.2	55.9	94.1	14.2	-24.8	3.8
Total										
Share, 70	100	100	100	100	100	100	100	100	100	100
Share, 95	100	100	100	100	100	100	100	100	100	100

Appendix 2

1. Decomposing Between- and Within-Sector Employment Shifts [Katz and Murphy (1992)]

The technique has its theoretical foundation in a set of labour demand equations, where labour is hired subject to a cost constraint, assuming constant returns to scale in the production function. The derivation allows the authors to arrive at a representation of labour demand where the total relative labour demand shift is represented according to a given group (occupation, for example), which is then readily decomposable into a between-sector and within-sector component. It should be remembered that both these shifts are to be understood under a regime of fixed relative wages. The total shift, as well as the between-sector shift, according to occupation or socio-economic groups, are directly observable. Utilising this theoretical approach, one can then arrive at an empirically estimable equation, to determine the size of these three segments of relative labour demand by any given cohort. The index of relative labour demand shifts is constructed as follows:

$$\Delta X_k^d = \frac{\Delta D_k}{E_k} = \sum_j \left(\frac{E_{jk}}{E_k} \right) \left(\frac{\Delta E_j}{E_j} \right) = \frac{\sum_j a_{jk} \Delta E_j}{E_k} \qquad (1)$$

The subscripts k and j refer to occupation (or socio-economic) groups and sectors respectively. The total relative demand shift for group k in the period under consideration is measured by ΔX_k^d. Specifically, it is measured by

$a_{jk} = \left(\frac{E_{jk}}{E_j} \right)$, which is group k's share in sector j, as a share of total

employment in that sector, weighted by the percentage change in total sectoral employment, ΔE_j, in which the weight is the group-specific

employment distribution, E_k. Note that the between-sector component explaining part of the shift in relative demand for group k is given by ΔD_k, while the within-sector shift is simply the difference between the total- and between-sector shifts. As with the Katz & Murphy (1992) approach, we normalise total employment in each year to sum to one, and so obtain a measure of relative demand shifts. In addition, the values for a_{jk} and E_k are represented in base year, which in this case is 1970.

2. Decomposing the Impact of International Trade on Labour Demand [Katz and Murphy (1992).]

In order to measure this impact of trade flows on labour demand, we utilise a similar decomposition technique to the one outlined above, and draw directly from the methodology of Katz and Murphy (1992) again. This approach isolates the impact of trade flows on explaining shifts in labour demand over time. Assume that the supply of labour, or factor inputs, is related to output in a standard production function paradigm. It is then possible to extend this and consider the impact of direct labour supply on traded output, ignoring indirect input-output effects. Thus, the implicit labour supply function in trade would be the labour input required to produce traded output domestically. Formally, let I_{it} be net imports in industry i in year t, Y_{it} the domestic output of industry i in year t, and E_{it} the share of labour units in the economy employed in industry i at year t. Therefore, the implicit supply of labour embodied in net imports in any given industry at time t, measured as a fraction of total labour units is given as $(E_{it}/Y_{it})^*I_{it}$.

From this formulation, we can derive a more generalised result - that of the implicit supply of labour of group k[5] contained in net trade in year t as a proportion of total domestic labour supply of group k. This would be:

---

[5] One can think of group k as representing occupation or socio-economic categories such as race and gender.

$$L_t^k = \sum_i e_i^k E_{it} \left(\frac{I_{it}}{Y_{it}} \right) \qquad\qquad (2)$$

where e_i^k is the average proportion of employment in industry *i* made up of workers in group *k* over the specified time period. Using the above, we can then measure the effect of trade on the relative demand for demographic group k in year *t* as:

$$T_t^k = -\left(\frac{1}{E^k} \right) \sum_i \left[e_i^k E_{it} \left(\frac{I_{it}}{Y_{it}} \right) \right] + \sum_i E_{it} \left(\frac{I_{it}}{Y_{it}} \right) \quad (3)$$

where E^k is the average share of total employment of group *k* over the period under consideration. The first term is the implicit labour supply of the group *k* contained in trade, normalised by the base year employment of group *k*, with the sign reversed to convert this supply-shift measure into a demand-shift measure. The second term adjusts the demand-shift measure so that trade affects only the relative demand for labour in group *k*.

The above equation however, assumes that export and import flows affect all workers homogeneously. This may not be the case, and it may be true that skilled and unskilled workers are differentially affected by these trade flows. In order to measure this different impact of exports and imports, the first term on the right-hand side of the above equation is replaced by:

$$-\left(\frac{1}{E^k} \right) \sum_i \left\{ \left(e_i^k E_{it} \left(\frac{X_{it}}{Y_{it}} \right) \right) - \left[p_i^k E_{it} \left(\frac{M_{it}}{Y_{it}} \right) \right] \right\} \quad (4)$$

where X measures exports and M imports, and p_i^k is group *k*'s average share of unskilled workers' employment in industry *i* over the stipulated period. It is

therefore assumed that imports will disproportionately impact on the demand for production-level workers relative to export flows.