



International
Labour
Office
Geneva

Bureau
international
du Travail
Genève

Oficina
Internacional
del Trabajo
Ginebra



ACT/EMP

Changing Dynamics in the Global Labour Market: Evidence from South Africa

Haroon Bhorat, Sumayya Goga,
Benjamin Stanwix

5-6
December
Décembre
Diciembre
2013

Geneva
Genève
Ginebra

International Symposium for Employers on
THE FUTURE OF WORK

Symposium international des employeurs sur
L'AVENIR DU TRAVAIL

Coloquio internacional de empleadores sobre
EL FUTURO DEL TRABAJO

www.ilo.org/employersymposium

Changing Dynamics in the Global Labour Market: Evidence from South Africa¹

Written by: Haroon Bhorat
Sumayya Goga
Benjamin Stanwix

Bureau for Employers' Activities, International Labour Office
2013

¹ All comments can be directed to haroon.bhorat@uct.ac.za

Copyright © International Labour Organization 2013

First published 2013

Publications of the International Labour Office enjoy copyright under Protocol 2 of the Universal Copyright Convention. Nevertheless, short excerpts from them may be reproduced without authorization, on condition that the source is indicated. For rights of reproduction or translation, application should be made to ILO Publications (Rights and Permissions), International Labour Office, CH-1211 Geneva 22, Switzerland, or by email: pubdroit@ilo.org. The International Labour Office welcomes such applications.

Libraries, institutions and other users registered with reproduction rights organizations may make copies in accordance with the licences issued to them for this purpose. Visit www.ifrro.org to find the reproduction rights organization in your country.

ILO Cataloguing in Publication Data

Bhorat, Haroon, Goga, Sumayya, and Stanwix, Benjamin

Changing dynamics in the global labour market: evidence from South Africa / Haroon Bhorat, Sumayya Goga, Benjamin Stanwix ; International Labour Office, Bureau for Employers' Activities.- Geneva: ILO, 2013

ISBN 9789221281580; 9789221281597 (web pdf); 9789220281604 (CD-ROM)

International Labour Office and Bureau for Employers' Activities; ILO International Symposium on the Future of Work (2013, Geneva, Switzerland)

employment / labour demand / skill / occupation / wages / South Africa R

13.01.3

Also available in (French): *Une dynamique du marché mondial du travail en pleine mutation: Données en provenance d'Afrique-du-Sud* (ISBN 978-92-2-228158-9) Geneva, [2013], in Spanish: *Dinámica variable en el mercado de trabajo mundial: Datos probatorios de Sudáfrica* (ISBN 978-92-2-328158-8) Geneva, [2013].

ILO Cataloguing in Publication Data

The designations employed in ILO publications, which are in conformity with United Nations practice, and the presentation of material therein do not imply the expression of any opinion whatsoever on the part of the International Labour Office concerning the legal status of any country, area or territory or of its authorities, or concerning the delimitation of its frontiers.

The responsibility for opinions expressed in signed articles, studies and other contributions rests solely with their authors, and publication does not constitute an endorsement by the International Labour Office of the opinions expressed in them.

Reference to names of firms and commercial products and processes does not imply their endorsement by the International Labour Office, and any failure to mention a particular firm, commercial product or process is not a sign of disapproval.

ILO publications and electronic products can be obtained through major booksellers or ILO local offices in many countries, or direct from ILO Publications, International Labour Office, CH-1211 Geneva 22, Switzerland. Catalogues or lists of new publications are available free of charge from the above address, or by email: pubvente@ilo.org

Visit our website: www.ilo.org/publns

Printed in Switzerland

Table of Contents

1	Introduction	1
2	Data	3
3	Skills-Biased Labour Demand: A Descriptive Overview	4
3.1	Introduction.....	4
3.2	GDP and Employment Trends	4
3.3	Aggregate and Sectoral Employment Trends	6
3.3.1	The Structure of the Economy	8
3.4	Occupational Employment Trends	16
3.5	Conclusion.....	20
4	Decomposing Labour Demand	22
4.1	Introduction.....	22
4.2	Methodology	22
4.3	Results	24
5	Occupations and Wages	27
5.1	Methodology	28
5.1.1	Identifying Task Categories	28
5.1.2	The Relationship between Tasks and Wages	29
5.2	Descriptive Statistics	30
5.3	Returns Across the Wage Distribution	36
6	Conclusion	40
7	Bibliography	42
8	Appendices	44

List of Figures

Figure 1: GDP and employment growth, 2001 – 2011	5
Figure 2: Gross value added and employment growth by sector: 2001-2012	9
Figure 3: Employment trends, by task categories: 2001-2012	34
Figure 4: Task wage premiums by quantiles: 2001-2011	37

List of Tables

Table 1: Simple GDP elasticity of total employment: 2001-2012	5
Table 2: The South African labour market: 2001-2012	7
Table 3: Growth in employment by sector: 2001-2012	11
Table 4: A closer look at public sector employment: 2001-2012	13
Table 5: Occupations within the business activities N.E.C. subsector of financial services: 2001-2012	14
Table 6: Growth in employment, by occupation: 2001-2012	17
Table 7: Changes in skills shares, by sector: 2001-2012	18
Table 8: Industry-based relative demand shift measures, by occupation: 2001-2012	25
Table 9: Occupational categories and occupational tasks: 2001 to 2011	32
Table 10: Wage Trends, by Task Categories: 2001-2011	35

1 Introduction

South Africa is a middle-income developing country which experienced profound changes in the 1990s as it moved from a system of governance characterized by racial segregation and unequal opportunities prior to 1994 to democracy in 1994. Notwithstanding the great strides made in the post-apartheid years, the South African economy has largely been unable to deal with its pressing unemployment and poverty problems. One view of what has shaped South Africa's unemployment challenge is the notion that the economy has increasingly demanded higher-skilled workers while the labour force consists of a large contingent of less-educated lower-skilled workers: a classic mismatch between labour demand and labour supply. In terms of labour demand, the research has suggested that factors such as technology, the changing structure of the economy, and trade flows have all engendered a skills-biased labour demand trajectory (Thurlow, 2006, Dunne & Edwards, 2006).

Between 1970 and 1995, there was capital deepening in the economy together with a shift away from primary sectors towards secondary and tertiary sectors. As a result, the primary sectors suffered steady employment losses, while most other sectors saw gains, with the financial and business activities sector showing the biggest gains. This was accompanied by broad occupational employment shifts which were skills-biased in nature. Within sectors, this manifested itself in increased demand for high-skilled occupations in the primary and secondary sectors, while the demand for unskilled workers declined. This, combined with the growing importance of the tertiary sectors, which on the whole are more skill-intensive than the primary and secondary sectors, led to a strongly skills-biased labour demand trajectory. Factors such as technological change within firms or the lower price of capital relative to labour have been some of the major explanations for the changing preference of firms for higher-skilled rather than lower-skilled workers (DPRU, 2007).

The post-apartheid labour market has seen a continuation of growth in the tertiary sector accompanied by an expansion of the sector's aggregate employment. In addition, while the tertiary sector has been growing and absorbing greater employment, its ratio of skilled to unskilled workers continues to increase. This reflects the intensification of a skills-biased labour demand trajectory, already established in the pre-1994 period. The growing importance of the tertiary sector in the economy is likely to have a negative impact on the demand for less-skilled workers. Thus, employment changes since the transition from apartheid have been a function of a variety of factors, including structural changes in the composition of output (Dunne & Edwards, 2006; Edwards, 2001). The losers have been less-skilled workers while the winners, invariably, have been better-educated, skilled workers.

This paper extends the analysis of labour demand trends to the period 2001 to 2012. Section 3 of the paper provides a descriptive analysis of skilled-biased labour demand changes, by examining sectoral and occupational employment growth trends. In Section 4 we consider, using the Katz &

Murphy (1992) decomposition technique, whether between- or within-sector forces play a greater role in the labour demand for workers in different occupations. Within-sector employment shifts are those changes in labour allocation that come from within the industry itself. The causes include technological change in a sector that may create the need for a certain skill-type over another or a change in the price of a non-labour factor that results in an altered preference for certain labour types. Between-sector changes are relative employment shifts occurring between sectors in the economy as a result of changing shares in their respective output. As sectors typically have differing patterns of skill demands, a growing or declining share in production of a sector may alter labour demand at different skill levels. The share of domestic output due to trade flows can similarly affect labour demand between sectors.

Labour demand changes have an impact on workers' wage levels. Traditionally, if an economy has become increasingly skills-intensive, one would expect to find larger wage premiums for better-skilled and better-educated workers over time. More recently, the international literature on labour demand explores the idea that technological change has not just reduced wages of low-skilled workers while raising the wages of the high-skilled, but that wages have fallen particularly for workers involved in work where the tasks are very routine or where the work is 'offshorable'. These workers tend to be in the middle of the distribution, thus leading to declining wage premiums in the middle of the wage distribution. This view of technological change moves beyond the high/low-skilled categories and identifies the tasks related to occupations as a key channel through which wages are affected.

In line with this literature, Section 5 analyses the changing returns to occupational tasks. Following Firpo, Fortin, & Lemieux (2011) we first identify five 'task categories', which are created to explore the way that different tasks are likely to be affected by technological change and international trade or competition. Having created the task categories, we then explore, using quantile regressions, how returns to occupational tasks have changed across the wage distribution over time. We expect to see a fall in wages for jobs involving tasks that face high risks of automation and international competition.

2 Data

South African labour market analysis is shaped by data availability and coverage, gradual improvements in survey design and implementation, and changing definitions. The October Household Survey – conducted by Statistics South Africa and the key official household survey dataset providing labour market information between 1994 and 1999 – was replaced in 2000 by the biannual Labour Force Survey (LFS). This survey was, in turn, replaced by the Quarterly Labour Force Survey (QLFS) in 2008. Since we are interested in skills-biased employment trends in the post-2000 period, our analysis utilizes labour market data from both the LFS and QLFS. It should be noted that the QLFS differs quite significantly from the LFS in methodological and definitional terms. In particular, the definition of discouraged jobseekers differs substantially between the two surveys, with the result that the broad labour force and broad unemployment are not comparable between them. Employment numbers between the two surveys, however, are comparable.²

Both the LFS and QLFS surveys are rotating panel household surveys, with a sample size of roughly 30 thousand dwellings in each wave. In our analysis the data are pooled and treated as repeated cross sections over time, and we use the standard weights provided by Statistics South Africa. Section 5 of this analysis uses wage data. Wage data are available from the LFS for the periods 2001 to 2007, and from the QLFS for 2010 and 2011. The wage data provided for 2010 and 2011 are annual, and it is not possible to accurately link this wage data to the particular quarter in which it was collected. However, given that we are interested in annual data, this should not bias our estimates. As the 2011 wage data have not yet been widely used, they should be treated with some caution. The earnings data in the LFS include a combination of both point and bracket responses, and we transformed all the brackets into point estimates.³

² More specifically, the QLFS takes a much more stringent approach to identifying discouraged jobseekers than the LFS. As a result of this, the number of discouraged jobseekers declines dramatically in the QLFS compared to the LFS, and the number of broadly unemployed and the broad unemployment rate is also lower in the QLFS (Yu, 2013).

³ Specifically, we transformed bracket responses into point responses by random allocation to a uniform distribution within the bracket to maintain variation.

3 Skills-Biased Labour Demand: A Descriptive Overview

3.1 Introduction

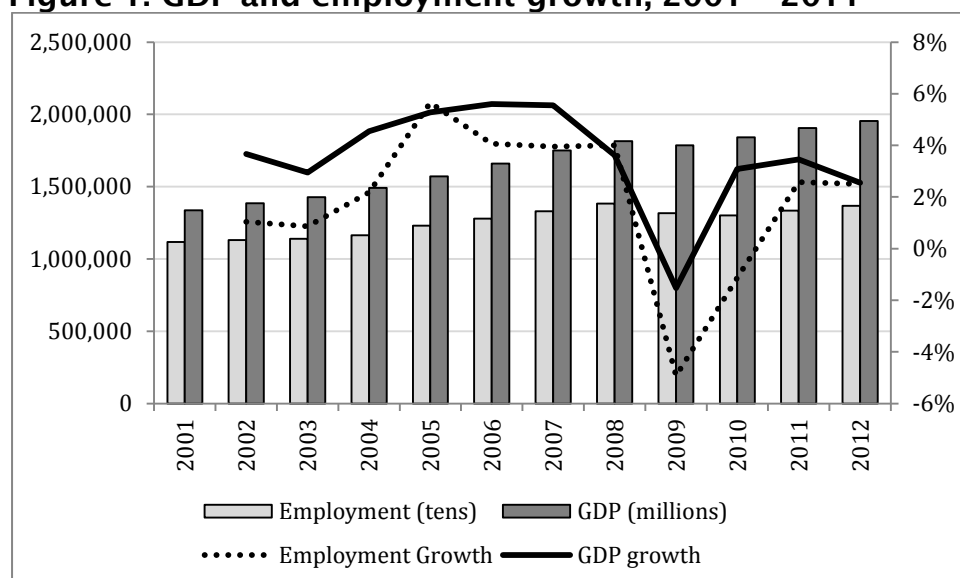
Economic growth in South Africa was weak during the 1980s and early 1990s when political uncertainty was rife. With the advent of democracy in 1994, however, the economy began to recover, with positive GDP growth rates in all years apart from 2009, when the global financial crisis resulted in the economy posting negative growth. Earlier studies show that the South African economy became increasing capital-intensive prior to 1994, and that this trend was accompanied by structural changes, with the tertiary sector accounting for a growing share of GDP (DPRU, 2003). The post-apartheid economy has experienced a continuation of the movement away from primary production towards tertiary production, accompanied by a greater share of employment within the tertiary sectors relative to the primary and secondary sectors. In addition, the economy experienced a marked increase in its ratio of skilled to unskilled workers (DPRU, 2007). These developments mark an intensification of a skills-biased labour demand trajectory, already established in the pre-1994 period.

The descriptive overview below analyses whether this skills-biased labour demand trend has continued in the post-2000 period through an in-depth analysis of employment trends. In particular, the disaggregation by sector and skills seeks to show whether the increasing dominance of the tertiary sector has persisted and whether economic growth has continued to benefit better-skilled workers disproportionately.

3.2 GDP and Employment Trends

Prior to the global financial crisis of 2008-2009 which forced South Africa, among a host of other countries, into a real economy recession, GDP growth rates in the South African economy were positive, though not spectacular, at between 3 and 5.6 per cent. Despite the recession, the growth rate in 2008 was 3.6 per cent, but in 2009, it turned negative. In fact, 2009 is the only year since the advent of democracy in 1994 in which the country posted a negative growth rate. While growth rates returned to positive levels for the period 2010 to 2012, they remained on average below their pre-crisis levels.

Figure 1: GDP and employment growth, 2001 – 2011



Source: SARB & StatsSA (LFS 2001-2007 and QLFS 2008-2012), Author's calculations

Employment grew more slowly than GDP during the period of relatively good GDP growth. While average GDP growth in the period 2002 to 2007 stood at 4.6 per cent, average employment growth, though positive, was much lower at 2.8 per cent. In turn, the global recession of 2008-2009 had a severe and deleterious impact on employment levels in the South African economy, with employment shrinking by almost 5 per cent in 2009 and by a further one per cent in 2010. Young African workers with incomplete education bore the brunt of the recession (DPRU, 2010). Employment growth turned positive in 2011 and 2012, but has not breached the 3 per cent level since the recession.

In trying to link the impact of the decline in growth as a result of the recession to consequences for the labour market, Table 1 below estimates simple output-employment elasticities for the pre- and post-crisis period. The simple elasticity of employment provides an indication of the sensitivity of GDP to employment growth, and hence serves as a proxy measure of the labour absorptive rate of economic growth.

Table 1: Simple GDP elasticity of total employment: 2001-2012

	Average Annual Growth		Simple Elasticity
	Employment	GDP	
Pre-Crisis (2001-2007)	2.9%	4.6%	0.64
Post-Crisis (2008-2012)	-0.3%	1.9%	-0.16

Source: StatsSA (LFS 2001 & 2007 and QLFS 2008 & 2012), Author's calculations

Notes: 1. The growth rates are average annual growth rates.

2. The simple elasticity is the employment growth rate divided by the GDP growth rate.

3. The September round of the LFS is used for the 2001 and 2007 data, while third quarter data from the QLFS is used for 2008 and 2012 data.

Table 1 above shows that the simple employment elasticity in the period 2001 to 2007 stood at 0.64, indicating that for every 1 per cent growth in

GDP total employment increased by 0.64 per cent. This stands in sharp contrast to the post-crisis period, where a 1 per cent increase in growth led to a 0.16 per cent decline in employment. Put another way, these data show that, for the post-crisis period, while average annual GDP growth stood at 1.9 per cent, employment in this period declined by 0.3 per cent. Ultimately then, the table shows that while output growth recovered fairly quickly in the aftermath of the crisis, labour market demand remained stagnant.

Employment growth trends in South Africa thus broadly followed GDP growth trends in the post-2000 period, although employment growth was generally lower than GDP growth. Furthermore, it appears that during harsh economic times such as the 2008-2009 recession, the negative growth in employment is much more pronounced than the shrinkage in GDP. These results suggest both that GDP growth rates would have to accelerate to much higher levels in order to deal adequately with South Africa's poverty and unemployment problems, but also that global economic difficulties appear to have a sharp and relatively long-lasting impact on South Africa's labour market.

3.3 Aggregate and Sectoral Employment Trends

The past 11 years have seen considerable growth in total employment, from 11.2 million in 2001 to 13.7 million in 2012 (Table 2 below). However, while the growth in employment was significant between 2001 and 2007, it did not grow significantly between 2008 and 2012. In contrast, the period between 2001 and 2008 Q4 was marked by a steady rise in employment from 11.2 million employed to 14.1 million.⁴ However, the global downturn of 2008 drove South Africa into recession in late 2008, and although the impact on output was relatively mild and short-lived, the impact on the labour market was profound. From a peak in employment of almost 14.1 million in 2008 Q4, the economy lost more than one million jobs, and by 2010 Q3 employment had plummeted to levels last seen in 2006. Thus, the expansion of employment in the South African economy over the period 2006 to 2008 was completely nullified by the end of 2010 thanks to the global crisis of 2008-2009.

The period between 2010 Q3 and 2012 Q3 saw a significant increase in the number of employed as the labour market began to recover from the crisis. Overall, however, the employment level in 2012 Q3 of 13,7 million still falls short of the high of 14.1 million seen prior to the recession. The aggregate gains in employment in the South African labour market since 2000 have therefore been driven by job creation between 2001 and 2007. Thus, while GDP recovered fairly quickly in the aftermath of the recession, the impact on employment has been severe and long-lasting.

⁴ See the figure in Appendix 1 for more annual employment data for the 2001 to 2012 period.

Table 2: The South African labour market: 2001-2012

	LFS	LFS	QLFS	QLFS	Change	
	2001 Sep	2007 Sep	2008 Q3	2012 Q3	2001Sep- 2007Sep	2008Sep- 2012Sep
Aggregates (Thousands)						
Working Age Population	28,118	30,420	31,216	33,253	8.2%*	6.5%*
Employed	11,181	13,306	13,839	13,678	19.0%*	-1.2%
Official Unemployment	4,655	3,905	4,157	4,668	-16.1%*	12.3%*
Official Labour Force	15,836	17,211	17,996	18,346	8.7%*	1.9%
Broad Unemployment	7,649	7,348	5,239	6,840	-3.9%	30.6%*
Broad Labour Force	18,830	20,654	19,078	20,518	9.7%*	7.5%*
Official Unemployment Rate	29	23	23	25	-6 pp*	2pp*
Broad Unemployment Rate	41	36	27	33	-5 pp*	6pp*
Official Labour Force Participation Rate	56	57	58	55	1 pp	-2pp*
Broad Labour Force Participation Rate	67	68	61	62	1 pp	1pp

Source: StatsSA (LFS 2001 & 2007 and QLFS 2008 & 2012), Author's calculations

Notes: 1. The broad estimates include both active and discouraged jobseekers as part of the labour force, while the narrow/official estimates do not regard discouraged jobseekers as part of the labour force.

2. * denotes a significant change at the 5 per cent level.

3. "pp" is percentage points.

Excluding discouraged jobseekers from the definition of the labour force⁵, the labour force participation rate in the labour market in 2001 stood at around 57 per cent in both 2001 and 2007. In turn, the data between 2008 and 2012 shows a decrease in the narrow labour force participation rate from 58 to 55 per cent. This decline occurred mainly during the recession as young workers delayed their entry into the labour market, suggesting that they sought to upgrade their skills in the short to medium term. Older workers also declined in participation, presumably as a function of early retirement (DPRU, 2010).⁶

Unemployment rates were very high in 2001, with almost 30 per cent of narrowly defined and 41 per cent of broadly defined labour market participants unable to find work. Importantly, both narrow and broad unemployment rates declined between 2001 and 2007 when the economy was growing relatively quickly. By 2007, the narrow rate of unemployment stood 6 percentage points lower at 23 per cent while the broad rate of unemployment stood 5 percentage points lower at 36 per cent. In turn, bearing in mind that broad unemployment rates are lower in the QLFS than the LFS, in the period between 2008 and 2012, when the economy was

⁵ The broad definition of the labour force includes discouraged jobseekers, while the narrow/official definition excludes discouraged jobseekers.

⁶ We only discuss the narrow labour force participation rate, since the broad rates are not comparable between the LFS and QLFS as a result of the QLFS adopting a much more stringent definition of discouraged jobseekers.

severely hit by the global recession, both the narrow and broad rate of unemployment rose from 23 to 25 per cent and 27 to 33 per cent respectively. Put another way, by 2012, a third of those willing and able to work, but not necessarily actively seeking work, could not find jobs in the South African economy.

3.3.1 The Structure of the Economy

This section examines more closely the structure of the economy and its impact on employment trends between 2001 and 2012. Figure 2 below expands on the interaction between GDP and employment growth trends by sector. We expect that sectors in which there was good output growth in the period would have been more likely to create jobs in the economy, while declining sectors would have shed jobs. Each of the bubbles in Figure 2 below represents a sector of the economy, while the size of the bubbles indicates the relative size of employment in that sector in the base year, 2001.⁷ The vertical axis shows average annual employment growth, while the horizontal axis shows the average annual growth in gross value added, both in percentage terms. Thus the co-ordinates for the centre of each of the bubbles are the relevant sector's employment and gross value added growth for the period. The 45 degree line divides the figure into two sections: bubbles below the line show sectors in which employment growth was lower than gross value added growth, while bubbles above the line show sectors in which employment growth exceeded output growth.

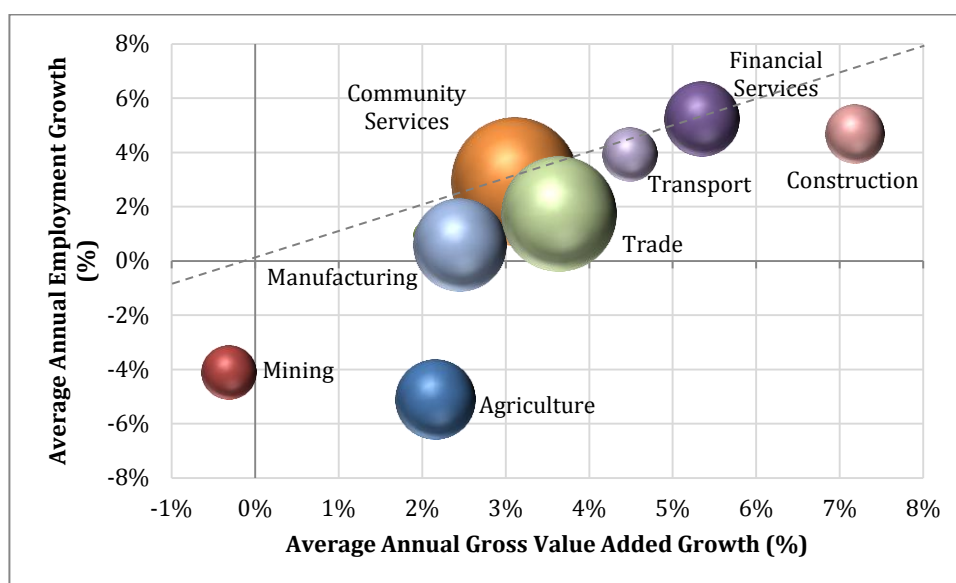
Figure 2 shows, firstly, that the primary sectors of the economy fared particularly badly in the period between 2001 and 2012. Output growth was negative for mining (-0.3 per cent) and agriculture was the lowest of the positive-growth sectors (2.2 per cent). Furthermore, these are the only two sectors that experienced a contraction in employment in the period, with employment growth in agriculture and mining contracting by 5.1 per cent and 4.1 per cent respectively. Thus, employment in the agricultural sector declined even though it experienced mild growth in gross value added. A contributing factor to the decline in employment in the agricultural sector was the minimum wage, introduced in the sector in March 2003 (Benjamin, Kanbur and Stanwix, 2011).

The decline in employment in the mining sector outstripped the decline in growth. The poor performance of the mining sector for the period can be attributed to a range of factors, including a strongly appreciating rand in the mid-2000s, infrastructural constraints (particularly as far as rail transport is concerned), the energy crisis in South Africa, and the application of new mining laws (OECD, 2008), while damaging widespread strike action in the mining sector in 2010 and 2011 would have further exacerbated the problem.⁸

⁷ The size of the bubbles indicates the share of that sector's employment in total employment in 2001.

⁸ Note that employment numbers for the mining industry from the household surveys (LFS and QLFS) are lower than numbers from firm-based data. Furthermore, the underestimation of employment within the mining and quarrying sector in the QLFS relative to the firm-based data is substantially larger than in the LFS a. The QLFS thus seems less able to capture mining employment than the LFS (DPRU, 2013).

Figure 2: Gross value added and employment growth by sector⁹: 2001-2012



Source: SARB & StatsSA (LFS 2001 and QLFS 2012), Author's calculations

Among the sectors that experienced the best output growth in the period were construction and three tertiary sectors, financial services, transport, and trade. Importantly though, employment growth did not exceed output growth in any of the sectors, and only the finance and community services sectors experienced employment growth in the period that was almost as high as gross value added growth. Specifically, while gross value added growth for the finance and community services sectors stood at 5.4 and 3.1 per cent for the period between 2001 and 2012, employment growth was at 5.3 and 3 per cent respectively. These two tertiary sectors thus experienced growth that was labour-neutral, while in all the other sectors of the economy output growth outstripped employment growth.

In particular, the discrepancy between output and employment growth was highest in the two primary sectors, followed by construction. Construction was the fastest-growing sector in the period, growing at 7.2 per cent between 2001 and 2012, but employment growth was much lower at 4.7 per cent. The boom in the construction sector at that time can be attributed to, among other factors, infrastructure projects related to the 2010 World Cup, the construction of the Gautrain rapid-rail system and several other public and private sector investment initiatives including those undertaken by Eskom and Transnet (Hanival & Maia, 2008).

Two of the large employing sectors in the economy, trade and manufacturing, experienced mediocre output growth in the period of 2.4

⁹ In this figure and the rest of the paper, we use shortened names for the sectors. The sectors' full names are as follows: agriculture, hunting, forestry and fishing; mining and quarrying; manufacturing; electricity, gas and water supply; construction; wholesale and retail trade; transport, storage and communication; financial intermediation, insurance, real estate and business services; community, social and personal services; and private households, extraterritorial organizations, representatives of foreign governments and other activities not adequately defined.

and 3.6 per cent respectively, with much lower employment growth of 0.6 and 1.7 per cent respectively. These relatively poor employment results for trade and manufacturing can, in part, be understood in terms of the impact of the recession on the South African economy. During the recession, the manufacturing sector, together with construction, experienced the largest job losses, with semi-skilled workers especially badly affected. Furthermore, informal sector workers, mostly captured under trade, were also particularly hard hit during the recession, accounting for a disproportionate share of jobs lost (DPRU, 2010).

In summary, Figure 2 shows an economy in which the primary sectors played an increasingly small role as far as economic growth is concerned, while the tertiary sectors expanded. In addition, employment growth in the period was, on the whole, better in the tertiary sectors than secondary sectors, and negative in the primary sectors of the economy. Importantly for a country like South Africa with high unemployment, two tertiary sectors, finance and community services, are the only ones which experienced labour-neutral growth, while gross value added growth outstripped employment growth in the other sectors, with the primary sectors of construction and trade most severely affected. By 2012, the tertiary sectors accounted for almost three quarters (72 per cent) of total employment, up from 63 per cent in 2001.

Here, we should point out one of the more contentious issues in the South African labour market in the post-2000 period: the rise in labour broking. Benjamin (2009) cites that the number of temporary employment service (TES) agencies registered with the Services Sector Education and Training Authority (SETA) alone rose from 1,076 in 2000 to 3,140 in 2006, while the National Association of Bargaining Councils (NABC) estimated that almost one million workers were employed through labour brokers in 2010 (SABPP, 2012). The use of labour broking employment has been contentious since it is seen as a mechanism by which labour and minimum wage laws can be avoided. Benjamin (2009) postulates that the fact that the number of agencies rose sharply in the 2000s is an indicator that labour law avoidance is a major contributing factor to the rise in labour broking.

It is not possible to directly ascertain the number of workers employed through labour brokers in the South African economy, since the nationally representative household surveys do not ask whether workers are employed through labour brokers. None the less, the business activities (not elsewhere classified (N.E.C))¹⁰ subsector of the financial services sector includes labour broking activities.¹¹ Given this, the increase in employment in the financial services sector may, in part, reflect the increase in those employed through

¹⁰ We refer to this subsector simply as the business activities sector in the rest of the paper.

¹¹ More specifically, the business activities N.E.C. subsector of the financial services sector includes the following: labour recruitment and provision of staff; activities of employment agencies and recruiting organizations; hiring out of workers (labour broking); disinfecting and exterminating activities in buildings; investigation and security activities; building and industrial plant cleaning activities; photographic activities; packaging activities; credit rating agency activities; debit collecting agency activities; stenographic, duplicating, addressing, mailing list and similar activities; business brokerage; interior design; fashion design; demonstration and exhibition activities; editorial, translation and interpretation activities; telephone answering activities; agencies representing people in motion pictures and other entertainment or sports attractions; and other business activities.

labour brokers in the South African economy. We examine this in further detail in the discussion of Table 3 below.

Table 3 Table 3 analyses the sectoral growth trends in employment from Figure 2 above more closely. The table shows absolute and relative growth numbers for each of the sectors. The absolute growth numbers show the absolute increase or decrease in employment for that sector for the period, while the relative growth figures show the growth of the sector relative to overall employment growth in the economy for the period. Relative growth is thus calculated by taking the growth rate for the sector and dividing it by the total employment growth rate for the period.¹² If relative growth is equal to 1, sector employment grew as quickly as overall employment in the period. In turn, if the relative growth figure is greater than 1, this indicates that employment growth in that sector was higher than overall employment growth, and vice versa.

Table 3: Growth in employment by sector: 2001-2012

	Growth (2001-2012)		Employment Share		Share of Change (2001-2012)
	Absolute	Relative	2001	2012	
Primary	-719,232*	-2.6	15.5%	7.4%	-28.8%
Agriculture	-514,468*	-2.7	10.5%	4.8%	-20.6%
Mining	-204,764*	-2.2	5.0%	2.6%	-8.2%
Secondary	537,376*	1.0	21.0%	21.1%	21.5%
Manufacturing	112,149	0.3	14.5%	12.7%	4.5%
Utilities	10,774	0.5	0.8%	0.8%	0.4%
Construction	414,453*	2.5	5.7%	7.7%	16.6%
Tertiary	2,720,821*	1.6	63.1%	71.5%	108.9%
Trade	513,572*	0.9	21.9%	21.7%	20.6%
Transport	288,364*	2.1	4.9%	6.1%	11.5%
Financial Services	782,108*	2.8	9.3%	13.3%	31.3%
<i>Business Activities N.E.C</i>	502,841	4.2	3.6%	6.6%	20.1%
<i>Other</i>	279,267	1.8	5.7%	6.7%	11.2%
Community Services	1,041,524*	2.1	17.8%	22.2%	41.7%
Private Households	95,253	0.4	9.2%	8.3%	3.8%
Total	2,497,763*	1.0	100.0%	100.0%	100.0%

Source: StatsSA (LFS 2001 and QLFS 2012), Author's calculations

Notes: 1. Relative growth is calculated by dividing the average annual growth rate for the sector by the total average annual growth rate.

2. * denotes a significant change at the 5 per cent level; we were unable to ascertain whether the changes in employment of subsectors within financial services were significant.

3. The share of change is calculated by dividing change in employment in the sector by the overall change in employment.

¹² The growth rates used in this calculation are average annual growth rates.

The growth data clearly show that workers in the primary sectors were losers in the period. The agriculture and mining sectors were the only two sectors that experienced a decline in employment, declining particularly sharply in the agricultural sector. More than half a million jobs were lost in agriculture in the period between 2001 and 2012, while over 200,000 jobs were lost in mining. Not surprisingly then, these two sectors also showed large negative relative growth. The employment numbers in the mining sector may be underestimated, however, as explained in footnote 8.

The relative growth figure of 1 for the secondary sectors implies that employment in these sectors grew as fast as overall employment growth in the economy. This relative growth figure is, however, driven by the construction sector. Although the construction sector employed just 5.7 per cent of the workforce in 2001, employment growth in construction was 2.5 times larger than overall employment growth. In contrast, neither the manufacturing nor utilities sectors saw a significant increase in employment in the period, implying that these two sectors performed relatively poorly. The results for the manufacturing sector, in particular, are of concern, since it was the third largest employer in the economy in 2001. As a result of its poor performance, its share of employment dropped from 14.5 per cent to 12.7 per cent in the period.

The tertiary sectors of the economy fared the best in terms of employment growth in the period, with the financial services and community services sectors creating 782,000 and one million jobs respectively in the period. The community services sector can be singled out. This sector employed almost 18 per cent of the workforce in 2001, and its impressive relative growth performance resulted accounted for more than 40 per cent of the increase in employment in the period. As a result, the sector's share of employment rose to between a fifth and a quarter of total employment by 2012.

We examine public sector employment growth in further detail in Table 4 below.¹³ Firstly, (although not shown here) it should be noted that 85.2 per cent of public sector workers in 2001 were found in the community services sector, and by 2012 more than 90 per cent of all public sector workers were working in community services. Thus, the community services sector serves as a sort of proxy for public sector employment. Secondly, Table 4 shows that overall growth was driven by public sector rather than private sector growth: the average annual growth rate of public sector employment in the period was 2.5 per cent, while private sector jobs grew at an average annual growth rate of 1.7 per cent. Employment thus grew substantially faster in the public sector compared to the private sector.

¹³ All those who indicated that they work for central government, provincial government or local government are regarded as falling within the public sector.

Table 4: A closer look at public sector employment: 2001-2012

	2001-2012			2001	2012	2001-2012	
	Private	Public	Total	Share of Public Sector Workers in Com Services		Share of Change	
	Average Annual Growth					Private	Public
Employment	1.7%*	2.5%*	1.8%*	85.2%	90.7%	80.3%	19.7%

Source: StatsSA (LFS 2001 and QLFS 2012), Author's calculations

Notes: 1. * denotes a significant change at the 5 per cent level.

Thirdly, further disaggregated data in the last two columns of the table show that the public sector accounted for 19.7 per cent of the change in employment in the period, while the private sector accounted for 80.3 per cent. Thus, a fifth of employment growth in the period between 2001 and 2012 was due to public sector employment growth.

Table 3 shows that the financial services subsector, although relatively small in terms of its employment share (9.3 per cent in 2001), performed most impressively, with the fastest growth in employment in the period, 2.8 times the overall employment growth rate. Between 2001 and 2012, the financial services sector's share of total employment rose from 9.3 to 13.3 per cent. However, as further discussed below, the increase in financial services employment was mainly due to an increase in employment within the business activities sector.

The performance of the trade sector is generally dependent on the overall performance of the economy as it represents final demand spending by consumers. Though the trade sector employed the largest share of workers in 2001, employment in the sector grew marginally more slowly than overall employment growth, maintaining its share of employment at 22 per cent. Crucially, however, due to phenomenal growth in employment in community services, the trade sector was overtaken by community services as the largest employer in the South African economy in 2012.

Given that labour broking employment may be driving employment within this sector, the financial sector deserves further scrutiny. The disaggregation of the financial services sector in Table 3 above is an attempt to identify whether some part of the increase in employment in the financial services sector may be due to labour broking employment. The financial services sector consists of five subsectors: i) business activities N.E.C.; ii) monetary intermediation; iii) insurance and pension funds (except compulsory social security); iv) legal, accounting, bookkeeping and auditing activities; and v) other. In Table 3 above we have disaggregated financial services into business activities N.E.C. and "other" which incorporates the remaining four financial services subsectors. Of the five subsectors under financial

services¹⁴, business activities accounted for the largest proportion of the employed in 2001 at 38.4 per cent. Furthermore, Table 3 shows that this subsector saw a rise of over half a million jobs in the period between 2001 and 2012 or 64 per cent of the employment created within the financial services sector in the period. The business activities sector, within which labour broking activities falls, has thus been the driver of employment growth within the fastest-growing sector of the economy (financial services) between 2001 and 2012.

Even though the data do not provide a more detailed breakdown of employment within the subsector, it may be argued that the dominant activities are employment agency, labour broking and security services activities. The results in Table 3 above would then suggest that growth within the financial services sector of the economy appears to have been driven by, among other activities, security services and labour broking activities.

In order to provide a better picture of the kinds of workers employed in the business activities, we disaggregate the subsector by its main occupation groups in Table 5 below. This shows that in 2001 the subsector consisted mainly of workers in protective services (42.6 per cent), helpers and cleaners (14.8 per cent) and “other” workers (33.7 per cent). Between 2001 and 2012, protective services workers increased by 228,000 and helpers and cleaners by 85,000. The increase in helpers and cleaners in offices, hotels and other establishments is a reflection of an increase in the use of contract cleaning staff, possibly employed through labour brokers. Furthermore, farmhands and labourers in this subsector increased from 0 to 50,000 in the period between 2001 and 2012, and this, too, may be evidence of an increase in the use of workers employed through labour brokers as farmhands and labourers.

Table 5: Occupations within the business activities N.E.C. subsector of financial services: 2001-2012

	2001	2012	2001	2012	Growth (2001-2012)	
	number		share		number	Per
Occupations within Business Activities N.E.C.						
General Managers of Bus Services	35,602	13,276	8.9%	1.5%	-22,326	-62.7%
Protective Service Workers	169,360	397,250	42.6%	44.1%	227,890	134.6%
Helpers and Cleaners ¹⁵	58,774	144,233	14.8%	16.0%	85,459	145.4%
Farmhands and Labourers	0	47,632	0.0%	5.3%	47,632	100.0%
Other	134,287	298,479	33.7%	33.1%	164,192	122.3%
Total Business Activities N.E.C.	398,022	900,863	100%	100%	502,841	126.3%

Source: StatsSA (LFS 2001 and QLFS 2012), Author's calculations

¹⁴ See Appendix 2 for the full table.

¹⁵ The helpers and cleaners occupation category includes helpers and cleaners in offices, hotels and other establishments.

Notes: 1. We were unable to ascertain whether the changes in employment of the occupation groups within the business activities N.E.C. subsector of financial services were significant.

In summary, it is difficult to directly estimate the number of workers employed through labour brokers and temporary employment services in the South African economy. Using official labour force survey data, it can be assumed that those who report being employed by labour brokers would be captured under the business activities subsector of financial services. This subsector was the main driver of growth within the financial services sector between 2001 and 2012, with protective services workers N.E.C, helpers and cleaners and farmhands and labourers accounting for the majority of the growth. There is thus tentative evidence in the labour force surveys of an increase in those employed through labour brokers.

Two issues should be highlighted, however. Firstly, labour broking employment is found in many sectors, including agriculture, construction, manufacturing, financial services, community services, wholesale and retail trade, mining, transport and communication. Many of those employed by labour brokers may not be aware of the fact that they are so employed. As respondents self-report, they may wrongly classify themselves under other sectors in the absence of direct questions on whether they are employed through labour brokers. (CAPES, 2010). Consequently, these numbers probably largely under-estimate the incidence of labour broker employment in South Africa.¹⁶

Secondly, it cannot be said with certainty that those included in the business activities subsector of financial services are, in fact, employed through labour brokers. What is clear, however, is that the employment change within this subsector, as shown in Appendix 3, was dominated by services and sales workers (46 per cent) and elementary workers (37 per cent). However, in the other subsectors of financial services, managers (30.1 per cent) and professionals (50.4 per cent) accounted for the majority of the change in employment. This evidence suggests that employment growth in financial services in the period was driven by the business activities subsector, and that, in turn, the increase in employment in that subsector was dominated by medium-skilled service and sales workers and unskilled elementary workers.

Overall, our sectoral analysis indicates that, in the period between 2001 and 2012, relative growth in employment was fastest in two tertiary sectors: financial services (2.8) and community services (2.1), together with a single secondary sector, construction (2.5). However, the increase in employment in financial services may partly be a reflection of an increase in those employed through labour brokers. Three tertiary sectors, namely community services, financial services and trade, together accounted for 93.6 per cent of the change in employment in the period, while the construction sector accounted for a further 16.6 per cent of the increase. Both of the primary

¹⁶ For example, if a person is employed through a labour broker on a construction site or in a mine, it is likely that the person would report their sector of employment as construction or mining, rather than financial and business services.

sectors provided a severe drag on employment levels, accounting for a negative share of 28.8 per cent in the change in employment in the period. Finally, the manufacturing sector showed a lacklustre performance, with no significant increase in employment in the period.

3.4 Occupational Employment Trends

Table 6 below shows that economic growth primarily favoured high-skilled occupations, followed by unskilled and then medium-skilled occupations. The employment growth rate for high-skilled occupations was double the overall employment growth rate, while the growth rates for medium-skilled and unskilled jobs were 0.6 and 0.8 of the overall growth rate respectively. The absolute numbers show that 1.1 million high-skilled jobs were created in the economy between 2001 and 2012, while the number of medium-skilled and unskilled jobs grew by 768,000 and 613,000 respectively. Thus, although workers across the skills spectrum shared in employment growth in the period, skilled workers benefited most, in both absolute and relative terms. In turn, medium-skilled workers were the relative losers.

Employment growth of managers and professionals was almost three times and double overall employment growth respectively. Professionals (26.7 per cent) and managers (19 per cent), together with medium-skilled service and sales workers (25.1 per cent) and unskilled elementary workers (20.7 per cent) accounted for the largest shares of the increase in employment. A striking feature of these results is the contribution of managers and professionals to the change in employment relative to their share in the workforce in 2001. While managers and professionals accounted for 5.9 and 14.9 per cent of employment in 2001, they contributed 19 and 26.7 per cent to the change in employment in the period, thus increasing their share of the workforce to 8.3 and 17 per cent respectively by 2012.

It is worth noting, however, as shown in Appendix 4, that a quarter of the increase in managers and more than 40 per cent of the increase in professionals in the period stemmed from the community services sector. In other words, a large proportion of the growth in high-skilled occupations was due to increased community service employment. The trade sector (27 per cent), financial services sector (19 per cent) and construction sector (12 per cent) also accounted for fairly large increases in managerial employment. In turn, apart from community services, the financial services (29 per cent) sector accounted for a large proportion of the increase in professional employment.

Table 6: Growth in employment, by occupation: 2001-2012

	Growth (2001-2012)		Employment		Share of (2001-2012)
	Absolute	Relativ	2001	2012	
High-Skilled	1,141,326	2.0	20.8%	25.3%	45.7%
Managers	475,491*	2.7	5.9%	8.3%	19.0%
Professionals	665,835*	1.7	14.9%	17.0%	26.7%
Medium-Skilled	767,555*	0.6	49.6%	46.1%	30.7%
Clerical workers	300,982*	1.2	9.8%	10.2%	12.1%
Service & sales workers	627,027*	1.8	12.7%	15.0%	25.1%
Skilled agricultural and fishery	-311,122*	-8.0	3.4%	0.5%	-12.5%
Craft & trade workers	124,687	0.4	13.7%	12.1%	5.0%
Operators & assemblers	25,981	0.1	10.1%	8.4%	1.0%
Unskilled	612,716*	0.8	29.4%	28.5%	24.5%
Elementary occupations	517,463*	1.0	20.1%	20.3%	20.7%
Domestic workers	95,253	0.4	9.2%	8.3%	3.8%
Total	2,497,763*	1.0	100.0%	100.0%	100.0%

Source: StatsSA (LFS 2001 and QLFS 2012), Author's calculations

Notes: 1. Relative growth is calculated by dividing the average annual growth rate for the occupation by the total average annual growth rate.

2. * denotes a significant change at the 5 per cent level

3. The share of change is calculated by dividing change in employment in the occupation by the overall change in employment.

Service and sales workers were second only to managers in terms of relative growth, with the employment growth rate for this occupation standing at 1.8 times the overall employment growth rate. They also accounted for a quarter of the change in employment in the period. As a result, from 12.7 per cent of the workforce in 2001, service and sales workers accounted for 15 per cent of the workforce in 2012. The increase in service and sales workers can mainly be attributed to higher demand from community services (52 per cent) and financial services (40 per cent) (see Appendix 4).

Two medium-skilled occupations, craft and trade workers and operators and assemblers, experienced the smallest relative gains in the period. Neither of these two occupations experienced significant employment growth economy-wide in the period between 2001 and 2012. Consequently, their share in total employment dropped from 13.7 to 12.1 per cent and 10.1 to 8.4 per cent respectively. The data in Appendix 4, however, show significant intersectoral churning for these medium-skilled workers in the period.

The data for unskilled workers show that growth in employment of elementary workers matched overall growth in the economy, while the growth in domestic workers was not significant. As a result the proportion of elementary workers remained at around 20 per cent, while the proportion of domestic workers declined from 9.2 per cent to 8.3 per cent. The results for

domestic workers can probably be attributed to the introduction of a minimum wage for domestic workers in 2002.

These results provide descriptive evidence of the impact of the growth trajectory of the economy on workers of different skills. In particular, they show that managers, professionals and service and sales workers were in high demand over the period 2001 to 2012, while, in relative terms, the demand for craft and trade workers and operators and assemblers fell. Finally, clerical workers and elementary workers maintained their status in the labour market, with the growth in employment for these two occupations matching overall employment growth.

Table 7 below sheds more light on the changes in skills shares in the primary, secondary and tertiary sectors of the South African economy in the period between 2001 and 2012. The primary sector lost 719,000 jobs in the period, including over half a million medium-skilled jobs and around 175,000 unskilled jobs, while there was no significant increase in high-skilled employment. The large and dramatic decrease in medium-skilled jobs in the primary sector resulted in the proportion of medium-skilled workers declining significantly by 17.7 percentage points from 54.5 per cent to 36.8 per cent. Given positive GDP growth in agriculture and some parts of mining, this effectively means an increase in the capital intensity of production.

Table 7: Changes in skills shares, by sector: 2001-2012

		Proportions					Change in Proportion	Change in
		2001	2004	2007	2010	2012	2001-2012	
Primary	High-skilled	2.9%	5.4%	4.8%	7.2%	7.6%	4.8 percentage	27,602
	Med-skilled	54.5%	52.5%	53.1%	35.2%	36.8%	-17.7 percentage	-571,229*
	Unskilled	42.6%	42.1%	42.1%	57.6%	55.5%	12.9 percentage	-175,392*
	Total	100%	100%	100%	100%	100%	-719,232*	
Secondary	High-skilled	14.2%	15.3%	16.6%	19.0%	18.1%	3.9 percentage	188,518*
	Med-skilled	69.8%	64.7%	63.6%	64.2%	61.5%	-8.3 percentage	136,140
	Unskilled	16.0%	19.9%	19.8%	16.8%	20.4%	4.4 percentage	214,002*
	Total	100%	100%	100%	100%	100%	537,376*	
Tertiary	High-skilled	27.4%	27.1%	31.8%	28.3%	29.3%	1.9 percentage	931,498*
	Med-skilled	41.8%	41.5%	39.8%	42.6%	42.6%	0.8 percentage	1,214,34
	Unskilled	30.8%	31.4%	28.4%	29.1%	28.1%	-2.7 percentage	576,288*
	Total	100%	100%	100%	100%	100%	2,720,821*	

Source: StatsSA (LFS 2001 and QLFS 2012), Author's calculations

Notes: 1. The primary sector includes agriculture and mining; the secondary sectors include manufacturing, utilities and construction; and the tertiary sector includes trade, transport, financial services, community services and private households.

2. High-skilled workers include managers and professionals; medium-skilled workers include clerical workers, service and sales workers, skilled agricultural and fishery workers, craft and trade workers and operators and assemblers; and unskilled workers include elementary workers and domestic workers.

3. * denotes a significant change at the 5 per cent level.

In the secondary sector, both high-skilled and unskilled employment rose significantly by around 200,000 jobs each, resulting in the proportion of both high-skilled and unskilled employment in the sector rising by around 4 percentage points. Meanwhile, the secondary sector experienced no significant rise in medium-skilled employment. The proportion of medium-skilled workers in this sector thus dropped from around 69.8 per cent to around 61.5 per cent.

Between 2001 and 2012, employment grew by 2.7 million workers in the tertiary sector. High-skilled and medium-skilled workers accounted for 2.1 million or more than 70 per cent of the increase in employment, with unskilled employment accounting for the rest of the increase. As a result, both the proportions of high-skilled and medium-skilled in the sector rose, while the proportion of unskilled declined by 2.7 percentage points. By 2012, high-skilled workers accounted for just under 30 per cent of tertiary sector workers, while medium-skilled and unskilled workers accounted for 42.6 and 28.1 per cent respectively.

In summary, both the primary and secondary sectors of the economy witnessed dramatically declining proportions of medium-skilled workers, for differing reasons. In the primary sector, the declining share of medium-skilled workers was due to a significant decline of more than half a million medium-skilled jobs, while in the secondary sector, it was due to the lack of growth in medium-skilled jobs. Both the secondary and tertiary sectors experienced a rise in the proportions of high-skilled workers in the period, due to significant and relatively high increases in high-skilled workers in these sectors. In contrast, while unskilled employment also rose in both the secondary and tertiary sectors, the *proportion* of unskilled workers rose only in the secondary sector. In the tertiary sector the proportion declined due to the much smaller increase in unskilled workers in that sector (576,000) compared to the increases in high-skilled (931,000) and medium-skilled employment (1.2 million).

Overall, skills-demand in the South African economy is related to a number of factors. Firstly, the relative shrinkage of the primary sectors and manufacturing imply a significant decline in the demand for less-skilled workers since these are the least skills-intensive sectors of the economy (Rodrik, 2006). Secondly, skills-upgrading throughout the economy has resulted in a decline in the demand for less-skilled workers. In other words, there has been substitution away from less-skilled towards more skilled labour. Thirdly, there has been significant capital-deepening of the economy in the tradable sectors, that is, production techniques adopted in these sectors have become increasingly capital-intensive (Rodrik, 2006).

The reasons for the movement of the economy away from agriculture, mining and manufacturing towards tertiary production are complex. In looking at the decline in manufacturing, in particular, Rodrik (2006) examines whether manufacturing became less profitable in the 1990s and onwards than earlier. He finds that the relative price of manufacturing goods decreased, but also that significant trade liberalization in the 1990s would inevitably have led to competitive pressures in the manufacturing sector.

Thus, the South African manufacturing sector found its dominant position in the local market under threat, as years of inward industrialization had left it uncompetitive internationally (Bhorat, Dieden & Hodge, 1998). As a result, manufacturing production declined steeply. Furthermore, tariffs fell quite sharply in labour-intensive sectors. Consequently, the commodity component of trade shifted away from sectors that were labour-intensive, thus reducing the demand for labour, particularly less-skilled labour, relative to capital (Thurlow, 2006 in Edwards & Stern, 2006).

Within manufacturing, Dunne & Edwards (2006) find substantial variation in the impact of trade on employment across manufacturing subsectors. Overall, trade (exports plus imports) led to increased employment in resource-based industries (iron and steel, food and beverages, etc.) and chemical industries (basic chemicals, plastics and rubber, etc.), while leading to lower employment in more labour-intensive sectors such as clothing, textiles and footwear, as well as the manufacture of metal goods. These changes led to significant churning within the workforce, but demand for labour has fallen fastest among less-skilled workers (Dunne & Edwards, 2006).¹⁷

The movement towards higher-skilled workers as well as the increasingly capital-intensive methods of production are both related to technological change. As far as technological change is concerned, Dunne & Edwards (2006) show that the majority of employment losses between 1994 and 2003 were probably due to skills-biased technological changes while trade liberalization also accounted for some of the proportion change. More specifically, it appears that firms found ways to cut costs and increase production by investing in capital and skills and shedding unnecessary jobs. Thurlow (2006) asserts that trade reforms have also contributed to the rising capital- and skills-intensity of production.

3.5 Conclusion

The above descriptive analysis shows some interesting results. Firstly, employment growth trends in the South African economy follow GDP growth trends, though employment growth tends to be slower than GDP growth. The South African labour market appears very vulnerable to economic slumps: the labour market impacts of the recent recession provide evidence that difficult economic times have a rapid, severe and long-lasting impact. Although the economy is recovering well from the recession, neither GDP growth rates nor employment levels have returned to pre-crisis levels.

Secondly, the period between 2001 and 2012 saw a continuation of the movement of the economy away from primary sector production towards tertiary production. The two primary sectors experienced the slowest GDP growth rates, with mining output declining, and employment in both

¹⁷ Rodrik (2006) also considers whether rising wage costs may have contributed to the decline in the sector, but finds that once real remuneration is broken down into a skills upgrading and a residual component, it is found that the residual skills-adjusted remuneration fell in the 1990s relative to the 1980s, thus making it unlikely that rising wage costs were responsible for the decline in manufacturing from the 1990s onwards.

agriculture and mining contracting severely in the period. Manufacturing employment was also stagnant in the period. The East Asian growth experience has shown that light manufacturing¹⁸ is critical to dynamic and sustainable growth. South Africa has not achieved an optimal growth strategy because of its relatively capital-intensive manufacturing, and no significant globally competitive light manufacturing base (see, for instance, the discussion in Hausmann and Klinger (2006) on South African exports).

In turn, the tertiary sectors, such as community services, financial services and trade, accounted for the largest increases in employment in the period. Importantly, growth in the community services and financial services sectors was labour-neutral, while output growth outstripped employment growth in the other sectors, particularly the primary sectors and construction. Employment growth within the financial services sector, one of the fastest growing sectors, was driven by growth in the business activities N.E.C. subsector which may reflect increasing labour broker employment. The increase in community service employment points to a large expansion in public sector employment in the period, with the public sector accounting for a fifth of the change in total employment in the South African economy between 2001 and 2012. South Africa's share of public sector employment is high, and is therefore cause for concern. For example, the IMF argues that the recent increase in public sector employment is not the best way to increase employment in South Africa, because it may crowd out critical health and education spending as well as put upward pressure on wages in the economy (IMF, 2012).

Fourthly, managers, professionals, and service and sales workers appear to have been in relatively high demand in the period between 2001 and 2012, due mostly to increases in employment in the community services and financial services sector. Craft and trade workers and operators and assemblers were the relative losers. their employment levels did not increase significantly in the period, while almost all other occupations, except domestic workers and skilled agriculture and fishery workers, experienced significant increases in employment. As a result the share of these two medium-skilled occupations (craft and trade workers and operators and assemblers) in total employment declined from 23.8 per cent to 20.5 per cent between 2001 and 2012. Medium-skilled clerical workers and unskilled elementary workers maintained their status in the labour market, with relative growth figures for these two occupations closely matching overall employment growth.

Fifthly, the proportion of medium-skilled workers declined dramatically in both the primary and secondary sectors. In contrast, large and significant increases in high-skilled employment in the secondary and tertiary sectors resulted in a rising proportion of high-skilled employment in these sectors.

Growth in employment has been driven by the public sector, financial services, labour brokers in semi-skilled and unskilled occupations, and trade. Hence, the real growth engine that is missing is light manufacturing.

¹⁸ Light manufacturing includes food processing and beverages, garments, leather products, metal products, and wood products (World Bank, 2012).

Furthermore, there is a skills base to grow this sector is lacking. Economic growth needs to rapidly increase the supply of those skills required by a globally competitive light manufacturing sector, and this must be achieved through the Sector Education Training Authorities (SETAs).

4 Decomposing Labour Demand

4.1 Introduction

The data in the previous section suggest that labour demand shifted toward individuals with greater skill levels. More specifically, South Africa's labour market, in the period between 2001 and 2012, saw a high demand for managers, professionals, service and sales workers while craft and trade workers and operators and assemblers were the relative losers. The dominance of tertiary sector, including the community services, financial services and trade sectors, is an overriding factor in explaining the aggregate shifts, although the increase in financial services employment should be treated with some caution. The fact that we can observe the labour demand outcome, however, is only half the puzzle solved. The other, perhaps more important, half of the puzzle is to determine the relative importance of the factors that shaped this labour demand trajectory. 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*. The issue is to estimate the relative strengths of these two forces in explaining the employment trends observed in the descriptive overview above. In order to achieve this, we utilize a basic decomposition technique drawn from a ground-breaking study by Katz & Murphy (1992).

Within-sector employment shifts are those changes in labour allocation that come from within the industry itself. Sources of within-sector shifts include technological change in a sector that may create the need for a certain skill-type over another. It may also be a change in the price of a non-labour factor, such as capital equipment or computers that results in altered preferences for certain labour types. Outsourcing of non-core functions, although hard to measure, is another form of within-sector shift that may result in changing labour preferences. Between-sector changes are relative employment shifts occurring between sectors in the economy as a result of changing shares in their relative output. As sectors typically have differing patterns of skill demands, a growing or declining share in production of a sector may alter labour demand at different skill levels. The share of domestic output that changes due to trade flows can similarly affect shifting labour demands between sectors. Finally, 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.

4.2 Methodology

The Katz & Murphy (1992) decomposition 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 can then readily be broken down 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 group, is directly observable. Utilizing 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:

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

The subscript k refers to occupation (or other group) and j refers to sectors.

The total relative demand shift for group k in the period under consideration

is measured by ΔX_k^d or $\frac{\sum_j \alpha_{jk} \Delta E_j}{E_k}$, where $\alpha_{jk} = \left(\frac{E_{jk}}{E_j} \right)$ is group k 's share of total

employment in that sector in the base year. ΔE_j is the change in total labour input in sector j between the two years. This measure then expresses the percentage change in demand for each group as a weighted average of the percentage change in sectoral employment in which the weights are group-specific employment distributions (Katz & Murphy, 1992). 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 normalize total employment in each year to sum to one, and so obtain a measure of relative demand shifts. In addition, the values for α_{jk} and E_k represent the base year, which in this case is 2001.

It should be noted that there are a number of drawbacks to the decomposition approach. First, it assumes that wages are constant in all recorded employment shifts. Thus, 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, suffers from 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 does not (and cannot) take account of the indirect input-output effects of such a change. These indirect effects may, in the long term, via higher national economic growth for example, cause an increase in the demand for these labour types. This is

the most fatal criticism of the decomposition technique, but yet one that is not easily resolved by better alternative techniques currently available.

4.3 Results

In the discussion below, we show the results of the decomposition methodology described above. The shifts reported are *relative* demand shifts, thus seeking to capture more accurately the magnitude of net sectoral employment growth, which absolute growth figures tend to mask. Importantly, Table 8 below reports on the changes in demand for a particular group due to within-sector and between-sector shifts, thus showing the proportion of the change in relative demand due to inter (between) and intra-sectoral (within) forces. In particular, we show the within-sector share represented as a share of total relative change in employment. Given the importance of community services as a proxy for public sector employment, we show the relative demand shifts with and without community services in Table 8 below.

Looking at the results including community services, Table 8 shows a relative increase in demand for all occupation groups in the period, with high and semi-skilled workers displaying the best results. The occupations displaying the highest total relative demand in the period were professionals, followed by clerical staff, managers and service and sales workers. These increases match well with the data above showing strong employment growth in sectors such as financial services, community services and trade, together with managers, professionals, service and sales workers and clerical staff.

The poorest performers in terms of relative demand were elementary workers, operators and assemblers and domestic workers. Thus, the period between 2001 and 2012 was marked by high relative demand for high-skilled occupations, together with some medium-skilled workers (clerical staff and service and sales workers), while medium-skilled craft and trade workers, operators and assemblers and unskilled workers experienced a relatively low demand.

The results for elementary workers here may be surprising, given that there was a significant growth of 517,000 elementary workers in the period between 2001 and 2012. The data below, however, show *weighted relative shares* of employment; put another way, the data show the relative performance of occupations given their shares in employment in 2001. The low total relative demand for elementary workers can thus be understood in the context of the fact that this occupation accounted for the largest chunk of employment in 2001, i.e. a fifth of all employment, but the growth in employment for this occupation was relatively slow, as shown in Table 6 below. The low relative demand for craft and trade workers, and particularly operators and assemblers is not surprising – neither of these two occupations saw significant increases in employment in the period between 2001 and 2012, with operators and assemblers displaying particularly poor results.

Importantly, Table 8 shows that for all the occupation groups shown, the within-sector component dominates over between-sector shifts in explaining the profile of relative demand. This is true particularly of managers where 95 per cent of the increase in relative demand in the period can be explained by intra-sectoral forces. In fact, however, for all other high and medium-skilled workers, the share of within-sector relative demand in explaining total relative demand is very high, ranging at between 87 and 96 per cent. However, while the within-sector component is also important for elementary workers, its dominance is less striking, reflecting the fact that between-sector forces played a greater role in determining relative demand for this occupation compared to other occupations. More specifically, these data probably reflect the collapse of unskilled employment in the primary sectors.

Finally, the relatively high within-sector component for domestic workers probably reflects the impact of the introduction of a minimum wage for domestic workers in 2002, which has resulted in stagnating levels of employment for domestic workers in the period. Overall, the results, including community services, in Table 6 above show that intra-sectoral forces dominate in our analysis of relative demand changes for different occupations over time, while inter-sectoral forces play a larger role in the relative demand of elementary workers compared to all other occupation groups.

Table 8: Industry-based relative demand shift measures, by occupation: 2001-2012

	<i>Including Community Services</i>				<i>Excluding Community Services</i>			
	Between	Within	Total	Share of Within in Total	Between	Within	Total	Share of Within in Total
High-Skilled								
Managers	0.92	12.63	13.32	94.9%	0.79	11.10	11.71	94.8%
Professionals	3.03	15.04	17.20	87.4%	1.13	6.09	7.07	86.1%
Medium-Skilled								
Clerical workers	1.59	12.88	14.07	91.6%	1.08	9.13	10.01	91.2%
Service & Sales	1.92	11.75	13.23	88.9%	1.21	7.69	8.71	88.3%
Skilled agric and	-0.55	-19.60	-20.47	95.8%	-0.62	-22.55	-23.59	95.6%
Craft & Trade Workers	1.35	7.88	9.01	87.4%	1.28	7.50	8.58	87.4%
Operators &	0.19	1.63	1.81	90.1%	0.12	1.04	1.15	90.0%
Unskilled								
Elementary Workers	0.28	1.10	1.37	80.1%	-0.17	-0.69	-0.86	79.7%
Domestic Workers	0.37	3.49	3.83	91.1%	0.37	3.49	3.83	91.1%

Source: StatsSA (LFS 2001 and QLFS 2012), Author's calculations

In order to try and isolate the impact of public sector employment from the relative demand shifts that may have been occurring elsewhere in the economy, we ran the decomposition for all the employed, excluding community services, since public sector workers are mainly found within the community services sector. These results are shown on the right-hand side

of Table 8 above, and are an attempt to illuminate the extent to which government employment may have influenced labour demand.

There are some interesting results from the analysis excluding community services. Firstly, the overall labour demand shifts are lower for each of the occupations in the Table 8 above when excluding community services. This is not surprising given that the community services sector accounted for around 40 per cent of the increase in employment in the period between 2001 and 2012, though it may be noted that not all of this increase can be apportioned to the public sector. Relative demand shifts are lower, in particular, for professionals, and to a lesser extent clerical and service workers. A more detailed analysis of the industry employment figures (see Appendix 4) reveal that more than 40 per cent of the increase in professionals in the period was in the community services sector, which also accounted for more than 50 per cent each of the increase in clerical and service and sales. In this context, the lower total relative demand figures, particularly for professionals, clerical and service and sales workers makes sense.

Secondly, Table 8 also shows that the share of within- and between-sector forces explaining total relative demand shifts are very similar, regardless of whether we include or exclude community services. Professionals are the only occupation worth mentioning, though the change is marginal. The share of within-sector demand in explaining total relative demand of professionals declines from 87.4 per cent to 86.1 per cent when we exclude the community services sector.

Thus, the data in Table 8 show that for all occupations, within-sector forces far outweigh between-sector forces in explaining overall relative demand shifts. For all occupations, barring elementary workers, within-sector influences constituted between 86 and 96 per cent of aggregate labour demand shifts. Hence, the forces of technological change and the greater preference for a specific factor mix have all catalysed firms into altering their labour demand practices in a particular way. Put simply, forces within each sector and firm have been the primary reason for the labour demand changes that have occurred in the period between 2001 and 2012. It should be noted that the smaller within-sector share of elementary workers reflects the high attrition of these primary sectors of the economy which are in secular decline.

The results of the decomposition in this section match well with employment shifts found in the previous section. More specifically, in the context of a growth trajectory within which mining and agricultural employment has collapsed, together with the creation of higher-skilled jobs in the tertiary sectors, it is not surprising that the overall relative demand shifts presented in Table 8 show strong demand for managers, professionals, service and sales workers and clerical workers. Furthermore, the table shows that medium-skilled craft and trade workers and operators and assemblers and unskilled workers experienced low relative demand, and these results are also not surprising, given the relatively poor performance of manufacturing and the primary sectors.

Given the importance of the public sector for growth in high-skilled and some medium-skilled occupations, the lower total relative demand figures, particularly for professionals, clerical and service and sales workers, excluding the community services sector, in the decomposition above, makes sense. Thus, the key missing link in a country like South Africa with an abundance of low skills is light manufacturing, since this would create much-needed jobs for lower-skilled workers.

Finally, the importance of within-sector forces in explaining relative demand patterns for medium-skilled and unskilled workers may be a reflection of the fact that sectors such as mining, agriculture, and manufacturing have been in decline due to various internal factors including technological change.

5 Occupations and Wages

In this section, we extend our analysis to examine the wage trends that accompanied the employment shifts experienced in Sections 3 and 4 above. Traditionally, the high levels of wage inequality in South Africa and the relatively large returns to skilled workers are explained by the high levels of inequality in education and experience (Bhorat, 2000). While education and experience account for a large portion of the apparent wage inequality, there are other (related) factors that may also be influencing the wage structure over time that are not directly related to skills. In particular, technological change and the impact of international trade may also be affecting wages and having an impact on returns to different occupations based on the tasks involved those occupations (Edwards, 2003).

The recent international literature on skills-biased technological change explores the idea that new technologies have not just depressed wages for low-skilled workers and raised wages for high-skilled workers but shows that wages have fallen specifically for those involved in performing routine or 'offshorable' tasks, a group often made up of workers in the middle of the distribution (Autor, Levy & Murnane, 2003; Goos & Manning 2007; Acemoglu & Autor 2011). This view of technological change moves beyond the high/low-skilled categories and identifies occupations as a key channel through which wages are affected. The contention is that in addition to skill-levels, the tasks performed in different occupations are closely linked to changes in the wage structure over time, where technological change and international competition have decreased returns to certain tasks. For example, jobs which require cognitive skills and creative problem-solving or face-to-face interaction are unlikely to be automated or threatened by international competition, while routine tasks on an assembly line or information processing jobs face higher risks in this regard.

In order to explore how occupational tasks may be playing a role in wage changes in South Africa we examine not only how the returns to occupational tasks have changed over time but also how these changes play out at different points along the income distribution. We expect to see that for those jobs involving tasks that face high risks of automation and international competition, wages have fallen over time. In addition we expect

that returns would not be distributed uniformly across the income distribution.

5.1 Methodology

5.1.1 Identifying Task Categories

Using wage and occupational information, we aim to analyse changes in the wage structure over a ten-year period (2001 to 2011), and we investigate whether these changes can be linked to occupational tasks. In order to do this, we identify five ‘task categories’, which are created to explore the way that different tasks are likely to be affected by technological change and international trade or competition. We create these categories using the four-digit occupation codes in the LFS and QLFS data, known as the South African Standard Classification of Occupations (SASCO). Using these codes we link every identified occupation with one or more of the five task categories below. The choice of these five categories is based on work by Jensen & Kletzer (2010) and, in particular, follows Firpo, Fortin, & Lemieux (2011). A brief explanation of each category is given here. The first two categories are meant to capture jobs that are likely to be affected by technological change and international competition, while the last three are less likely to be affected, and we thus use the reverse of these three to capture any potential impact.

1. **Information and communication technology (ICT):** ICT-related jobs have a high information content and are likely to be affected by technological change through the adoption of new production technologies, or face competition from countries where the same thing can be done more efficiently. These jobs generally include activities such as acquiring information, analysing data, recording information, and often involve interaction with computers. In the SASCO codes this consists of occupations such as software engineers, computer programmers, typists and data entry.
2. **Automation/routinization:** These jobs are routine in nature and have the potential to be automated, often involving repetitive tasks, structured work environments, and where the pace of the job is often determined by mechanical or technical equipment. These jobs could also potentially be at risk through increased trade and import penetration. They include occupations such as textile weavers, engravers, machine operators, and assemblers.
3. **Face-to-Face:** This type of work relies on face-to-face contact, such as establishing and maintaining personal relationships, working directly with the public, managing people, caring for others, teaching, and work requiring face-to-face discussions. Generally these are jobs that cannot be easily automated or replaced by a competing international firm. Such jobs range from room service attendants, food vendors, labour supervisors, travel guides, to therapists and teachers.

4. **On-Site:** These jobs require the worker to be present at the particular place of work, and usually include tasks involving physical work, controlling machines/processes, operating vehicles or mechanical equipment, inspecting equipment, constructing physical objects. Again, these jobs are not easily offshorable and are generally made up of construction workers, machine operators, drivers, mechanics, and various kinds of manual labourer.
5. **Decision-Making/Analytical:** This kind of work requires non-routine decision-making abilities, usually tasks that involve creative thought, problem-solving, developing strategies, taking responsibility for outcomes and results. Such jobs cannot easily be automated and are usually at lower risk of being displaced by international competition. Occupations include artists, all types of professionals, managers, and other jobs generally considered to be high-skilled jobs.

Note that certain jobs fall into more than one category, for example many managers would be involved in face-to-face tasks and also in decision-making/analytical tasks. There is thus overlap in the categories. In addition, in some cases, the nature of the LFS/QLFS survey coding forced us to categorize certain SASCO codes into the same task category, even though we might think they belonged in different categories. For instance, we had to combine certain farmers (who would be involved in decision-making) together with farm foremen (who would not necessarily be involved) in the decision-making category; this introduces some measurement error but the problem was limited to less than 10 SASCO codes overall.

5.1.2 The Relationship between Tasks and Wages

Our examination of the relationship between our five task categories and wages builds on earlier results which show increased labour demand in skilled sectors, and the Katz & Murphy decomposition revealing that within-sector forces explain the bulk of the changes in labour allocation. Moving beyond a basic ‘returns to skills’ analysis, we use the task categories described in section 5.1.1 above to examine how different tasks are being rewarded in the South African labour market and the factors that may be driving these shifts. The task categories can be linked to skills, where, for example, analytical jobs are more highly skilled while on-site or automated jobs generally require lower-skilled workers.

Our wage regression includes controls for the five task categories as well as the standard controls for factors that strongly influence earning power such as education, race, and age/experience, thus controlling for individual skills as a predictor of wages. We take this approach in an attempt to identify wage premiums linked to occupational tasks, while controlling for other individual characteristics. A traditional Ordinary Least Squares (OLS) wage regression estimates the wage premium at the mean of the wage distribution. However, since we are also interested in whether the wage premiums associated with task categories are different at different points of

the wage distribution, we adopt a quantile regression approach. Put another way, we are also interested in whether, for example, the wage premium to automated jobs declined in the middle of the wage distribution (given that we expect that technological change may have resulted in declining wage premiums for routine jobs which tend to be medium-skilled), and therefore employ quantile regressions rather than OLS regressions.

While OLS regressions allow us to estimate wage premiums at the mean of the wage distribution, the quantile regression approach allows us to observe wage changes throughout the distribution. In this way we hope to shed some light on the expected impact of technological change and international trade, not only on the levels of wages for each task category but also at different points in the wage distribution within each category.

Following Firpo *et al.* (2011) our conditional quantile regression has the log of monthly wages as the dependent variable and task category as the independent variable, with basic controls included.

$$\text{Log of Monthly Wages}_t = \beta_1 + \beta_2 X_t + \beta_3 (\text{Task Category}_t) + \alpha$$

where t is the year, and X includes controls for age, race and education. The variable of interest here is the coefficient on β_3 in each occupational category for each decile of the income distribution in any given year. This variable provides an estimate of the returns to each category across each decile of the income distribution for the year in question. We run the regressions for 2001 and 2011. In Section 5.3 below, we plot the resulting coefficients for the task categories only, while Appendix 7 provides full quantile results for 2001 and 2011 for selected quantiles.

It should be noted that for the last three task categories, we use the opposite of the chosen task category in the regression, i.e. instead of those employed in occupations that involve face-to-face interaction we present the results for those employed in occupations that have *no* face-to-face interaction, etc. This makes all the results easily comparable when looking for evidence of technological change and the impact of international trade.

5.2 Descriptive Statistics

The descriptive statistics below expand on our task categories. Specifically, we show how the task categories relate to the occupational data, the changes in task employment over the period, and the changes in wages related to tasks over time. Table 9 shows the task categories against occupational categories from the household survey data for 2001 and 2011. It should be noted that the far right-hand column called '*LFS Totals*' shows the actual employment totals for each occupation directly from the LFS/QLFS, independent of the overlapping task categories. For example, in the 2001 LFS there were 663,945 managers in South Africa. In contrast, the '*Total*' column to the left of '*LFS Totals*' gives the total number of managers in our five task categories. It is clear that there is an overlap in these categories, where, for example, many managers are involved in face-to-face tasks as well as analytical tasks and are thus included in both task categories. A correlation matrix (Appendix 5) reveals that the strongest correlations (0.41) are between automated and on-site, and analytical and

face-to-face. This overlap highlights the extent to which our task category measure is a blunt instrument. Table 9 explores the composition of these categories in more detail to give a better sense of what occupations each one includes.

Table 9 below shows that the ICT category consists of occupations that are classified in the household survey data as professionals, technicians, and clerical workers. These occupations include jobs such as software engineers, computer programmers, typists and data entry workers. In general, ICT-related jobs are thought to be easily affected by technological change and international competition, because technology is easily transferrable and routine tasks can be easily automated. Looking at automated jobs next, the table below shows that, in the main, this task category consists of elementary workers, craft workers and operators and assemblers, and some clerical workers and technicians. Automated jobs contain elements which could be automated or routine and are thus also potentially at risk from technological change and global competition.

Face-to-face jobs are jobs that cannot be easily automated or replaced by a competing international firm, since they have face-to-face components. This includes some lower-paid jobs in elementary and service occupations (for example, service attendants, food vendors, labour supervisors/foremen), but it also includes higher-paid occupations such as managers, professionals, technicians and clerical workers. On-site jobs, in the fourth column, are those which are not easily offshorable since they have an on-site component. The table shows that jobs with an on-site component are numerous and span all occupational categories, but are mainly found in elementary, craft, operator and domestic occupations. These include construction workers, machine operators, drivers, mechanics, various kinds of manual labourers and domestic workers. The final task category consists of jobs with an analytical or decision-making component, and the majority of these higher-skilled jobs are found in professional, managerial and technical occupations.

Table 9: Occupational categories and occupational tasks: 2001 to 2011

LFS September 2001												
	ICT		Automated		Face-to-Face		On-site		Analytical		Total	LFS Totals
	No.	Shar	No.	Shar	No.	Shar	No.	Shar	No.	Shar		
Managers	0	0%	0	0%	663 227	19%	8 681	0%	663 227	35%	1 335 135	663 945
Professionals	77 922	12%	2 986	0%	249 490	7%	31 776	0%	381 861	20%	744 036	485 829
Technicians	178	29%	205 165	5%	531 864	15%	134 110	2%	671 219	36%	1 720 996	1 176 031
Clerical workers	368	59%	1 029	26%	356 139	10%	100 998	2%	51 481	3%	1 907 311	1 090 772
Service	0	0%	0	0%	1 034	29%	740 526	12%	32 993	2%	1 808 162	1 429 021
Skilled Agriculture	0	0%	283 450	7%	0	0%	292 128	5%	43 464	2%	619 042	520 699
Craft Workers	0	0%	724 015	18%	0	0%	1 297	20%	30 134	2%	2 051 912	1 529 375
Operators and	0	0%	475 869	12%	0	0%	878 239	14%	0	0%	1 354 108	1 127 155
Elementary Workers	0	0%	1 311	33%	673 791	19%	2 055	32%	0	0%	4 041 162	2 252 554
Domestic Workers	0	0%	0	0%	0	0%	881 411	14%	0	0%	881 411	881 411
Total	625	100%	4 032	100%	3 509	100%	6 421	100%	1 874 380	100%	16 463	11 156
QLFS Q4 2011												
	ICT		Automated		Face-to-Face		On-site		Analytical		Total	LFS Totals
	No.	Shar	No.	Shar	No.	Shar	No.	Shar	No.	Shar		
Managers	0	0%	0	0%	1 157	24%	20 220	0%	1 157	40%	2 334 672	1 157 833
Professionals	177 053	15%	8 436	0%	415 379	9%	80 129	1%	716 452	25%	1 397 450	769 895
Technicians	217 476	18%	336 415	7%	680 002	14%	206 931	3%	856 331	30%	2 297 154	1 510 919
Clerical workers	787 136	67%	1 451	30%	478 675	10%	122 805	2%	51 449	2%	2 891 906	1 529 944
Service Workers	0	0%	0	0%	1 391	29%	1 208	15%	64 804	2%	2 664 120	1 968 706
Skilled Agriculture	0	0%	55 868	1%	0	0%	60 361	1%	22 645	1%	138 874	71 800
Craft Workers	0	0%	723 277	15%	0	0%	1 476	19%	4 431	0%	2 204 031	1 652 057
Operators and	0	0%	386 750	8%	0	0%	1 010	13%	0	0%	1 396 912	1 133 984
Elementary Workers	0	0%	1 844	38%	661 684	14%	2 733	35%	0	0%	5 239 587	2 960 509
Domestic Workers	0	0%	0	0%	0	0%	886 883	11%	0	0%	886 883	886 883
Total	1 181	100%	4 806	100%	4 783	100%	7 805	100%	2 873	100%	21 451	13 642

Source: StatsSA (LFS 2001-2007 and QLFS 2008-2011), Author's calculations

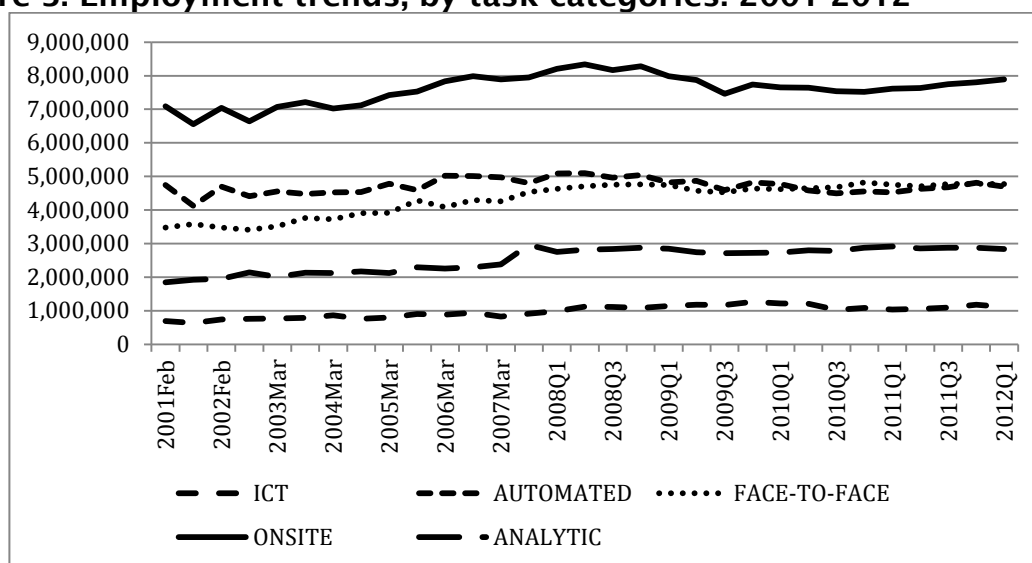
Table 9 above shows some interesting results: Firstly, the on-site category accounts for the largest category of workers in all years. In 2011, on-site jobs account for around 36 per cent of the task-employed. This is not surprising given that this category spans a wide range of occupation types, since most jobs have some on-site component. Analytical and ICT jobs, which mostly consist of better-skilled workers (professionals, technicians, and clerical workers), account for the smallest share of employment by task category: 2.9 and 1.2 million of the 21.4 million employed in 2011. In turn, automated and face-to-face jobs account for about 4.8 million of the 21.4 million employed in task-based jobs in 2011.

Secondly, Table 9 shows that in each of the years there is considerable overlap between tasks. So, for instance, while the actual employment total in 2011 Q4 stands at 13.6 million, our total for the task categories measures stands at 21.5 million. The difference between the two is made up of those occupations that have been coded into more than one of the five categories. These overlap results are not surprising, since many jobs fall into more than one task category. For instance, certain machine operators would fall into the automated category as well as the on-site category.

Figure 3 below shows employment trends for each task category over time. It shows graphically the relative dominance of on-site employment, that is, that most employment in South Africa falls into the on-site category. Sectors which dominate this category are manufacturing, construction and trade, and domestic workers as well as the majority of farmworkers. Overall, the trend in on-site employment shows a rise from 2001 to 2008 when the economy was growing relatively quickly, followed by a noticeable decline from the end of 2008 when the impact of the recession began to bite in the South African labour market. In the last two years on-site employment stabilized and an overall upward trend is evident.

Thus, on-site employment trends mirror overall employment trends quite closely.. This is not surprising given that a large share of overall occupations in the economy have an on-site component. Though not shown here, it is worth noting that the share of on-site jobs in total jobs declined in the period between 2001 and 2012. The descriptive analysis shows a stable or declining share of employment for elementary workers, craft workers, operators and assemblers, and domestic occupations, the occupational categories within which on-site employment is concentrated, and it is thus not surprising that the overall share of on-site employment in total task employment decreased in the period.

Figure 3: Employment trends, by task categories: 2001-2012



Source: StatsSA (LFS 2001-2007 and QLFS 2008-2012), Author's calculations

In turn, the figure above shows that the face-to-face and analytical categories display a sustained upward trend over the period, with face-to-face employment increasing from 3.5 million to 4.8 million and analytical employment increasing from 1.9 million to 2.9 million. These types of job have high shares of higher-skilled workers, so we would expect an upward trend in employment in the period, given the skills-biased employment trajectory noted in section 3. Finally, jobs involving ICT-related and automated tasks remained relatively stable between 2001 and 2012. Overall these movements reveal similar trends to those indicated and described in detail in Sections 3 and 4.

Table 10 below takes a brief first look at wage data over the period for each of the task categories. It shows that ICT-related jobs and analytical jobs have the highest average wages, while jobs with potential for automation and on-site jobs are associated with lower wages. Jobs involving face-to-face contact are in the middle of this distribution. The results for ICT-related jobs and analytical jobs are expected, since there is a dominance of better-skilled workers in these task categories, as shown in Table 9. In turn, automated jobs and on-site employment is dominated by lower-skilled elementary workers, craft workers and operators and assemblers, thus accounting for the lowest average wages among these groups.

Table 10: Wage Trends, by Task Categories: 2001-2011

	ICT	AUTOMATED	FACE-TO-FACE	ON-SITE	ANALYTICAL
2001	8.13	6.88	7.18	6.62	8.21
2002	8.21	6.77	7.37	6.55	8.18
2003	8.11	6.85	7.29	6.60	8.22
2004	8.14	6.92	7.37	6.70	8.28
2005	8.13	6.96	7.28	6.74	8.21
2006	8.19	6.94	7.38	6.74	8.29
2007	8.20	7.05	7.51	6.86	8.31
2008	n/a	n/a	n/a	n/a	n/a
2009	n/a	n/a	n/a	n/a	n/a
2010	8.50	7.80	8.37	7.28	8.60
2011	8.46	7.78	8.39	7.63	8.67
% Change	4%	13%	17%	15%	6%

Source: StatsSA (LFS 2001-2007 and QLFS 2008-2011), Author's calculations

Notes: 1. The wages are log of monthly wages

2. The wages above are real wages deflated to 2001 prices.

An examination of the wage trends over time indicates that face-to-face, automated and on-site jobs saw the largest average wage increases over the period while analytical and ICT-related jobs experienced the lowest increases. These results thus appear to indicate that the low-earning categories have seen relatively larger increases in wages than higher earning jobs. , This may, in part, be due to increased protection for poorer workers through minimum wages. Furthermore, these preliminary descriptive results do not control for productivity-related characteristics of workers, such as education, experience or race.

A closer look at wages is provided in Appendix 6, where we disaggregate wages by task category and industry for 2001, 2007 and 2011. This provides a more detailed picture of average wages, and the broad shifts which have taken place over the period under review. Looking across each row reveals the average wages within each industry, by task category. For example in the agricultural industry in 2001, jobs classified as on-site had an average log monthly wage of 5.92 while analytical jobs in the industry earned 8.21 on average. The data show rising wages for all task categories in the agricultural industry, and particularly for those in automated and on-site categories. This may partly be due to the impact of the minimum wage. By contrast, looking down a column indicates how wages within a task category differ by industry.

It is again clear, for example, that ICT-related and analytical jobs are associated with the highest wages, although substantial increases in wages for the other three task categories are evident. An important question that requires more detailed analysis is whether wage trends reveal that skilled (or scarce-skill) sectors, along with those sectors which are afforded government or union protection, are earning wage premiums at the expense of those sectors which are not protected or those facing the pressures of global

competition. The descriptive data lend modest support to this hypothesis, for instance in the case of agricultural and manufacturing, where the former appears to have benefited from state protection while international competition may be putting pressure on manufacturing wages. However, given the aggregate nature of this descriptive data, it is difficult to identify clear trends in this regard. In the next section, we investigate the premiums associated with the task categories more comprehensively by using quantile regressions which control for productivity-related characteristics of workers.

5.3 Returns Across the Wage Distribution

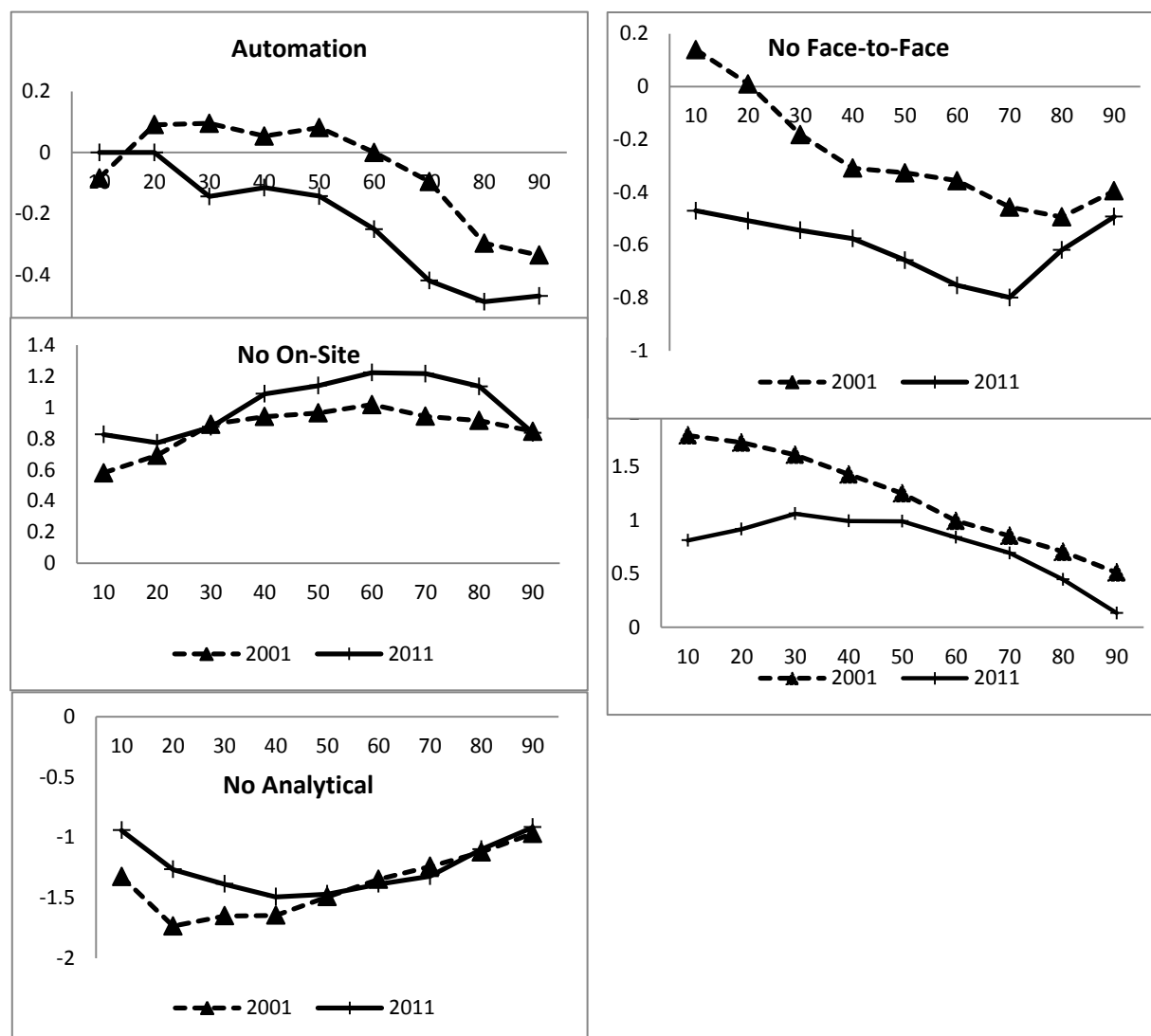
A quantile regression allows us to model the relation between a set of predictor variables (in our case task categories) and a dependent variable (in our case, wages) over specific percentiles (or quantiles) of the wage distribution. The sample for the quantile regression results presented below comprises all working-age employed individuals who provided earnings information in the two surveys. In both years (2001 and 2011), earnings are measured by the log of the total monthly wages. Our model includes controls for education, age/experience, and race. We specify a set of splines for the education level of workers and another set of splines for age, which serves as a proxy for experience. Standard dummies for race, with African as the base case, are also included in our estimation. The full regression results are included in Appendix 7 and reveal that the coefficients on the standard controls are as expected. Below we present results only for the five task categories.

The quantile regression results for the task categories are shown in Figure 4 below. For those in automated or routine occupations, the results show very small positive returns for workers in the middle of the distribution in 2001 but negative premiums for those at the bottom of the distribution (10th quantile) and at the top of the distribution (70th to 90th quantiles). The positive returns in the middle of the distribution in 2001 would probably include some technicians, clerical workers, craft workers and operators and assemblers. Importantly, the figure shows that, over time, the returns to automated jobs fell throughout most of the distribution range, but particularly in the middle of the distribution. This may suggest that demand for automated jobs has declined in the period, particularly for craft workers, operators and assemblers, and elementary workers. This is the first piece of evidence suggesting that technological innovation and international competition may be impacting on the demand for, and consequently wages of, those employed in routine work. These effects may have been felt in industries such as clothing and textiles, which have suffered as a result of increased international competition.

In 2001, workers throughout most of the distribution range with no face-to-face component to their work faced lower returns than those employed in jobs with face-to-face contact. This trend intensified in the period between 2001 and 2011, with premiums decreasing significantly. The occupational categories with no face-to-face contact are largely in the primary sectors and include, among others, domestic workers, farm workers and machinery operators. These results are expected, given that jobs requiring no face-to-

face contact are more likely to be replaced by changing technologies and global competition. Thus, the results from the face-to-face graph present the second piece of evidence of the potential impact of technology and international competition on wages.

Figure 4: Task wage premiums by quantiles: 2001-2011



Source: StatsSA (LFS 2001 and QLFS 2011), Author's calculations

We expect wages of workers with no on-site component to be higher than wages of workers with an on-site component, since on-site workers are dominated by craft workers, operators and assemblers, elementary workers and domestic workers. As expected, Figure 4 shows that workers that have no on-site component to their jobs earn better wages than those with an on-site component, and that the premium increases as one moves up the distribution. This result is thus intuitive given that on-site jobs are generally lower-paid jobs. Figure 4 shows that over time, the premiums on jobs that do not require one to be on-site have increased, particularly in the middle of

the distribution. The employment trends presented in Section 3 above show substantial growth in tertiary sector employment together with the highest relative growth in demand for managers, professionals and service workers. In this context, the increasing premiums for workers that are not on-site in the middle to upper part of the distribution is not surprising.

The ICT and analytical categories are dominated by medium to higher-skilled workers. Not surprisingly then, Figure 4 shows that workers in ICT jobs earn a wage premium over those not in ICT jobs, though the wage premium for ICT jobs over non-ICT jobs declines as one moves up the distribution. Over time, the premium for ICT workers declined slightly, but particularly for workers below the 30th percentile, probably technicians and clerical workers, though ICT workers still earn a premium relative to non-ICT workers.

Finally, the last graph in Figure 4 shows, as expected, that jobs with no analytical or decision-making component to them are associated with the largest negative wage premiums, and these are highest for those in the lower-middle of the wage distribution. Workers in this category include domestic workers, elementary workers, operators and assemblers and also a significant number of clerical, service and craft workers. Over time, the results show no change in the wage premiums from the 50th to 90th quantiles, though the relative wage ‘penalty’ for those at the bottom of the income distribution has lessened somewhat. This may be due in part to the extension of minimum wages to several low-paid sectors, including domestic workers and farmworkers. Overall, the introduction of minimum wages in 11 sectors of the economy, chiefly implemented in the early 2000s, with steady wage increases every few years, represents an exogenous ‘policy shock’ which appears to be influencing wages at the bottom of the distribution.

This section has attempted to give an overview of changes in the South African wage structure over a recent ten-year period. In particular, the aim has been to investigate whether there is any evidence of specific occupational tasks serving as a channel through which wages are influenced. The descriptive overview revealed some expected evidence of wage inequality being linked to particular occupational tasks, where jobs involving tasks that require greater levels of skill are associated with higher wages. To some extent this shows evidence of skills-bias.

Overall the conditional quantile results show several interesting trends. Firstly, both workers in ICT-related jobs and workers not on-site earn better throughout the wage distribution than their counterparts in non-ICT related jobs and working on-site. This is not surprising, given that these two task categories are dominated by medium to higher-skilled occupations which were in high demand in the period. Furthermore, for analytical jobs, which are dominated by managers, professionals and technicians, the premium increased between the 40th and 80th quantiles over the 2001 to 2011 period. This is in line with a high demand for these occupations in the period, as illustrated in Sections 3 and 4. Increasing skills-intensity thus appears to be matched by rising wages for higher-skilled tasks.

Secondly, for both the automated and no face-to-face categories, wage premiums have declined over time. For those in jobs with automated

components, the decline was particularly large in the middle of the wage distribution (between the 30th and 80th quantiles), with positive premiums turning negative at the 30th, 40th, 50th and 60th quantiles. Similarly, in jobs that do not involve any face-to-face interaction, we show a clear decline in wage premiums over time across the entire distribution, and particularly between the 10th to 70th quantiles. By 2011, the negative premium for those in the 70th quantile was almost -0.8. Thus, the declining wage premiums for those in automated jobs and for those with no face-to-face contact appears to support the hypothesis that technological change and globalization has led to a decrease in the demand for jobs consisting of tasks that can be automated or are at risk due to international competition.

Thirdly, jobs with no analytical or decision-making component are, as expected, associated with negative wage premiums and there is evidence that the wage 'penalty' for those at the bottom of the income distribution has lessened. This result may be due to the introduction and extension of minimum wages for workers in several low-earning sectors, including domestic workers and farmworkers.

6 Conclusion

This paper examined broad labour market trends in South Africa with a focus on the nature of employment growth, and the resulting impact on wages. Overall, employment growth over the period 2001 to 2012 was mostly as a result of employment growth between 2001 and 2007. We found that employment gains made during the mid-2000s were completely nullified by the recession with employment at the end of 2010 returning to levels last seen in 2006, though employment levels have since begun to recover somewhat. Thus, the recession had a severe and lasting impact on employment levels. Furthermore, there are several other markers of employment growth in the period. Firstly, employment within the primary sectors collapsed in the period with agriculture and mining together losing over 700,000 jobs, resulting in large scale employment losses among the lower-skilled.¹⁹

Secondly, the manufacturing sector did not witness any increase in employment in the period. In terms of production and exports, South Africa remains a resource-based economy with no significant globally competitive light manufacturing sector. The emergence of labour-abundant countries like China and India has squeezed emerging countries like South Africa out of low-skilled exports while skills constraints in the South African economy pose a challenge as far as development of more sophisticated manufacturing industries is concerned. Exports in South Africa are, as a result, typically unsophisticated and concentrated mainly in resource-based products, with little movement towards a significant amount of higher technology production and exports (DPRU, 2012). A globally competitive light manufacturing sector in South Africa could provide a possible growth engine.

Thirdly, growth has mainly been created within tertiary sectors such as financial services and community services. The increase in financial services employment has largely been within the business activities (not elsewhere classified) subsector, which may reflect labour broking employment. In turn, public sector employment has grown faster than private sector employment with the public sector accounting for 15 per cent of total employment in 2012. However, growing employment within the public sector has its limits, since increasing public sector employment is not seen to be an efficient or effective way of increasing employment in the South African economy (IMF, 2012).

Fourthly, as a result of employment growth driven mainly by the tertiary sectors, high- and medium-skilled occupations, such as managers, professionals and service and sales workers saw significant employment gains. In turn, craft and trade workers, and operators and assemblers experienced no significant employment growth, and the economy saw a declining proportion of medium-skilled workers in the primary and secondary sectors. The relative demand for occupational groups from the

¹⁹ Note, however, that employment numbers for the mining industry using household survey data are lower than employment numbers for the industry using firm-based data (see DPRU, 2013).

Katz & Murphy decomposition match well with the findings above. Furthermore, they show that within-sector shifts dominate over between-sector shifts in explaining the profile of relative demand. This supports the claim that technological changes, among other factors, have played an important role in employment trends.

Global competition, increasing capital intensity, the shrinkage of primary sector employment as well as technological change have all resulted in increasing skills-intensity in the South African labour market. We would expect these changes to be associated with increasing wage premiums for higher-skilled workers, as well as declining wage premiums for workers in jobs that are affected by global competition and technological change. The quantile regression results show that, when controlling for age/experience, race and education, jobs which involve automated or routine tasks and those without any face-to-face component (largely lower to medium-skilled jobs) have experienced a drop in wage levels over time across most of the income distribution. Thus, wage premiums for occupational tasks appear to be influenced by structural changes such as technology and international competition.

Importantly, too, at the bottom of the wage distribution, the wage 'penalty' on those in jobs with no analytical component has declined. This group consists of domestic workers, elementary workers, operators and assemblers and also a significant number of clerical, service and craft workers. The decline in the wage penalty for those at the bottom of the wage distribution may, in part, be due to the extension of minimum wages to several low-paid sectors including domestic workers and farmworkers.

7 Bibliography

D. Acemoglu and D.H. Autor, *Skills, Tasks, and Technologies: Implications for Employment and Earnings*, in O. Ashenfelter and D. Card, eds., *Handbook of Economics*, Vol. IV.B: 1043-1172, Amsterdam, North-Holland, (2011).

D.H Autor, F. Levy and R.J. Murnane, *The Skill Content of Recent Technological Change: An Empirical Exploration*, *Quarterly Journal of Economics*, Vol. 118(4): 1279-1333, (2003).

P. Benjamin, *Untangling the Triangle: The Regulatory Challenges of Triangular Employment*. Preliminary Draft for Presentation, Conference on "Regulating Decent Work" 6-8 July 2009, (2009) .

H. Bhorat, R. Kanbur and B. Stanwix *Estimating the Impact of Minimum Wages on Employment, Wages and Non-wage Benefits: The Case of Agriculture in South Africa*. Development Policy Research Unit (DPRU) Working Paper No. WP 12/149, University of Cape Town, (2012).

H. Bhorat *Wage Premia and Wage Differentials in the South African Labour Market*. Development Policy Research Unit (DPRU) Working Paper No. 00/43, University of Cape Town, (2000).

H. Bhorat, J. Hodge and S. Dieden *The Impact of Structural and Production Method Change on Employment Growth of Occupational Groups in South Africa*, *The Trade & Industry Monitor*, 6:2, (1998).

Facing the Facts: Labour Broker Research in 2010, Confederation of Associations in the Private Employment Sector (CAPES) (2010)

Development Policy Research Unit (DPRU) *Employment in the Mining and Quarrying Industry in South Africa*. Fact Sheet 10, University of Cape Town, (2013).

Development Policy Research Unit (DPRU) *Towards Economic Transformation and Growth: A Review of the South African Economy*, Research Report Prepared for the African Centre for Economic Transformation (ACET), (2012).

Development Policy Research Unit (DPRU) *The South African Economy Pre- and Post-Recession and Fiscal Responses to the Recession*, Research Paper, University of Cape Town, (2010).

Development Policy Research Unit (DPRU) *The Determinants of Labour Demand Shifts in South Africa: The Role of International Trade, Technology and Structural Change*,. Research Paper, University of Cape Town, (2007).

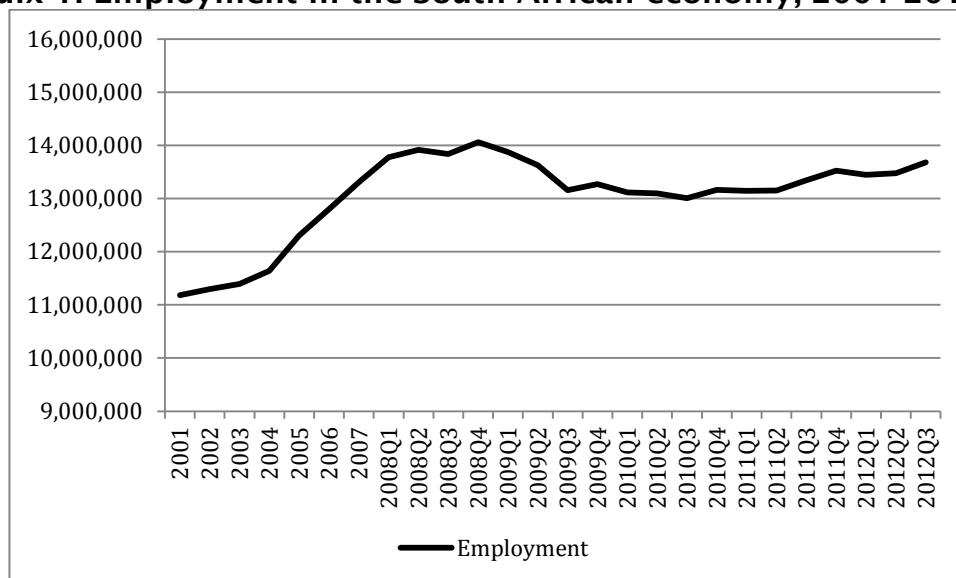
Development Policy Research Unit (DPRU) *Employment and Household Poverty: The Effects of Trade, Investment and Technology*,. Research Paper, University of Cape Town, (2003).

P. Dunne and L. Edwards, L *Trade, Technology and Employment: A Case Study of South Africa*. Paper prepared for the Centre for the Study of African Economics, University of Oxford, Conference on "Reducing Poverty and Inequality: How can Africa be included?" 19th-21 March 2006, (2006).

- L. Edwards and M. Stern, *Trade and Poverty Research Project in South Africa: Lessons and Policy Recommendations*. Paper prepared for the South African Trade and Poverty Research Project, South African Labour and Development Research Unit (SALDRU), University of Cape Town, (2006).
- L. Edwards, Globalisation and the Skill Bias of Occupation Employment in South Africa, *South African Journal of Economics*, Vol. 69(1), 40-71, (2001).
- S. Firpo, N.M. Fortin, and T. Lemieux, *T Occupational Tasks and Changes in the Wage Structure*, IZA Discussion Paper No. 5542, (2011).
- M Goos and A. Manning, *Lousy and Lovely Jobs: The Rising Polarization of Work in Britain*, *The Review of Economics and Statistics*, Vol. 89(1), 118-133, (2007).
- S. Hanival and J. Maia, *An Overview of the Performance of the South African Economy since 1994*, (2008).
- R. Hausmann and B. Klinger, *South Africa's Export Predicament*. Centre for International Development (CID) Working Paper No. 129, Harvard University, (2006).
- International Monetary Fund (IMF) *South Africa: 2012 Article IV Consultation*, (2012).
- J.B. Jensen and L.G. Kletzer, *Measuring Tradable Services and the Task Content of Offshorable Services Jobs*, In K. Abraham, M. Harper and J. Spletzer, eds., *Labor in the New Economy*, University of Chicago Press, (2010).
- L.F. Katz and K.M. Murphy, *Changes in Relative wages, 1963-1987: Supply and Demand Factors*, *The Quarterly Journal of Economics*, Vol. 107(1),: 35-78, (1992).
- Organisation of Economic Co-operation and Development (OECD), *African Economic Outlook – South Africa*. AfDB/OECD (2008).
- D. Rodrik, *Understanding South Africa's Economic Puzzles*. Bureau for Research and Economic Analysis of Development (BREAD) Working Paper No. 131, (2006).
- South African Board for People Practices (SABPP) *Contingent Work Forces and Decent Work*. SABPP Position Paper (2012).
- J. Thurlow, *Trade Liberalization and Pro-Poor Growth in South Africa*. Paper prepared for the South African Trade and Poverty Research Project, South African Labour and Development Research Unit (SALDRU), University of Cape Town, (2006).
- World Bank, *Light Manufacturing in Africa: Targeted Policies to Enhance Private Investment and Create Jobs*. A co-publication of the Agence Française de Développement and the World Bank, (2012).
- D. Yu, *Youth Unemployment in South Africa since 2000 revisited*. Stellenbosch Economic Working Papers 04/13, University of Stellenbosch, (2013).

8 Appendices

Appendix 1: Employment in the South African economy, 2001-2012Q3



Source: StatsSA (LFS 2001-2007 and QLFS 2008-2012), Author's calculations

Appendix 2: Decoding the business activities N.E.C subsector of financial services: 2001-2012

	2001	2012	2001	2012	Growth (2001-	
	number		share		number	per cent
Monetary Intermediation	150,007	122,584	14.5%	6.7%	-27,423	-18.3%
Insurance and Pension Funding, Except Compulsory Social	107,853	109,438	10.4%	6.0%	1,585	1.5%
Legal, Accounting, Bookkeeping and Auditing Activities ²⁰	116,861	155,932	11.3%	8.6%	39,071	33.4%
Business Activities N.E.C. ²¹	398,022	900,863	38.4%	49.6%	502,841	126.3%
Other	262,526	528,560	25.4%	29.1%	266,034	101.3%
Total Financial Services	1,035,269	1,817,377	100.0%	100.0%	782,108	75.5%

Source: StatsSA (LFS 2001 and QLFS 2012), Author's calculations

Notes: 1. We were unable to ascertain whether the changes in employment of the subsectors within the financial services sector were significant.

²⁰ The legal, accounting, bookkeeping and auditing activities subsector includes the following: legal, accounting, bookkeeping and auditing activities; tax consultancy; market research and public opinion research; business and management consultancy.

²¹ The business activities N.E.C. subsector of the financial services sector includes the following: labour recruitment and provision of staff; activities of employment agencies and recruiting organizations; hiring out of workers (labour broking); disinfecting and exterminating activities in buildings; investigation and security activities; building and industrial plant cleaning activities; photographic activities; packaging activities; credit rating agency activities; debit collecting agency activities; stenographic, duplicating, addressing, mailing list and similar activities; business brokerage; interior design; fashion design; demonstration and exhibition activities; editorial, translation and interpretation activities; telephone answering activities; agencies representing people in motion pictures and other entertainment or sports attractions; and other business activities.

Appendix 3: Occupation changes within financial and business activities: 2001-2012

	Financial Services			
	Business Activities		Other	
	No. Change	Share of Change	No. Change	Share of Change
Managers	6,297	1.3%	84,135	30.1%
Professionals	20,150	4.0%	140,751	50.4%
Technicians	20,938	4.2%	8,988	3.2%
Clerical workers	35,274	7.0%	-49,791	-17.8%
Service and Sales Workers	229,930	45.7%	21,706	7.8%
Skilled Agricultural Workers	-19,405	-3.9%	0	0.0%
Craft and Trade Workers	7,402	1.5%	35,197	12.6%
Operators and Assemblers	17,429	3.5%	9,589	3.4%
Elementary Workers	185,266	36.8%	28,689	10.3%
Total	502,841	100.0%	279,267	100.0%

Source: StatsSA (LFS 2001 and QLFS 2012), Author's calculations

Notes: 1. We were unable to ascertain whether the changes in employment of the occupation groups within the business activities N.E.C. subsector of financial services were significant.

Appendix 4: Occupation increases by sector: 2001-2012

	Manager	Professional	Clerical worker	Service and Sales	Skilled Agriculture and Fishing	Craft and Trade	Operator and Assembler	Elementary	Domestic	Total
Agriculture	2%	1%	-2%	1%	84%	-1%	-	-	0%	-
Mining	-1%	2%	-5%	-1%	0%	-	-	4%	0%	-8%
Manufacturing	8%	6%	0%	2%	0%	-	-10%	12%	0%	4%
Electricity	-1%	2%	0%	-1%	0%	3%	-16%	1%	0%	0%
Construction	12%	6%	9%	0%	0%	109	45%	28%	0%	17%
Trade	27%	9%	49%	7%	0%	56%	61%	9%	0%	21%
Transport	7%	5%	6%	1%	0%	-1%	528	11%	0%	12%
Financial Services	19%	29%	-5%	40%	6%	34%	104	41%	0%	31%
<i>Business</i>	1%	6%	12%	37%	6%	6%	67%	36%	0%	20%
<i>Other</i>	18%	22%	-	3%	0%	28%	37%	6%	0%	11%
Community	25%	41%	52%	52%	9%	14%	88%	32%	0%	42%
Private	0%	0%	0%	0%	0%	0%	0%	0%	100	4%
Total	100	100	100	100	100	100	100	100	100	100

Source: StatsSA (LFS 2001 and QLFS 2012), Author's calculations

Appendix 5: Task category correlation matrix (2001, 2011)

	2001				
	Analytical	ICT	Automated	Face-to-Face	On-Site
Analytical	1				
ICT	0.1058	1			
Automated	-0.0354	0.2139	1		
Face-to-Face	0.4189	-0.0369	0.0058	1	
On-Site	-0.0523	-0.052	0.4103	0.1564	1

	2011				
	Analytical	ICT	Automated	Face-to-Face	On-Site
Analytical	1				
ICT	0.1117	1			
Automated	0.0312	0.2547	1		
Face-to-Face	0.414	-0.0301	0.0316	1	
On-Site	0.0346	-0.0425	0.4115	0.1392	1

Source: StatsSA (LFS 2001 and QLFS 2011), Author's calculations

Appendix 6: Log monthly wages, by industry and task category: 2001, 2007 & 2011

2001					
	ICT	Automated	Face-to-Face	On-site	Analytical
Agriculture	7.66	5.87	7.45	5.92	8.21
Mining	8.28	7.56	8.60	7.56	9.18
Manufacturing	8.35	7.23	8.25	7.40	8.34
Utilities	8.20	7.71	8.20	7.75	8.60
Construction	7.86	7.03	8.15	6.83	8.69
Trade	7.96	7.07	6.57	6.47	7.86
Transport	8.28	7.78	8.00	7.65	8.39
Financial Services	8.27	7.92	7.91	7.24	8.70
Community Services	8.18	7.78	7.90	7.50	8.18
Domestic	n/a	n/a	5.98	5.93	n/a

2007					
	ICT	Automated	Face-to-Face	On-site	Analytical
Agriculture	7.57	6.47	7.81	6.27	8.25
Mining	8.26	7.79	8.65	7.78	8.72
Manufacturing	8.27	7.30	8.36	7.39	8.55
Utilities	8.05	8.13	8.45	7.86	8.96
Construction	7.90	6.92	8.59	6.91	8.69
Trade	7.90	7.07	6.84	6.80	7.82
Transport	8.59	7.87	7.88	7.55	8.46
Financial Services	8.52	7.94	7.81	7.29	8.86
Community Services	8.02	7.72	7.95	7.35	8.26
Domestic	n/a	n/a	6.38	6.29	n/a

2011					
	ICT	Automated	Face-to-Face	On-site	Analytical
Agriculture	8.49	7.36	7.19	7.76	8.09
Mining	8.29	8.38	8.01	8.48	9.08
Manufacturing	8.43	7.66	8.11	8.01	8.66
Utilities	8.17	8.43	8.09	8.40	8.91
Construction	8.66	7.42	8.57	7.30	9.02
Trade	8.33	8.91	8.56	8.36	7.83
Transport	8.32	7.94	8.04	8.67	8.41
Financial Services	8.76	8.72	8.28	8.29	8.87
Community Services	8.22	8.57	7.88	8.78	8.38
Domestic	n/a	n/a	6.49	8.02	n/a

Source: StatsSA (LFS 2001 & 2007 and QLFS 2011), Author's calculations

Appendix 7: Quantile regressions, selected quantiles: 2001 & 2011

	2001			2011		
	q10	q50	q90	q10	q50	q90
White	0.714*** (0.0910)	0.864*** (0.0234)	0.733*** (0.0154)	0.529*** (0.115)	0.721*** (0.0121)	0.626*** (0.0167)
Coloured	0.647*** (0.0897)	0.304*** (0.0135)	0.173*** (0.0152)	0.693*** (0.0674)	0.262*** (0.0111)	0.145*** (0.0130)
Asian	0.599*** (0.175)	0.600*** (0.0292)	0.442*** (0.0179)	0.961*** (0.212)	0.567*** (0.0229)	0.498*** (0.0506)
High school	0.254*** (0.0529)	0.796*** (0.0148)	0.681*** (0.0127)	0.277*** (0.0613)	0.595*** (0.00891)	0.585*** (0.0115)
Higher Education	0.910*** (0.117)	1.216*** (0.0281)	1.042*** (0.0206)	0.878*** (0.0874)	1.361*** (0.0167)	1.069*** (0.0199)
Experience 15 years	0.477*** (0.0488)	0.512*** (0.0196)	0.405*** (0.0186)	0.478*** (0.0730)	0.292*** (0.0129)	0.302*** (0.0140)
Experience 25 years	0.613*** (0.0785)	0.713*** (0.0170)	0.577*** (0.0240)	0.503*** (0.0945)	0.409*** (0.0100)	0.491*** (0.0198)
Experience 35 years	0.444*** (0.0530)	0.688*** (0.0166)	0.614*** (0.0179)	0.277*** (0.0779)	0.465*** (0.0158)	0.596*** (0.0184)
Experience 45+	-0.135 (0.104)	0.309*** (0.0587)	0.476*** (0.0455)	0.185* (0.104)	0.227*** (0.0431)	0.537*** (0.0466)
ICT	-0.0351 (0.328)	* (0.0249)	7 (0.0254)	0.501** (0.196)	0.108*** (0.0186)	-0.0307 (0.0259)
Auto	-0.298*** (0.0618)	0.0269** (0.0137)	0.0364** (0.0154)	-0.707*** (0.0503)	-0.148*** (0.0125)	0.0967** (0.0120)
No Face-to-Face	0.374*** (0.0591)	0.510*** (0.0152)	0.471*** (0.0132)	0.373*** (0.0859)	0.455*** (0.0101)	0.527*** (0.0137)
No Onsite	0.161** (0.0643)	0.292*** (0.0122)	0.291*** (0.0153)	0.317*** (0.0736)	0.325*** (0.0140)	0.297*** (0.0191)
No Analytical	-0.522*** (0.0804)	-0.832*** (0.0136)	-0.660*** (0.0186)	0.0237 (0.103)	-0.507*** (0.0142)	-0.557*** (0.0152)
Constant	3.598*** (0.104)	6.126*** (0.0183)	7.223*** (0.0323)	3.467*** (0.116)	6.593*** (0.0202)	7.547*** (0.0268)
Observations	51,309	51,309	51,309	49,335	49,335	49,335
Pseudo R Squared	0.2294	0.3302	0.3245	0.2282	0.2879	0.3095

Source: StatsSA (LFS 2001 and QLFS 2011), Author's calculations

Notes: 1. The data are weighted using 2001 Census weights.

2. Standard errors are in parentheses.

2. The dependent variable is log of monthly wages.

3. *** - significant at the 1% per cent level.

4. The sample includes all those between 15 and 65 who are employed and have non-missing wage data.

5. The reference variable for race is African, and we used splines for education and experience.