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WIDER Working Paper 2014/115

South African labour market transitions during the global financial and economic crisis

Micro-level evidence

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September 2014

Abstract: This paper studies individual-level labour market transitions and their determinants in South Africa during the zenith and aftermath of the global financial and economic crisis using 2008 to 2010-2011 panel data from the National Income Dynamics Study and matched cross-sections of the Quarterly Labour Force Survey over 2008Q1-2012Q4. We uncover considerable movement in South African labour markets over the crisis period. Chances of continued employment vary along gender, age and education levels and between different occupations and sectors. The time variation in the economic significance of some of these determinants remains however difficult to link to South Africa's economic trajectory.

Keywords: global financial crisis, labour markets, employment, survey data, South Africa
JEL classifications: F61, G01, J64

Acknowledgements: I wish to thank Ingrid Woolard and Arden Finn for getting me started with the NIDS datasets and Sher Verick for sharing his code for the QLFS matching algorithm. Helpful comments and suggestions from participants at the UNU-WIDER Conference on Inclusive Growth in Africa, the 2013 CSAE Annual Conference at Oxford University and seminars at the University of Antwerp and Catholic University of Louvain are gratefully acknowledged. The usual disclaimer applies.

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This paper has been presented at the UNU-WIDER 'Conference on Inclusive Growth in Africa: Measurement, Causes, and Consequences', held 20-21 September 2013 in Helsinki, Finland.

ISSN 1798-7237 ISBN 978-92-9230-836-0 https://doi.org/10.35188/UNU-WIDER/2014/836-0

Typescript prepared by Liisa Roponen for UNU-WIDER.

UNU-WIDER gratefully acknowledges the financial contributions to the research programme from the governments of Denmark, Finland, Sweden, and the United Kingdom.

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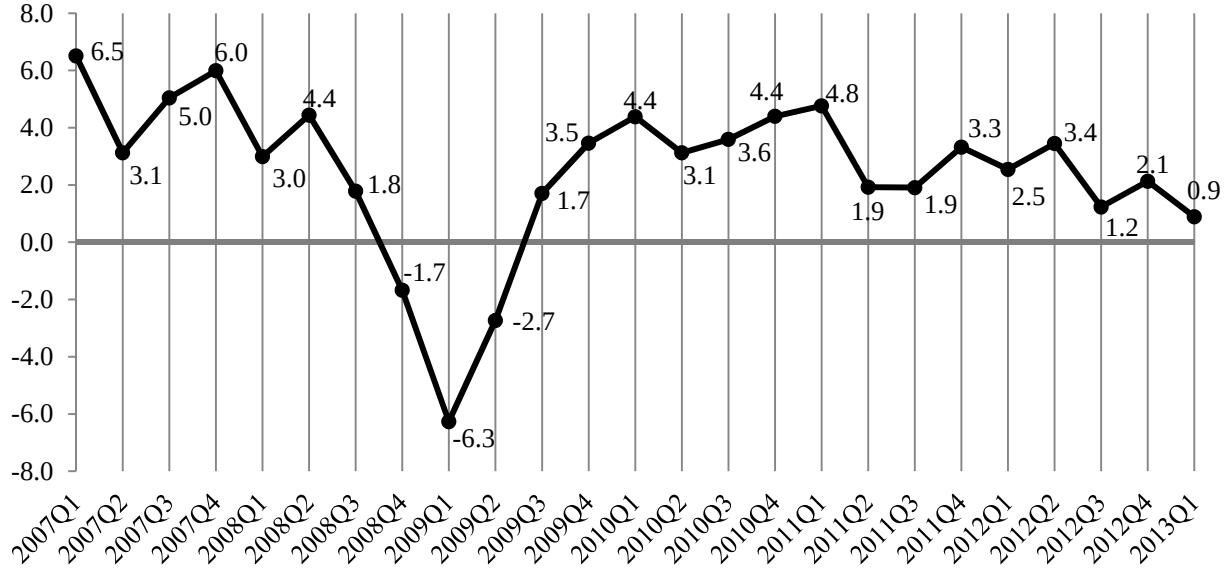
1 Introduction

The last few years have seen a multitude of studies documenting the transmission of the global financial and economic crisis from developed country financial systems and economies to developing and emerging countries, through channels such as reduced private capital flows, shrinking trade and lower international remittances (e.g., World Bank 2009; IMF 2010; ODI 2010; for a summary, see Essers 2013). These external, macro-level shocks and the policy responses to them showed to have important impacts on developing country households and individuals (e.g., Harper et al. 2011; Heltberg et al. 2012).

Because of its integration in the world economy, South Africa also did not escape the trembles of the crisis. Figure 1 shows that South Africa entered recession in 2008Q4, for the first time since the demise of apartheid. The slump in economic activity was driven to a large extent by a fall in manufacturing output, next to contractions in the mining sector, wholesale and retail trade, and financial, real estate and business services.[1] After three quarters of negative growth, the South African economy in 2009Q3 picked up again. However, despite an ambitious government action plan including monetary policy easing and new public investment, economic revival has been anaemic. South African growth seems to have been punctuated by renewed global slowdown, at least partly due to lingering problems in the euro zone and a disappointing recovery in the USA, both important trade and investment partners.

Evidently, this adverse economic course has not been without consequences for South Africans (Mabugu et al. 2010; Ngandu et al. 2010; Kucera et al. 2012). In this paper we focus on changes in individuals' labour market status, a critical determinant of their own and their households' well-being (World Bank 2012; see Leibbrandt et al. 2012 on South Africa specifically). Described as its 'Achilles' heel', South Africa's extraordinarily high, structural unemployment and segmented labour markets (along dimensions of race, gender, formality, urban/rural divisions, etc.) have

Figure 1: Annualized growth of (seasonally adjusted) quarterly GDP at constant prices, 2007Q1-2013Q1 (%)



Source: Statistics South Africa (2013a).

[1] Manufacturing alone contributed approximately -2.9, -3.8 and -1.5 percentage points to the -1.7, -6.3 and -2.7 per cent quarter-on-quarter growth in 2008Q4, 2009Q1 and 2009Q2, respectively (Statistics South Africa 2013a).

been the subject of an enormous literature (see, among many others, Hofmeyr 2000; Kingdon and Knight 2004, 2006, 2009; Bhorat and Kanbur 2006; Banerjee et al. 2008; Heintz and Posel 2008; Rodrik 2008; Leibbrandt et al. 2010).[2] We aim to examine in greater detail how this troublesome labour market situation further evolved during the global economic crisis. As is well-documented for both previous and the most recent crisis episodes, recessions tend to have heterogeneous impacts across workers with different demographic backgrounds and employed in different sectors and occupations (Clark and Summers 1981; Kydland 1984; Verick 2011; Hoynes et al. 2012; Cho and Newhouse 2013).

Table 1: Evolution of unemployment rates, 2008-12 (%)

	Narrow unemployment					Broad unemployment				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Overall	22.8	23.9	24.9	24.9	25.1	27.4	29.9	32.6	33.3	33.5
Male	19.8	22.0	22.8	22.5	22.9	23.4	26.9	29.3	29.7	30.0
Female	26.4	26.2	27.5	27.8	27.8	32.1	33.5	36.6	37.5	37.6
Black/African	27.0	28.1	29.2	28.9	28.8	32.4	35.3	38.3	38.7	38.6
Coloured	18.8	20.2	22.0	22.6	24.0	20.6	22.2	24.9	26.1	26.9
Asian/Indian	12.0	12.0	9.0	10.5	10.9	12.7	14.3	11.4	12.8	13.2
White	4.2	4.7	5.8	5.8	5.8	4.7	5.4	7.0	7.0	6.9
Age 15-25	43.4	45.6	48.3	47.6	49.1	49.2	53.6	58.0	58.7	59.7
Age 26-35	24.3	26.4	27.3	27.8	27.6	28.7	32.1	34.7	35.6	35.5
Age 36-45	15.1	15.6	16.5	17.1	17.3	18.5	20.2	22.3	23.5	23.6
Age 46-55	9.4	10.3	11.3	11.7	12.1	12.9	14.5	16.8	17.4	18.0
Age 56-64	6.8	5.8	7.0	5.6	6.4	9.8	9.0	11.4	9.9	11.1
Urban	21.2	22.8	24.0	24.1	24.3	24.0	26.3	28.5	28.7	28.8
Rural	27.9	27.3	27.9	27.5	28.0	37.0	40.1	44.1	46.1	46.2
Western Cape	18.3	20.5	21.8	22.2	23.8	19.6	21.7	23.2	23.3	24.8
Eastern Cape	26.4	27.6	27.4	27.5	28.9	35.2	38.3	39.8	39.9	42.1
Northern Cape	23.1	26.8	26.8	28.7	28.4	28.2	32.0	33.9	34.7	33.5
Free State	24.0	26.4	27.9	27.7	32.6	28.4	32.1	33.3	33.5	37.2
KwaZulu-Natal	22.0	20.0	19.9	19.8	21.0	26.4	29.5	31.7	32.2	33.2
North West	24.2	27.3	26.6	26.4	25.2	31.3	34.4	36.4	40.7	39.3
Gauteng	21.6	23.8	26.8	27.0	25.0	24.0	26.4	30.4	30.5	28.6
Mpumalanga	23.5	25.7	28.4	29.5	29.9	29.1	32.0	37.8	39.5	40.5
Limpopo	30.2	26.4	22.9	20.0	21.0	38.0	37.4	39.0	40.5	38.8

Notes: Sample includes only people of working age (15-64). All figures are averaged over four quarters and population-weighted. Narrow unemployment rate is calculated as (unemployed searching)/(unemployed searching + employed); broad unemployment rate as (unemployed searching and discouraged)/(unemployed searching and discouraged + employed).

Source: Own calculations using 2008Q1-2012Q4 QLFS data (Statistics South Africa various years).

According to the Quarterly Labour Force Survey (QLFS), total employment, defined as the number of people aged 15-64 that are engaged in market production activities, decreased from a peak of about 14 million in 2008Q4 to a trough of just under 13 million in 2010Q4 (Statistics South Africa 2013b), reversing the (modest) gains made during the preceding economic boom. As with economic growth, the recovery has been sluggish; in 2013Q1 total employment stood at

[2] For a recent meta-analysis of this literature, see Fourie (2012).

13.6 million. Conversely, the ranks of the unemployed swelled from 3.9 million in 2008Q4 to 4.6 million people in 2013Q1. Table 1 gives the 2008-2012 evolution of South African unemployment rates, disaggregated by gender, race, age group, geography type and province. It shows that the official, narrowly defined unemployment rate increased only slightly over this five-year period, from 22.8 to 25.1 per cent, whereas the rise in the broad unemployment rate, which also counts discouraged individuals who would prefer to work but have given up job search, was more substantial. Moreover, the upward trend in unemployment rates varies significantly across population segments and geographically. Limiting ourselves to the broad unemployment rates, increases were most spectacular for men, black Africans and Coloureds, youth and in rural areas. In terms of provinces, Mpumalanga, Gauteng and Northern Cape saw the largest jumps in unemployment rates in the 2008-2010 period; over 2010-2012 the greatest increases were observed in Free State, North West and again Mpumalanga.

Most of these trends have already been documented in earlier work on South African labour markets during the global crisis (see Verick 2012). However, overviews based on repeated cross-sections do not allow one to evaluate gross changes in labour market participation, with individuals entering and exiting particular labour market states, or to determine the identity of those who move from one state to another. Such transitions are exactly what this paper seeks to study.[3] Our main research question is the following: which individual, household level and job-specific characteristics are associated with staying or not staying employed in South Africa during the height and aftermath of the global crisis? In addressing this question we make use of two South African datasets. The first is a nationwide panel dataset: the National Income Dynamics Study (NIDS), whose first two waves cover the 2008 and 2010-2011 period. In the second instance, we employ an algorithm developed by Ranchod and Dinkelman (2008) to create a matched, individual level panel from the 2008Q1-2012Q4 rounds of the QLFS. We believe that an analysis of these two longitudinal datasets offers a valuable complement to existing studies. The nature of the current paper is mostly exploratory and some of the results we present ask for further scrutiny in the future.

The remainder of the paper is structured as follows. Section 2 summarizes the findings of three closely related studies and the remaining knowledge gaps. Section 3 first describes the NIDS dataset and employs it to construct transition matrices and decomposable measures of labour market mobility. Second, we explain our empirical model to analyse the determinants of individual labour market transitions. Another sub-section discusses the model estimates based on NIDS data. Section 4 introduces the matched QLFS dataset and uses it to put the results extracted from NIDS into perspective, by studying the evolution of labour market transitions over time. Section 5 concludes.

2 Related literature

A first related study is by Leung et al. (2009). To evaluate the effect of different individual characteristics on the likelihood of employment, they pool six rounds of the QLFS over 2008-2009 and regress an employment dummy on gender, race, years of schooling and professional experience as well as an interaction of these variables with the deviation of gross domestic product (GDP) growth from its long-term trend. They conclude that human capital, both education and work experience, significantly reduced the negative impact of the crisis on

[3] In this paper we do not study changes in wage earnings or the number of hours worked by the employed, two other potentially important channels of labour market adjustment. QLFS data, however, show a remarkable stability in the average number of hours worked in South Africa over 2008-2011 (Statistics South Africa 2012). Coverage of monthly wage earnings data is very patchy in the datasets we used for this paper.

employment. Female workers were also found to be less affected than men. Race, on the other hand, while in itself highly significant in determining labour market outcomes, did not further compound crisis effects. Leung et al. (2009) acknowledge that their approach does not allow to control for job-specific variables or to study individual labour market transitions.

Second, with the same QLFS data Verick (2010) constructs multinomial logit models where the outcome variable exists of five distinct labour market statuses: formal sector employment, informal sector employment, unemployment, discouragement and outside the labour force. Including as regressors age, education, marital status, household size, race and province dummies, he estimates, separately for men and women, three cross-sectional models for 2008Q2, 2009Q2 and 2009Q3 and then compares between quarters the resulting average predicted probabilities for unemployment, discouragement and informal sector employment. The results for women suggest little change in the likelihood of having a certain labour market status over the quarters under consideration. For African men and males with below-tertiary education, however, the estimates show a significant increase in the probability of discouragement.

In a third study, Verick (2012) corroborates his earlier results, based on updated multinomial logit models pooled over four 'pre-crisis' quarters (2008Q1-2008Q4) and eight 'crisis' quarters (2009Q1-2010Q4) of the QLFS: rising discouragement, particularly among poorly educated African men. In addition, Verick (2012) uses matching on observable characteristics to create a QLFS panel and finds that mobility between statuses was higher in 2008 than in 2009. The low matching rate of his newly constructed panel is said to limit more in-depth analysis of the determinants of labour market transitions.

The following section shows how the NIDS, a large, detailed panel dataset, can be employed to mitigate some of the limitations of the just-described papers. In Section 4 we come back to the approach of matching different rounds of the QLFS to construct a panel.

3 National Income Dynamics Study panel

3.1 Dataset structure and descriptives

The National Income Dynamics Study (NIDS) is South Africa's first nation-wide, representative panel data survey.[4] Between January and December 2008, 7,301 households, representing 28,247 resident individuals, were interviewed. A second wave of inquiries was organized from May 2010 to September 2011; this time 28,641 individuals from 6,814 households were successfully interviewed. The result is a panel dataset of 21,098 individuals who appear in both waves.[5] Leaving out those that died or emigrated in between waves, the overall attrition rate is an acceptable 19 per cent. At the moment of writing, a third wave had been conducted in the field but was not yet available for analysis. Combining household level and individual interviews, NIDS collects detailed information on, among other topics, household expenditure and consumption, demographics, education, health, well-being, and labour market participation.

There are several reasons why NIDS qualifies as a useful instrument to gauge labour market transitions during the global crisis. First, the timing of the two waves of interviews matches

[4] See Brown et al. (2012). NIDS datasets can be obtained from DataFirst: www.datafirst.uct.ac.za. This paper uses version 4.1 of wave 1 and version 1.0 of wave 2.

[5] Unlike the QLFS (see Section 4), NIDS is a panel of individuals and not of households; household identifiers are only meaningful within (and not between) waves.

reasonably well with that of the most intense phase of the crisis: wave 1 contains information from around the time the banking crises in the USA and Europe took a turn for the worse and before the South African economy entered recession;[6] wave 2 was undertaken when economic recovery had already set in, but only timidly so (see Figure 1). South African labour markets had not yet fully recovered from the economic downturn by 2011 (see Table 1). A second important trait of NIDS is its longitudinal character, making an analysis thereof a natural complement to the studies reviewed in Section 2. Third, NIDS' design allows individual labour market information to be combined with numerous other individual and household level characteristics.

One problem with NIDS, however, is that cross-sectional analysis reveals a large reduction in the number of unemployed and a large increase in the number of individuals outside the labour force between waves 1 and 2, which does not fully correspond with trends observed in the QLFS. Elsewhere it is suggested that some of the individuals who in reality were actively searching for employment at the time of the NIDS wave 2 may have been incorrectly classified by fieldworkers (Finn and Ranchod 2013). We keep this limitation in mind when specifying our empirical model. Another point worth noting is that between-wave attrition rates in NIDS are particularly high for better-off white South Africans (SALDRU 2012). Although we use panel weights supplied by NIDS that are meant to correct for this attrition bias, estimates for this group of individuals may not be very accurate.

Following Cichello et al. (2012) we restrict ourselves to adults aged 20-55 in 2008 who were successfully interviewed in both waves. The official working age in South Africa is 15-64, but we do not want our analysis to be unduly influenced by school leavers, first-time employees, pensioners and/or people preparing for retirement. This leaves us with 8,371 panel members. NIDS labour market data make it possible to categorize these individuals in different, mutually exclusive groups. Within NIDS an individual is defined as employed if he/she is engaged in productive activity; this includes those who are paid a wage to work on a regular basis for an employer ('regular wage employment'); work for themselves, including in partnership with others ('self-employment'); work for an employer on an irregular and short-term basis ('casual employment'); work on the household's own plot or food garden ('subsistence agriculture'); or assist other people with their business activities ('assistance with others' business'). The 'searching unemployed' are not employed but have actively searched for work in the four weeks prior to the interview. They can be distinguished from the 'discouraged unemployed', who would have liked to work but did not actively look for a job. The 'not economically active (NEA)' are not interested in finding employment (e.g., full-time students, the sick and disabled, those that fulfil unpaid domestic duties) and are per definition outside the labour force.

To visualize labour market transitions, Table 2 gives the transition matrix for the just described labour market categories. We pool with casual employment the categories of subsistence agriculture and assistance with others' business, as there were reportedly some problems in the field with capturing engagement in these activities during wave 2 of NIDS (Cichello et al. 2012). It is clear that there is considerable individual movement between labour market statuses, an observation in line with other studies adopting longitudinal views on South African labour markets (Cichello et al. 2005; Banerjee et al. 2008; Ranchod and Dinkelman 2008). Almost a quarter of those in regular wage employment in 2008 were no longer in this category by 2010-2011. That said, wage employment is a relatively stable state compared to self- or casual and other employment. The limited inflow into and considerable flow out of self-employment and casual work may partly reflect the limited size of South Africa's informal sector, which traditionally has not absorbed those outside (formal) wage employment (Kingdon and Knight 2004). Over 40 per

[6] More than 90 per cent of all wave 1 interviews were conducted over February-June 2008.

cent of the NEA in 2008 were in the labour force by 2010-2011, most of them in employment. Among those who were (searching or discouraged) unemployed in the first period, mobility is even greater (keeping in mind possible misclassification). It can be calculated from Table 2 that 51.4 per cent of all individuals aged 20-55 in 2008 switched labour market status from wave 1 to wave 2 (see further).

Constructing transition matrices for male and female adults separately, we find that regular wage employment, casual work and unemployment appear to be more stable states for men than for women (results not shown). The opposite is true for self-employment and NEA. Overall, women are more mobile than men (54.3 versus 47.1 per cent switched status).

Table 2: Transition matrix for labour market status, 2008 and 2010-2011, row proportions (%)

			Labour market status in 2010-2011					
			39.8	6.0	4.7	12.0	5.0	32.5
			Regular wage employment	Self-employment	Casual/ other employment	Unemployed searching	Unemployed discouraged	NEA
Labour market status in 2008	37.1	Regular wage employment	**76.4**	3.2	3.2	5.3	2.7	9.3
	7.4	Self-employment	16.6	**34.0**	5.3	7.8	2.6	33.8
	8.6	Casual/ other employment	24.1	6.4	**6.1**	12.1	6.1	45.3
	18.5	Unemployed, searching	21.7	3.9	6.5	**21.6**	6.5	39.8
	6.3	Unemployed, discouraged	18.0	3.2	6.8	18.1	**10.8**	43.1
	22.2	NEA	14.0	3.8	4.4	15.0	6.1	**56.8**

Notes: Sample includes only panel members aged 20-55 in 2008. All figures have been weighted using panel survey weights that account for between-wave attrition. Outer left column (top row) gives the overall proportions of each category in 2008 (2010-2011).

Source: Own calculations using NIDS data (NIDS 2008, 2010-2011).

Another interesting exercise is to decompose overall labour market mobility, i.e., the percentage of individuals changing labour market status, into 'upward', 'downward' and 'within' mobility components. Note that using the above taxonomy of six labour market statuses, total mobility can be written as:

$$m_{total} = \sum_{i=1}^{6} \sum_{j=1}^{6} s_i t_{ij \mid i \neq j}$$

where s_i is the i^{th} element of the 6x1 vector S containing the proportions of each labour market category for wave 1, and t_{ij} is the element on the i^{th} row and in the j^{th} column of the 6x6 transition matrix T between waves as depicted in Table 2. This expression is decomposable into:

$$m_{total} = \sum_{i=4}^{6}\sum_{j=1}^{3} s_i t_{ij} + \sum_{i=1}^{3}\sum_{j=4}^{6} s_i t_{ij} + \sum_{i=1}^{3}\sum_{j=1}^{3} s_i t_{ij\,|\,i\neq j} + \sum_{i=4}^{6}\sum_{j=4}^{6} s_i t_{ij\,|\,i\neq j}$$

$$= m_{upward} + m_{downward} + m_{within\ employment} + m_{within\ non-employment}$$

with upward mobility being the mobility from different non-employment states into employment; downward mobility the transition from employment into non-employment; and within (non-) employment mobility the movement between distinct forms of (non-) employment.

Appendix Table A1 lists the mobility measures and their decompositions based on our labour market status transition matrices, calculated for the whole adult sample and for men and women separately. We observe a downward mobility which is slightly larger than upward mobility and little difference between men and women in this regard. Within employment, mobility is greater for men than for women, while within non-employment it is the other way around.

Having illustrated some important facets of labour market transitions in South Africa over the 2008 and 2010-2011 period covered by NIDS, we now move to an analysis of the determinants of such transitions. This enables us to identify whether there are differences between particular types of workers. The next sub-section spells out our empirical model.

3.2 Model set-up

To evaluate the effect of specific individual and household characteristics on labour market transitions we opt for a simple binary probit model of the following form:[7]

$$\Pr(y = 1 \mid X, Z) = \Phi(X'\beta + Z'\delta),$$

where y is the binary outcome variable of the transition under study; Φ is the standard normal cumulative density function; and X and Z are vectors with potential determinants. Transition outcome y takes the value 1 for individuals who are in regular wage employment in 2008 and again in 2010-2011 and the value 0 for those no longer in regular wage employment in 2010-2011. Individuals who do not have a regular wage job in 2008 are left out of the analysis.[8]

X is a vector of demographic individual and household level characteristics as well as geographical variables; in our baseline model this includes age cohort dummies, educational attainment, race, marital status, household size and urban/rural and province dummies (following the studies summarized in Section 2). In other specifications we add a household head dummy, the number of other household members in wage employment and real per capita household income. We also consider Z, a vector of job-specific variables; these are occupation and sector types, a trade union membership dummy, contract type/duration, the length of wage employment at the time of interview and initial wage earnings. For all variables included in X and

[7] There are two problems with estimating multi-nomial models here. First, because of the likely misclassifications in wave 2 of some of the non-employed (see Section 3.1), estimating models that differentiate between different types of non-employment may lead to distorted results. Second, many of the multi-nomial models we have tried to estimate did not converge. This is probably because the use of many dummy regressors makes maximum likelihood estimation computationally very demanding.

[8] As such, this paper focuses mainly on downward mobility; we are particularly interested in the characteristics of wage workers who were laid off (or, alternatively, chose to quit wage employment) during the difficult economic climate of 2008 and 2010-2011. The study of upward (or within) labour market mobility falls outside the scope of the paper.

Z we use 2008 values; we investigate how the initial characteristics of an employed individual (before the recession) relate to whether that individual is again employed (in the early recovery period). Because of gender differences in labour market dynamics, separate models are estimated for male and female panel members aged 20 to 55.

Appendix Table A2 describes the baseline explanatory variables, comparing their distribution for the different transition outcomes. Male workers who transition out of regular wage employment by 2010-2011 tend to be younger, less educated, part of larger households, and are more likely to be unmarried and living in rural areas compared to the ones remaining employed. Most of these differences seem to hold for female wage workers too, although the age distribution does not significantly differ between those who exit regular wage employment and those who do not. Also, there are relatively more black and less white women in the group leaving regular wage employment.

3.3 Model estimates and discussion

Table 3 displays the estimation results for the probit model specified above. In columns (1a) and (1b) the baseline model is estimated for men and women, respectively. Columns (2a) to (4b) show the results when adding extra household level variables. Instead of reporting probit coefficients or marginal effects at the mean, we list the estimated average marginal effects (see Verick 2012). For categorical variables, each parameter in Table 3 should be read as the survey-weighted average, percentage point difference in the probability of being wage employed in 2010-2011 between the category of individuals in question and the omitted reference category, conditional on being in regular wage employment in 2008 (and holding all other regressors constant at their actual sample values).

Column (1a) of Table 3 indicates that men aged 36-45 had a 13 percentage point higher chance of continued regular wage employment than their 20-25 year-old peers. There are no significant differences between the latter and other age cohorts. We find these age differences also with female workers (see column 1b). Greater educational attainment, i.e., completed secondary level education or more, seems to protect women, but not men, from transitioning out of employment, a result which only partly mirrors Leung et al. (2009). Of course, by restricting the analysis to those in regular wage employment in 2008 we are already focussing on the relatively better-educated. Race does not seem to matter for (male or female) regular wage employment transitions. While this finding is in line with Leung et al. (2009) we cannot, however, rule out the possibility that it is influenced by higher attrition rates among whites. Married men (but not women) had a greater likelihood of remaining wage employed than non-married men, which corresponds well with Verick's (2010) cross-sectional results but may not be readily interpretable. Household size seems to have a small negative effect on staying in wage employment in 2010-2011 (although it is statistically significant only for men). This could reflect the importance of intra-household transfers (see Verick 2012), a topic we do not pursue further here. Lastly, rural women's likelihood of continued wage employment was almost 15 percentage points lower than that of urban-based women.

Including additional household characteristics does not alter most of the just-mentioned results. Columns (2a) to (4b) of Table 3 confirm that mid-aged workers were more likely to remain in regular wage employment; secondary level (and especially tertiary) education was a good buffer for women; racial differences were insignificant; and living in a rural area harmed female workers' prospects of staying wage employed. Moreover, being the household head is positively associated with remaining in wage employment for men (column 2a), a possible explanation being that those

who are expected to take care of the household are under pressure not to give up their job.[9] The consequence of having other workers in the household for employment (transitions) is, ex ante, ambiguous. Simply put, on the one hand, living together with other workers could reduce incentives to also engage in employment. On the other hand, these co-habiting workers may possess useful social networks increasing employment chances for each other individual (Dinkelman 2004). From Table 3 it looks as if the second effect dominates the latter for women, whereas for men there is no significant net impact (columns 3a and 3b). The presence in the household of children under the age of five or pensioners receiving a state-provided old age pension in 2008 has no significant impact on regular wage employment transitions (results not shown). Columns (4a) and (4b) add the log of real household per capita income (deflated to September 2008), suggesting that workers hailing from richer households were more likely to remain employed. However, since this variable is highly collinear with race, educational attainment and household size, its inclusion makes it difficult to disentangle the precise, independent effects of the different variables. Introducing dummies for the quarter in which individuals were interviewed in wave 2, to account for the long (six-quarter) period over which wave 2 was implemented, leaves our results qualitatively unchanged (results not shown).

Table 3: Probit estimates for regular wage employment transitions, 2008 and 2010-2011 (baseline and extra household variables): average marginal effects

	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)	(4a)	(4b)
	Male	Female	Male	Female	Male	Female	Male	Female
Omitted: age 20-25								
Age 26-35	0.0550	0.0467	0.0258	0.0608	0.0627	0.0643	0.0488	0.0510
Age 36-45	0.1335*	0.0827*	0.0985	0.0989*	0.1423**	0.1054**	0.1245*	0.0816*
Age 46-55	0.0855	0.0414	0.0439	0.0418	0.0935	0.0567	0.0718	0.0267
Omitted: no education								
Primary education	-0.0976**	0.0050	-0.0940**	0.0147	-0.0980**	-0.0036	-0.1035**	-0.0433
Secondary education	0.0084	0.1621***	0.0093	0.1588***	0.0095	0.1544***	-0.0156	0.0544
Tertiary education	0.0228	0.2621***	0.0272	0.2634***	0.0241	0.2549***	-0.0199	0.1246**
Omitted: Black/African								
Coloured	0.0352	-0.0389	0.0467	-0.0423	0.0386	-0.0321	0.0401	-0.0694
Asian/Indian	-0.0311	0.0450	-0.0202	0.0399	-0.0408	0.0445	-0.0615	-0.1140
White	-0.0367	0.0489	-0.0397	0.0392	-0.0400	0.0436	-0.0741	-0.0647
Married	0.0989**	0.0510	0.0807**	0.0522	0.1012**	0.0407	0.0903**	0.0142
Household size	-0.0154***	-0.0106	-0.0093	-0.0082	-0.0176***	-0.0155**	-0.0085	-0.0018
Rural	-0.0471	-0.1486***	-0.0485	-0.1483***	-0.0487	-0.1483***	-0.0275	-0.1194***
Household head			0.0865**	0.0247				
Omitted: No other regular wage workers in hhold								
One other regular wage worker					-0.0067	0.026		
Two or more other regular wage workers					0.0649	0.1159***		
Household per capita income (log)							0.0415*	0.1057***
Observations	1,122	1,199	1,118	1,189	1,122	1,199	1,122	1,199

Notes: Average marginal effects based on survey-weighted binary probit regressions where dependent variable takes value 1 if individual was in regular wage employment in both periods and 0 if only in the first. Sample includes only panel members aged 20-55 who were in regular wage employment in 2008. All models include province dummies. Significance based on survey design-adjusted standard errors. Significance levels: ***1% **5% *10%.

Source: Own calculations using NIDS data (NIDS 2008, 2010-2011).

[9] Household headship is, of course, correlated with age, which shows itself in the decline of the statistical and economic significance of the 36-45 age group dummy in column (2a).

Table 4: Probit estimates for regular wage employment transitions, 2008 and 2010-2011 (extra job variables): average marginal effects

	(1a) Male	(1b) Female	(2a) Male	(2b) Female	(3a) Male	(3b) Female	(4a) Male	(4b) Female	(5a) Male	(5b) Female	(6a) Male	(6b) Female	(7a) Male	(7b) Female
Omitted: age 20-25														
Age 26-35	0.0501	0.0353	0.0638	0.0743	0.0431	0.0396	0.0577	0.0481	0.0325	0.0338	0.0578	0.0194	0.0230	0.0298
Age 36-45	0.1258*	0.0804	0.1245*	0.1230**	0.1271**	0.0747	0.1430**	0.0829*	0.1149*	0.0763	0.0884	0.0296	0.0915	0.0517
Age 46-55	0.0863	0.0425	0.0796	0.1125**	0.0533	0.0255	0.0870	0.0426	0.0718	0.0236	0.0216	-0.0745	0.0360	0.0062
Omitted: no education														
Primary education	-0.1008**	-0.0179	-0.0695	0.0029	-0.0950**	-0.0150	-0.0997**	-0.0002	-0.0919**	-0.0032	-0.0983**	-0.0197	-0.1086***	-0.0459
Secondary education	0.0101	0.1010*	0.0369	0.1492*	0.0121	0.1193**	-0.0074	0.1480***	0.0139	0.1347**	-0.0199	0.1465***	-0.0414	0.0437
Tertiary education	0.0290	0.1942***	0.0220	0.2197***	0.0135	0.2055***	0.0027	0.2459***	0.0235	0.2419***	0.0048	0.2317***	-0.0659	0.0981*
Omitted: Black/African														
Coloured	0.0342	-0.0445	-0.0162	-0.0100	0.0392	-0.0522	0.0414	-0.0385	0.0326	-0.0489	0.0277	-0.0781	0.0447	-0.0682
Asian/Indian	-0.0361	0.1309	-0.0188	0.0407	0.1012	0.0442	0.0947	0.0403	0.0804	0.029	-0.0426	0.0026	-0.1039	-0.0829
White	-0.0422	0.0245	-0.0226	-0.0011	-0.0395	0.0547	-0.0363	0.0484	-0.0737	0.0585	0.0158	0.0074	-0.1079	-0.0372
Married	0.0999**	0.0481	0.0926**	0.0355	0.0969**	0.0426	0.0892**	0.0493	0.0962**	0.0321	0.0722*	0.0312	0.0728*	0.0330
Household size	-0.0159***	-0.0108	-0.0145**	-0.0094	-0.0153***	-0.0118*	-0.0143**	-0.0109	-0.0136**	-0.0106	-0.0131*	-0.0096	-0.0131**	-0.0110*
Rural	-0.0501	-0.1384***	-0.0645	-0.1732***	-0.0491	-0.1484***	-0.0529	-0.1465***	-0.0635	-0.1359***	-0.0482	-0.1345***	-0.0194	-0.1128***
Omitted: elementary occupation														
Semi-skilled	-0.0311	0.1014**												
Managerial/profess.	-0.0495	0.1081**												
Omitted: agriculture, hunting, forestry and fishing														
Mining and quarrying			-0.0899	0.1725***										
Manufacturing			-0.0285	-0.0869										
Utilities			0.1200***											
Construction			-0.2723***	-0.0392										
Wholesale and retail trade			-0.1678**	-0.0181										
Transport, storage and communication			-0.0814	-0.1041										
Financial intermediation et al.			-0.0854	-0.0146										
Community, social and personal services			-0.0491	-0.0225										
Union member					0.0548	0.0981***								
Written contract							0.0710*	0.0341						
Omitted: limited contract duration														
Unspecified contract duration									0.0499	0.0157				
Permanent contract									0.1609**	0.1010				
Months in wage employment (log)											0.0381***	0.0556***		
Monthly take-home pay (log)													0.0812***	0.1011***
Observations	1,096	1,183	995	891	1,092	1,179	1,110	1,192	1,117	1,190	954	1,023	1,122	1,199

Notes: Average marginal effects based on survey-weighted binary probit regressions where dependent variable takes value 1 if individual was in regular wage employment in both periods and 0 if only in the first. Sample includes only panel members aged 20-55 who were in regular wage employment in 2008. All models include province dummies. Significance based on survey design-adjusted standard errors. Significance levels: ***1% **5% *10%.

Source: Own calculations using NIDS data (NIDS 2008, 2010-2011).

Restricting our analysis to individuals who were in regular wage employment before the recession allows us to also include job-specific variables (vector Z) that do not feature in earlier, cross-sectional studies of South African labour markets during the crisis (see Section 2). In Table 4 we add to our baseline model, in turn, occupation type, employment sector, union membership, contract type, contract duration, length of wage employment in 2008, and initial wage earnings. Female wage workers were more than 10 percentage points less likely to be out of a regular wage job in 2010-2011 if they practised semi-skilled or managerial/professional rather than elementary occupations in 2008 (column 1b). For men there seem to be no significant differences between occupation types (column 1a). The inclusion of industry dummies in columns (2a) and (2b), whereby we exclude private household workers and take agriculture, hunting, forestry and fishing as the reference industry, suggests that men active in the construction and wholesale and retail trade sectors in 2008 were less likely to still be in regular wage employment by 2010-2011.[10] This seems to make sense, given the high labour intensity of these industries and the fact that, in terms of economic value added, they took a hit (trade) or stagnated (construction) during the years under consideration (Statistics South Africa 2013a). What is puzzling, however, is the insignificance of the manufacturing dummy, the industry whose contribution to South African GDP suffered most during the crisis and which reportedly shed thousands of workers in 2009 and 2010. Perhaps workers in the South African manufacturing sector have overall more transferable skills than, say, construction workers, which would give them an advantage in finding new employment when made redundant. QLFS cross-sectional data indicate some employment growth in manufacturing between 2010 and 2011, while employment in the construction sector continued to shrink (Statistics South Africa 2012). To further investigate hypotheses about the vulnerability of certain jobs to economic slowdown, one would need to study in detail the actual job tasks performed by individuals and/or the specific sub-sectors in which they are employed.

Columns (3a) and (3b) indicate that union membership is positively associated with regular wage employment in 2010-2011, but only significantly so for women. For men, working under a written, and even more, under a permanent contract increases the probability of retaining wage employment (columns 4a and 5a). The last four columns of Table 4 (6a) to (7b) examine the role of work experience, proxied by the log of the number of months an individual was employed in his/her wage job prior to interview, and initial wage earnings, i.e., the log of real monthly take-home pay. Both turn out to be highly significant in explaining male and female job security, but again pose problems of collinearity in view of their correlation with age and education.

Our results suggest that not only the external economic environment, but also individual or household decisions about labour supply played an important role in South African labour markets over the course of 2008-2011, given the significance for continued wage employment of factors such as household size and marital status. It seems, nevertheless, difficult to argue that all, or even most, transitions out of regular wage employment are voluntary. In fact, a simple comparison between those leaving wage employment and those remaining employed or changes in self-perceived life satisfaction and economic status, as well as differences between the economic status anticipated in 2008 and the actual economic status reported in 2010-2011, shows that these changes are significantly more favourable for the latter group (results not shown). While this is certainly no proof of causality from employment transition outcomes to subjective well-being, it does signal that these transitions are not purely driven by 'free choice' and hints at some unexpectedness of job loss.

[10] The significant marginal effects for men in the utilities sector (column 2a) and women in mining and quarrying (column 2b) should be viewed with caution because of the very small sub-samples on which these estimates are based.

One important limitation of the analysis so far is that the NIDS data provide information on labour market transitions only between two points in time. Hence we cannot directly attribute the nature of the transitions we examined to the global economic crisis and its recessionary effects on the South African economy; these transitions and their determinants may be typical of how South African labour markets function, both in 'normal' and more difficult economic times. Also, the design of NIDS requires us to adopt a medium-term view on labour market transitions. The two-year(-plus) time span between the 2008 and 2010-2011 NIDS waves may hide a lot of short-term churning across labour market states. Therefore, in the next section we compare our NIDS findings with results coming from another, higher-frequency longitudinal dataset, i.e., a panel constructed from repeated QLFS cross-sections.

4 Matched Quarterly Labour Force Survey cross-sections

4.1 Dataset structure and descriptives

The QLFS is a household-based survey on the labour market activity of individuals aged 15 or older.[11] It was launched in 2008 as a replacement for its semi-annual predecessor and is designed as a rotating panel of around 30,000 dwellings, divided into four groups. Each quarter, 25 per cent of the dwellings rotate out of the sample and are replaced by new dwellings. In principle, each dwelling thus remains in the sample for four consecutive quarters. However, the unit of observation is the household rather than the dwelling; if one household moves out of a particular dwelling and another moves in after two quarters, the new household will be enumerated for the remaining two quarters.

Using the QFLS as a longitudinal dataset of individuals is not straightforward, as household identifiers are generally maintained across quarters but individual identifiers not necessarily so. We therefore follow a matching on observable demographic characteristics approach, using the algorithm developed by Ranchod and Dinkelman (2008); individuals are matched between quarters using household identifier, gender, race, age and additional consistency checks on educational attainment and marital status. Starting from a total of 1,087,829 observations for working-age individuals in 20 quarters of QLFS data (2008Q1 to 2012Q4), the matching algorithm leaves us with a panel dataset of 760,847 observations. We calculate that our average matching rate is 68.8 per cent, compared to 48.7 per cent in Verick (2012) (for QLFS 2008Q1-to 2010Q4).

A number of issues arise when matching (Ranchod and Dinkelman 2008). First, the matched individuals may not be a random sub-sample of the pooled QLFS cross-sections and hence not representative of South Africa's population. If attrition between quarters is correlated with observable characteristics, however, we can use inverse probability weighting (IPW) techniques to reduce the bias caused by non-random matching. Probit estimations per quarter indicate that individuals who are older, female, non-African, married, better-educated and live in smaller households are generally more likely to be matched to the next quarter. Second, matching could also be correlated with unobservable characteristics that are not well proxied by observables. This matters because, assuming that labour market transitions are more prevalent among individuals who migrate/move, 'the stability of individuals who are matched may lead us to overestimate persistence' (Ranchod and Dinkelman 2008: 7). Third, even with the consistency checks in our algorithm, we cannot completely rule out false matches, which may lead to an *under*estimation of persistence in labour market states.

[11] See www.statssa.gov.za/qlfs/index.asp. All QLFS data can be downloaded from DataFirst.

Table 5: Transition matrices for labour market status, 2008Q1-2012Q4, row proportions (%)

Labour market status in quarter t	Labour market status in quarter t+1																									
	Formal sector employment					Informal sector employment					Unemployed, searching					Unemployed, discouraged					NEA				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Formal sector employment	**91.0**	**92.0**	**92.5**	**92.7**	**92.7**	3.9	3.3	3.2	3.1	3.1	2.8	2.9	2.3	2.4	2.3	0.5	0.5	0.6	0.7	0.7	1.8	1.3	1.4	1.2	1.2
Informal sector employment	12.2	10.3	10.0	9.5	9.8	**74.4**	**76.9**	**79.4**	**80.1**	**79.0**	6.3	5.5	4.5	4.8	4.8	1.7	2.5	2.3	2.2	2.7	5.5	4.8	3.8	3.3	3.8
Unemployed, searching	9.9	7.2	5.6	5.6	6.3	6.8	5.0	5.1	4.1	4.3	**62.2**	**65.5**	**68.0**	**69.5**	**70.1**	5.5	7.1	8.4	7.9	7.2	15.6	15.2	13.0	13.0	12.2
Unemployed, discouraged	6.4	4.1	3.3	3.6	3.3	6.8	5.0	5.3	3.9	4.1	18.6	17.7	16.1	15.8	14.7	**43.9**	**52.0**	**55.8**	**58.5**	**60.9**	24.4	21.3	19.5	18.3	17.0
NEA	2.7	1.8	1.8	1.8	1.8	3.4	2.6	2.0	1.7	1.9	10.3	9.6	9.0	8.8	8.5	4.2	5.3	6.3	6.7	6.2	**79.5**	**80.8**	**80.9**	**80.9**	**81.6**

Notes: Quarter-to-quarter transition rates (Q1 to Q2, Q2 to Q3, and Q3 to Q4) per year for 2008-12. Sample includes only panel members aged 20-55 in quarter t. All figures have been weighted using QLFS cross-sectional weights for quarter t multiplied by the inverse of the estimated match probability from quarter t to quarter t+1.

Source: Own calculations using matched QLFS data (Statistics South Africa various years)..

Bearing these limitations in mind, we again look at transition matrices. Table 5 compiles quarter-to-quarter transition rates across the five labour market states identified in the QLFS: 'formal sector employment' (based on criteria of company size and registration for VAT and income tax), 'informal sector employment', 'searching unemployed', 'discouraged unemployed' and 'NEA'. Transitions from Q1 to Q2, Q2 to Q3 and Q3 to Q4 are pooled and compared over the years 2008-2012. All figures are weighted using the standard QLFS cross-sectional weights multiplied by the inverse of the match probability predicted by the IPW probits mentioned above. Again, we restrict ourselves to panel members aged 20-55 in quarter t.

As expected, we find that quarter-to-quarter movement between labour market statuses is much more limited than two-year mobility (see Table 2), although there is no strict correspondence between the different employment categories in NIDS and QLFS. Still, labour market states are far from stable. Especially job search decisions seem to change considerably from one quarter to the next. Another important observation is that labour market states have become progressively more 'absorbing' during the recession (2009) and in its aftermath (2010-2012). This works in two directions; the prevalence of transitions from unemployment into employment states has fallen over 2008-2012, while movement from formal and informal sector employment to strict unemployment has also come down, albeit to a lesser extent. Indeed, it seems that the net increases in unemployment rates apparent from Table 1 are driven more by reduced inflows into employment than by larger outflows (see Verick 2012).

Redoing the analysis by gender, we find that formal sector employment and unemployment are more stable for men than for women, whereas informal sector employment and NEA are steadier states for women (results not shown). For both sexes we note an overall, gradual rise in labour market status persistence from 2008 to 2012.

Mobility measures in Appendix Table A3 indicate that 18 per cent of all 20-55 year-old individuals changed labour market status between quarters in 2012, compared to 21 per cent in 2008. This decline is present in all components of mobility but mobility within non-employment, and is largest for upward mobility. Female mobility trumps that of men in all years, mostly due to greater within non-employment movement. Because of a faster decline in female mobility, however, the gender gap has narrowed since 2008.

4.2 Model estimates and discussion

As in Section 3 we limit ourselves for the matched QLFS to a simple binary probit analysis to study the determinants (and their time variation) of continued employment for 20-55 year-old workers. Our dependent variable assigns a value of 1 to individuals who remain in formal sector employment from one quarter to the next and 0 to those who move out of formal sector employment between quarters. We make abstraction of individuals who are initially not employed in the formal sector. To the extent possible we include in our models the same regressors as with the NIDS data, i.e., demographic, geographical and job-specific variables. Table 6 presents the average marginal effects for these probit models, again with transitions from Q1 to Q2, Q2 to Q3, and Q3 to Q4 pooled for each year over 2008-2012. For brevity, only four different specifications are reported. Because of the matching issues outlined earlier, these results should be interpreted with caution.

The baseline specifications in columns (1a) and (1b) of Table 6 show communalities with those of Table 3, but also some differences. One noticeable result is the importance of secondary and tertiary education for remaining employed in the formal sector for both genders, something also observed in NIDS for regularly employed women. According to the QLFS data, the strength of higher education's buffering effect has decreased over the years, especially in the case of women.

Table 6: Probit estimates for formal sector employment transitions, 2008Q1-2012Q4: average marginal effects

	(1a) Male					(1b) Female					(2a) Male					(2b) Female				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Omitted: age 20-25																				
Age 26-35	0.0153*	0.0174*	0.0305***	0.0291***	0.0361***	0.0563***	0.0513***	0.0196*	0.0490***	0.0292**	0.0152*	0.0157	0.0278***	0.0270**	0.0348***	0.0550***	0.0483***	0.0194	0.0489***	0.0282**
Age 36-45	0.0329***	0.0273***	0.0577***	0.0393***	0.0499***	0.0807***	0.0612***	0.0474***	0.0498***	0.0492***	0.0325***	0.0268***	0.0546***	0.0358***	0.0486***	0.0781***	0.0562***	0.0472***	0.0493***	0.0478***
Age 46-55	0.0391***	0.0399***	0.0572***	0.0518***	0.0506***	0.0901***	0.0941***	0.0688***	0.0527***	0.0591***	0.0386***	0.0383***	0.0535***	0.0478***	0.0490***	0.0865***	0.0879***	0.0682***	0.0516***	0.0572***
Omitted: no education																				
Primary education	0.0282**	0.0013	0.0237*	0.0084	0.0069	0.0521**	0.0503**	0.0056	-0.0077	-0.0190	0.0273**	-0.0024	0.0185	0.0025	0.0049	0.0372	0.0354*	0.0003	-0.0123	-0.0219
Secondary education	0.0741***	0.0454***	0.0631***	0.0398**	0.0483***	0.1285***	0.0999***	0.0533***	0.0406**	0.0379**	0.0717***	0.0398***	0.0547***	0.0275*	0.0443***	0.1011***	0.0731***	0.0441**	0.0313	0.0302*
Tertiary education	0.1036***	0.0813***	0.0891***	0.0797***	0.0788***	0.1770***	0.1483***	0.0999***	0.0859***	0.0723***	0.0990***	0.0771***	0.0786***	0.0642***	0.0743***	0.1442***	0.1152***	0.0908***	0.0752***	0.0617***
Other education	-0.0224	0.0526*	0.0537**	0.0106	0.0682***	0.1837***	0.1508***	-0.0491	0.0705*	-0.0726	-0.0230	0.0465*	0.0451**	-0.0023	0.0653**	0.1565***	0.1248***	-0.0599	0.0609	-0.0797
Omitted: Black/African																				
Coloured	0.0098	0.0152	0.0356***	0.0034	0.0209**	0.0437***	0.0272**	0.0281***	0.0110	-0.0032	0.0092	0.0148	0.0354***	0.0028	0.0208**	0.0418***	0.0248**	0.0276**	0.0101	-0.0043
Asian/Indian	0.0068	0.0368***	0.0034	0.0098	0.0356***	0.0184	0.0312*	0.0276*	0.0170	0.0131	0.0053	0.0366***	-0.0001	0.0046	0.0345**	0.0136	0.0267	0.0256	0.0144	0.0106
White	0.0187*	0.0369***	0.0442***	0.0243***	0.0468***	0.0085	0.0080	0.0293***	0.0071	-0.0100	0.0163	0.0368***	0.0412***	0.0180*	0.0457***	0.0031	0.0006	0.0278***	0.0043	-0.0133
Married	0.0484***	0.0356***	0.0402***	0.0334***	0.0351***	0.003	-0.0006	0.0046	0.0103	0.0013	0.0478***	0.0340***	0.0390***	0.0319***	0.0342***	0.0000	-0.0019	0.0041	0.0099	0.0003
Household size	-0.0065***	-0.0048***	-0.0069***	-0.0082***	-0.0038***	-0.0089***	-0.0032**	-0.0047***	-0.0049***	-0.0051***	-0.0065***	-0.0048***	-0.0070***	-0.0082***	-0.0038***	-0.0090***	-0.0031**	-0.0047***	-0.0048***	-0.0051***
Rural	-0.0100	0.0033	-0.0103	-0.0144*	-0.0232***	-0.0111	-0.0213**	-0.0139	-0.0174*	-0.0263***	-0.0103	0.0063	-0.0074	-0.0116	-0.0214***	-0.0087	-0.0200**	-0.0130	-0.0167*	-0.0260***
Omitted: elementary occupation																				
Semi-skilled											-0.0006	0.0254***	0.0192**	0.0214***	0.0107	0.0200*	0.0203**	0.0129	0.0123	0.0062
Managerial/professional											0.0094	0.0155	0.0255**	0.0376***	0.0122	0.0422***	0.0458***	0.0113	0.0163	0.0177
Observations	12,063	12,441	12,438	11,561	12,564	9,100	9,789	9,779	9,358	10,079	12,062	12,441	12,438	11,561	12,564	9,099	9,789	9,779	9,358	10,079

Table 6 contines

Table 6 (continued)

	(3a) Male					(3b) Female					(4a) Male					(4b) Female				
	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012	2008	2009	2010	2011	2012
Omitted: age 20-25																				
Age 26-35	0.0115	0.0158	0.0278***	0.0296***	0.0350***	0.0516***	0.0500***	0.0173	0.0480***	0.0275**	0.0022	0.0043	0.0163*	0.0145	0.0276***	0.0367***	0.0316***	0.0035	0.0311***	0.0135
Age 36-45	0.0250**	0.0231**	0.0538***	0.0392***	0.0471***	0.0714***	0.0582***	0.0443***	0.0473***	0.0457***	0.0131	0.0098	0.0371***	0.0166	0.0355***	0.0512***	0.0355***	0.0275***	0.0248**	0.0246**
Age 46-55	0.0308***	0.0342***	0.0519***	0.0498***	0.0460***	0.0766***	0.0897***	0.0644***	0.0491***	0.0528***	0.0149	0.0179*	0.0322***	0.0251**	0.0311***	0.0543***	0.0615***	0.0450***	0.0207	0.0288**
Omitted: no education																				
Primary education	0.0238*	0.0015	0.0218*	0.0104	0.0100	0.0314	0.0189	-0.0075	-0.0144	-0.0303*	0.0138	-0.0057	0.0096	-0.0002	0.0061	0.0248	0.0083	-0.0123	-0.0234	-0.0293**
Secondary education	0.0617***	0.0398***	0.0556***	0.0352**	0.0445***	0.0998***	0.0610***	0.0372**	0.0305	0.0210	0.0393***	0.0207*	0.0303***	0.0079	0.0302**	0.0695***	0.0243	0.0140	-0.0017	-0.0005
Tertiary education	0.0874***	0.0730***	0.0779***	0.0725***	0.0718***	0.1433***	0.1111***	0.0839***	0.0758***	0.0525***	0.0629***	0.0541***	0.0523***	0.0415***	0.0542***	0.1052***	0.0654***	0.0582***	0.0375**	0.0275*
Other education	-0.0242	0.0477*	0.0547***	0.0056	0.0666***	0.1546***	0.1139***	-0.0667	0.0611	-0.0862	-0.0123	0.0333	0.0351*	-0.0282	0.0725***	0.1220***	0.0874***	-0.0692	0.0337	-0.0957
Omitted: Black/African																				
Coloured	0.0088	0.0132	0.0328***	0.0008	0.0169*	0.0447***	0.0278***	0.0257**	0.0126	-0.0010	-0.0092	0.0021	0.0245***	-0.0050	0.0182*	0.0245**	0.0065	0.0161	-0.0004	-0.0088
Asian/Indian	0.0057	0.0361***	0.0023	0.0107	0.0357***	0.0212	0.0278	0.0263	0.0189	0.0148	0.0031	0.0339***	-0.0055	0.0083	0.0338**	0.0019	0.0142	0.0256	0.0151	0.0005
White	0.0222**	0.0370***	0.0444***	0.0265***	0.0477***	0.0120	0.0075	0.0310***	0.0097	-0.0078	0.0218**	0.0388***	0.0431***	0.0224**	0.0488***	0.0020	-0.0063	0.0299***	0.0209*	0.0021
Married	0.0438***	0.0334***	0.0375***	0.0304***	0.0341***	0.0010	-0.0003	0.0045	0.0091	0.0006	0.0366***	0.0253***	0.0308***	0.0168**	0.0272***	-0.0022	-0.0002	0.0009	0.0060	-0.0066
Household size	-0.0063***	-0.0047***	-0.0068***	-0.0081***	-0.0035***	-0.0090***	-0.0032**	-0.0046***	-0.0050***	-0.0055***	-0.0057***	-0.0041***	-0.0064***	-0.0071***	-0.0032***	-0.0087***	-0.0026*	-0.0037***	-0.0034***	-0.0045***
Rural	-0.0141	-0.0024	-0.0134*	-0.0217***	-0.0319***	-0.006	-0.0088	-0.0091	-0.0139	-0.0226**	-0.0112	-0.0002	-0.0161**	-0.0167**	-0.0298***	0.0001	-0.0055	0.0018	-0.0055	-0.0198**
Omitted: elem. occup.																				
Semi-skilled											-0.0080	0.0230***	0.0162**	0.0181**	0.0130*	0.0145	0.0051	-0.0004	0.0016	-0.0076
Managerial/professional											0.0137	0.0245**	0.0291***	0.0462***	0.0201**	0.0332**	0.0357***	0.0012	0.0082	0.0011
Omitted: agricult. et al.																				
Mining and quarrying	0.0509***	0.0254**	0.0364**	0.0169	0.0098	0.0966***	0.1333***	0.0833***		0.0846***	0.0261*	-0.0036	0.0137	-0.0294**	-0.0291**	0.0502*	0.0828***	0.0409*		0.0375
Manufacturing	0.0129	-0.0070	0.0040	-0.0038	-0.0153	0.0476**	0.0716***	0.0525***	0.0220	0.0338	-0.0044	-0.0309***	-0.0193**	-0.0280***	-0.0375***	0.0092	0.0271	0.0268*	-0.0031	0.0117
Utilities	0.0053	0.0065	0.0015	0.0175	-0.0108	-0.0861	0.0546	0.0629**	-0.0092	0.0960***	-0.0166	-0.0167	-0.0304	-0.0108	-0.0379	-0.1377	0.0238	0.0335	-0.0593	0.0753***
Construction	-0.0750***	-0.0658***	-0.0757***	-0.0639***	-0.0826***	0.0005	-0.0190	-0.0392	0.0148	0.0204	-0.0459***	-0.0516***	-0.0600***	-0.0517***	-0.0628***	-0.0176	-0.0282	-0.0248	0.0129	0.0209
Wholes. and retail trade	-0.0197	-0.0250*	-0.0122	-0.0285***	-0.0336***	0.0155	0.0562***	0.0182	0.0240	0.0270	-0.0295**	-0.0373***	-0.0256***	-0.0403***	-0.0437***	-0.0193	0.0197	-0.0049	0.0001	0.0145
Transport et al.	-0.0314*	-0.0320**	-0.0374**	-0.0523***	-0.0518***	0.0351	0.0771***	0.0302	0.0314	0.0605**	-0.0306**	-0.0371***	-0.0421***	-0.0551***	-0.0513***	-0.0085	0.0341	0.0026	0.0100	0.0292
Financial intermed. et al.	-0.0214	-0.0175	-0.0066	-0.0082	-0.0182	0.0347*	0.0795***	0.0200	0.0237	0.0280	-0.0374***	-0.0344***	-0.0309***	-0.0272***	-0.0323***	-0.0061	0.0288*	-0.0092	-0.0026	0.0094
Comm. et al. services	0.0267**	0.0035	0.0092	0.0056	-0.0030	0.0577***	0.0607***	0.0260	0.0306*	0.0458**	0.0025	-0.0198*	-0.0155	-0.0261***	-0.0306***	0.0093	0.0043	-0.0046	-0.0015	0.0224
Union member														0.0466***	0.0271***				0.0325***	0.0392***
Written contract											0.0549***	0.0516***	0.0557***	0.0372***	0.0449***	0.0495***	0.0496***	0.0623***	0.0618***	0.0315***
Omitted: lim. contract dur.																				
Unspec. contract dur.											0.0237*	0.0282**	0.0267**	0.0151	0.0038	0.0522***	0.0093	0.0340**	0.0234	0.0079
Permanent contract											0.0709***	0.0758***	0.0647***	0.0521***	0.0438***	0.1050***	0.0964***	0.0957***	0.0769***	0.0741***
Observations	12,062	12,436	12,436	11,557	12,56	9,097	9,786	9,774	9,26	10,078	12,061	12,436	12,436	11,318	12,249	9,097	9,786	9,774	9,099	9,866

Notes: Average marginal effects based on survey-weighted binary probit regressions where dependent variable takes value 1 if individual was in formal sector employment in both quarter t and quarter t+1 and 0 if only in quarter t. Sample includes only panel members aged 20-55 who were in formal sector employment in quarter t. Results for transitions from Q1 to Q2, Q2 to Q3, and Q3 to Q4 are pooled per year for 2008-12.

All models include province dummies. Significance based on survey design-adjusted standard errors. Significance levels: ***1% **5% *10%.

Source: Own calculations using matched QLFS data.

Formal sector job persistence increases with age, right up to the 46-55 age group, while in NIDS it seemed more concentrated in the 36-45 age group. Before and during the recession (2008-2009), partial correlations between age and job persistence were quantitatively stronger for female than for male workers, but the following years (2010-2012) have seen a convergence. Unlike in NIDS we find some significant racial differences in staying employed, most clearly between white and black males. Part of this discrepancy may be due to the high attrition rates of whites in NIDS. Conversely, positive associations of continued employment with being married (for men) and negative associations with household size and rural residence correspond well with earlier findings.

Columns (2a)-(3b) add occupation type and sector dummies. There is some evidence of semi-skilled and professional workers being more likely to stay employed than elementary workers (most evident for men in 2009-2011 and for women in 2008-2009). Working in construction stands out as being negatively associated with male job security over the whole 2008-2012 period (see NIDS), with no clear trend in the strength of the effect. Negative correlations of the wholesale and retail trade and transport, storage and communication clusters show themselves most clearly in 2011-2012. Unexpectedly, mining correlates positively with male formal sector employment persistence in 2008-2010. For female workers the likelihood of keeping a job from one quarter to the next is especially greater in the community, social and personal services sector (by far the most common sector of female employment) and in manufacturing.[12]

Finally, in columns (4a) and (4b) a full set of job-specific variables is included: occupation types, sector, contract type, contract duration and trade union membership. This last variable is, however, only available in the QLFS data from 2010Q3 onwards. Male and female workers with a written and/or permanent contract and union members have higher chances of continued formal sector employment (in line with NIDS findings). There are no clear time trends in the strength of these determinants, except a small decline in the importance of having a permanent contract. Moreover, despite multicollinearity, most results of columns (1a)-(3b), such as higher education's protection against transitions out of formal sector employment, seem to withstand the simultaneous inclusion of job-specific variables. One apparent change is that, once we control for contract-related variables, almost all sectors underperform in terms of male employment persistence relative to agriculture (where verbal and non-permanent contracts are comparatively common).

5 Conclusions

This paper has studied South African labour market transitions and their determinants during the global financial and economic crisis, employing two longitudinal, individual level datasets: first, the NIDS, a nation-wide panel survey dataset with waves in 2008 and 2010-2011; and second, a quarterly panel created by matching QLFS cross-sections over 2008Q1-2012Q4. These datasets have allowed us to look at gross changes in labour market participation and to gauge the demographic, geographical and job-specific characteristics associated with continued employment in South Africa during the zenith and aftermath of the crisis.

While some of our findings need to be subjected to further scrutiny and keeping in mind the limitations of the data at hand, several results stand out at this stage. First of all, building on Cichello et al. (2012) for NIDS and Verick (2012) for QLFS, we find considerable mobility in

[12] The significant marginal effects for female miners are again based on very small sub-samples.

South African labour markets over the crisis period, in and out of employment as well as within different employment and non-employment states.

Second, whereas transitions out of employment are partly the result of conscious labour supply decisions, also the external environment seems to play an important role. In NIDS and the matched QLFS we find evidence suggesting that the likelihood of continued employment differs significantly between particular types of workers. From both datasets it appears that younger and less-educated workers are more likely to transition out of employment. Evidence on racial differences is mixed and may be blurred by non-random sample attrition in the data. Being a trade union member and working under a written and/or permanent contract significantly increase one's chances of staying in regular wage work and formal sector employment. Ceteris paribus, construction and wholesale and retail trade, but not manufacturing, seem to have been the sectors with the least job security for male workers.

Third, closer examination of the evolution over time of quarter-to-quarter transition rates between labour market states shows that mobility gradually decreased over the 2008-2012 period, and confirms Verick's (2012) finding that net increases in South African unemployment rates during the crisis are to be ascribed more to reduced inflows into employment than rising outflows. Focusing on the determinants of staying employed, however, we do find time variation in the economic significance of some demographic and job-specific explanatory variables. For example, according to our QLFS estimates, the strength of the buffering effects of higher education and of having a permanent contract diminished over the years under consideration. It could be that better-educated workers are made redundant only when the economic malaise drags on. Indeed, it may cost companies much effort and money to hire and train similar workers once the economy picks up again. Such admittedly speculative hypotheses would need to be further tested. In any case, it seems not straightforward to link the time-varying strength of certain job security correlates directly to the evolution of South Africa's economy over the course of the crisis.

There are several directions in which this research could be extended. One obvious extension is to study in greater detail other labour market transitions with NIDS and QLFS data, including the factors hindering (or helping) the unemployed to find employment during the crisis. Another interesting avenue would be to use more detailed information on job tasks and/or specific sub-sectors to further disentangle the vulnerability of particular types of workers. Lastly, we expect the third wave of the NIDS panel and a better-matched QLFS panel (under preparation by Statistics South Africa) to further contribute to our understanding of how labour market transitions vary along South Africa's economic trajectory.

Appendix

Appendix Table A1: Labour market mobility measures and decomposition, 2008 and 2010-2011 (%)

	Immobility	Mobility				
		Overall	Upward (into employment)	Downward (out of employment)	Within employment	Within non-employment
All adults	48.6	51.4	12.6	15.1	6.6	17.1
Male	52.9	47.1	11.9	14.8	9.7	10.7
Female	45.7	54.3	13.1	15.3	4.4	21.5

Notes: Based on transition matrices. For decomposition method, see main text.

Source: Own calculations using NIDS data (NIDS 2008, 2010-2011).

Appendix Table A2: Summary statistics for main explanatory variables 2008, by gender and transition outcome in 2010-2011

	Male			Female		
	Not wage employed in 2010-2011	Wage employed in 2010-2011	F-stat.	Not wage employed in 2010-2011	Wage employed in 2010-2011	F-stat.
Age 20-25	0.2284	0.1167		0.1431	0.1248	
Age 26-35	0.4281	0.3793	4.62***	0.3273	0.3368	0.80
Age 36-45	0.1963	0.3227		0.2734	0.3232	
Age 46-55	0.1471	0.1812		0.2562	0.2153	
No edu.	0.1015	0.1349		0.2044	0.0987	
Primary edu.	0.4799	0.3277	3.92**	0.5213	0.2985	21.15***
Second.edu.	0.2634	0.3005		0.1921	0.2868	
Tertiary edu.	0.1552	0.2369		0.0822	0.3160	
Black/Afr.	0.8222	0.7490		0.7962	0.6828	
Coloured	0.0735	0.1049	0.95	0.1361	0.1271	3.98**
Asian/Indian	0.0259	0.0285		0.0136	0.0269	
White	0.0784	0.1175		0.0541	0.1631	
Not married	0.6927	0.5109	11.80***	0.7140	0.5856	9.98***
Married	0.3073	0.4891		0.2860	0.4144	
Hh. size	3.9732	3.2282	4.74**	5.2662	4.2588	10.64***
Urban	0.6763	0.7641	5.04**	0.5953	0.8088	27.06***
Rural	0.3237	0.2359		0.4047	0.1912	

Notes: Survey-weighted proportions in age cohort/education/race/marital status/location categories of male/female adults, compared along employment transition outcomes in 2010-2011. For household size, means are compared. Sample includes only panel members aged 20-55 who were in regular wage employment in 2008. Significance levels: ***1% **5% *10%.

Source: Own calculations using NIDS data (NIDS 2008, 2010-2011).

Table A3: Labour market mobility measures and decomposition, 2008Q1-2012Q4 (%)

	Immobility	Mobility				
		Overall	Upward (into employment)	Downward (out of employment)	Within employment	Within non-employment
All adults						
2008	79.0	21.0	4.8	4.0	3.3	8.9
2009	80.6	19.4	3.6	3.5	2.7	9.6
2010	81.0	19.0	3.4	3.0	2.4	10.2
2011	81.3	18.7	3.2	2.9	2.3	10.3
2012	81.8	18.2	3.3	3.0	2.4	9.6
Male						
2008	80.5	19.5	4.9	3.8	4.4	6.3
2009	81.5	18.5	3.9	3.6	3.4	7.6
2010	81.7	18.3	3.8	3.1	3.2	8.2
2011	82.3	17.7	3.4	3.2	3.0	8.1
2012	82.5	17.5	3.5	3.0	3.1	7.9
Female						
2008	77.6	22.4	4.7	4.1	2.3	11.3
2009	79.7	20.3	3.4	3.5	2.0	11.4
2010	80.4	19.6	3.1	2.8	1.7	12.0
2011	80.4	19.6	2.9	2.6	1.7	12.3
2012	81.1	18.9	3.1	2.9	1.7	11.1

Notes: Based on transition matrices. For decomposition method, see main text.

Source: Own calculations using matched QLFS data (NIDS 2008, 2010-2011).

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