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The South African Labour Market 1995-2004: A Cohort Analysis

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Abstract

This paper constructs a 'synthetic panel' from successive years of the October Household Surveys and Labour Force Surveys, and shows that new insights into the South African labour market are revealed when groups of individuals, defined by their date of birth, are followed from 1995 to 2004. Three main features of the South African labour market post-95 are highlighted. First, the age at which young Africans become economically active, i.e. transit from school into the labour force, is continually declining. Second, this increasing supply of labour to the market is not being absorbed into employment resulting in a growing pool of unemployed youth. Third, the proportion of the population employed is extremely stable over the ten-year period for all ages. These findings have implications for the future focus of labour policy as rising unemployment is primarily a consequence of increased youth participation and not due to a decline in the availability of jobs.

Introduction

With 2004 marking a decade of democracy, questions about the progress of the South African economy are widespread. The rate of unemployment is one measure of economic progress. South Africa's unemployment rate has been on an upward trend and reached approximately 27.9 per cent by the narrow definition of unemployment in 2004 (Stats SA, 2004: iii).

One major contributor of South Africa's high unemployment is the severe mismatch of labour demand and supply. The system through which employees and employers find a productive match is marred by information asymmetries leading to inefficient search mechanisms. Employers rely on internal networks to supply them with new employees, reducing the pool from which they pick productive workers. This affects



the mechanisms through which workers search for work, shifting from an active search to a more passive reliance on information from family and friends (Wittenberg, 2002). This creates circles of employed but also alienates the unemployed leading to an increase in the number of discouraged workers.

South African labour laws exacerbate the situation. In attempting to protect the employee, the laws tend to distort the flows out of employment, creating a process that benefits those employed but not those searching for work (Bhorat *et al*, 2002: 54). Employers are more cautious when employing, as unsuccessful matches are difficult to terminate. These cause friction in the flows between the employment states¹ creating inefficiencies in the labour market.

This paper investigates the source of the asymmetry between demand and supply in the South African labour market, and after ten years of democracy assesses the changes that have occurred. The question asked is whether the employment experience of younger generations is different from that of older generations.

Labour market analyses tend to focus on the labour market at a point in time or to infer dynamics between two or three points in time (Allanson *et al* (2002), Bhorat (2004), Bhorat & Oosthuizen (2005), Casale & Posel (2002)). A cohort dataset constructed of ten consecutive cross sectional surveys allows a closer analysis of developments over time and with ten years of data, it is also possible to assess how these developments affect different age cohorts.

It is found that rising unemployment is being fuelled by a continual decline in the age Africans transit from school into economic activity. The employment experienced remains fairly consistent between cohorts, not absorbing the increasing supply.

Literature Review

Models

The population is divided into the economically active and the not economically active. Those economically active are divided into the employed and the unemployed. As this paper aims to observe the dynamics in the labour market and the effect on the youth, it is the transition rates between these employment states as well as their levels that are of interest.

The search framework models the optimal approach to job search (Mortensen (1986) & Mortensen and Pissarides (1999)). The worker problem is that of finding a suitable job in a decentralised labour market where job information is limited and costly and takes time to evaluate (Mortensen, 1986: 850). These asymmetries in information create frictions in the flows between employment states and therefore characterise

¹ Employment states refer to employed, unemployed (both strict and broad) and not economically active and the term will be used throughout the paper.



the rate of transition between employment, unemployment and leaving the labour force.

Considering that search involves incurring a present day cost on the expectation of higher future benefits, search is a form of investment (Wittenberg, 2002: 1166). An optimal labour participation strategy defines the state in which a worker chooses to be, by optimising the present value of their future net benefits (Mortensen, 1986: 855). Thus if high levels of investment in work search are required, less workers will choose to participate in the labour market, at the margin.

Dinkelman and Pirouz (2001) apply a search model to the South African labour market. Dividing the population into three states: employed, searching unemployed and out of the labour force (not economically active), they specify a series of choices individuals make based on a comparison of value functions defined for each state. V_j is the value of taking a job offer. V_{su} is the value of search unemployment, which is defined as the difference between the benefits and costs to search. Finally, $V_{o,i}$ is the value of being out of the labour force in state i ² (Dinkelman & Pirouz, 2001: 2). The benefits of search equal the probability of finding a job multiplied by the expected wage from the job found, given the set of characteristics of the individual plus direct unemployment benefits and indirect benefits through household transfers (Dinkelman & Pirouz, 2001: 3). The costs of search include all costs associated with searching for a job, such as transport, media, time and other opportunity costs (Dinkelman & Pirouz, 2001: 3).

Dinkelman & Pirouz (2001) focus on the dynamics between the different states. Rational jobless individuals choose to be searching unemployed if $V_{su} > V_{o,i}$ and out of the labour force if $V_{o,i} > V_{su}$. In other words making a decision to search or not to search is based on the labour market circumstances individuals face at each point in time (Dinkelman & Pirouz, 2001: 4).

An implication of the search framework is that a person is always in transition between states and thus the question of importance is the rate of these transitions (Wittenberg, 2002: 1167). In order to estimate the rate of transition between states, knowledge of the duration that individuals remain in a particular state is required.

Panel data provides information with regard to duration spent in a particular period enabling direct transition rate calculation and is thus best suited for such an analysis. Dinkelman (2004) uses two stage panel data³ to model the probability of a successful transition from a state of 'strict' unemployment in 1993 to employment in 1998 using a logit model. Her focus rests on the mediating role household characteristics play between individuals and the labour market. She concludes that the search framework holds for the South African labour market since active search is found to strongly affect the success of transition to employment, demonstrating the presence of frictions of time, space and information. Household composition has been found to

² Out of the labour force states include house worker, student, retired or other

³ The KIDS panel from 1993 and 1998 is used



influence these frictions, with features that either mitigate or exacerbate them⁴ (Dinkelman, (2004), Keller, (2004) & Wittenberg (2001)).

South African panel data is however limited and in the absence of such data, Wittenberg (2002) uses an indirect approach. Three cross sectional surveys are used and the proportion of age cohorts in each state is calculated for the successive years from 1993 to 1995. The change in the levels of a state is then interpreted as an approximation to the underlying net flow (Wittenberg, 2002: 1172).

Wittenberg (2002) notes that this approach is not entirely unproblematic as the “transitions between age cohorts are reflective of intertemporal transitions only if the overall system is in equilibrium” (Wittenberg, 2002: 1172). Political and economic changes in the three-year period may distort labour market ‘equilibrium’. The consistency of the emerging pattern does however, suggest that intertemporal changes are small relative to the flows and thus the direction of change is quite reliable even if the magnitude is distorted. A nonparametric graphical approach is used, in order to highlight the overall patterns without explicit quantification of the functional form. (Wittenberg, 2002)

Another approach to analysing labour market dynamics is to observe changes in aggregate numbers employed, unemployed and not economically active between different points in time, and infer linear trends between them. Bhorat (2004) and Bhorat & Oosthuizen (2005) report aggregate changes between the OHS 1995 and the LFS 2002. Casale & Posel (2002) look at aggregate changes between the OHS 1995 and 1999 surveys.

Lastly, cohort data analysis can be used to track groups of individuals defined by their date of birth over time. Dinkelman (2004) notes that measurement error can be magnified via the use of panel data given that labour market transition rates between states has been shown to be sensitive to this error. Cohort analysis has the advantage over panel data of controlling for measurement error⁵ but to date has only been used by Gruen (2004) in an analysis of formal sector wages using the OHS 95, 97 and 99 datasets. This paper first extends Wittenberg’s (2002) non parametric LOWESS approach to include 10 successive years of data and then uses cohort data to analyse the changes in employment, unemployment and economic activity in South Africa since the introduction of democracy, with a particular focus on the differences between age cohorts.

A South African debate

One of the debates in the labour force literature is about the appropriate definition for unemployment in South Africa. Stats SA adopted the narrow definition of

⁴ Dinkelman 2004 finds that the presence of pension income and working adults in the household act as safety nets for the unemployed while Wittenberg 2001 finds that the presence of employed acquaintances form a connections network which provides information about the labour market. This may reduce active search as individuals rely on family and friend to find jobs.

⁵ A discussion on measurement errors can be found in the data section



unemployment in 1998 under the premise that it is in line with the International Labour Organisation definition and that the expanded definition is too subjective a measure and is therefore vulnerable to error (Kingdon & Knight, 2001: 6). The exclusion of the non-searching from the official definition of unemployment carries the assumption that the non-searching are not members of the labour force. The debate is therefore over the appropriateness of this assumption in South Africa's environment of mass unemployment (Kingdon & Knight, 2001 and Natrass, 2002).

Kingdon & Knight (2000) test whether the searching and non-searching states are distinct using a three test system as a proxy for differences in transition rates from the two states into employment. Their hypothesis is that if the non-searching are distinct from the searching that they should be found to have less impact on local wages, be richer and happier. They find significant evidence to reject this hypothesis. The non-searching are found to be more deprived and no happier than the searching unemployed. In addition local wages are more closely correlated to broad unemployment rates than narrow unemployment rates indicating that employers consider both states to be genuinely unemployed (Kingdon & Knight, 2001: 9). Their findings support the 'discouraged' worker theory and negate the theory of a 'taste for unemployment'. The decision to search is dependent on the rate of unemployment prevailing in the labour market and the costs associated with search (Kingdon & Knight, 2001: 8).

Natrass (2002) divides the 'non-searching' unemployed further, into 'network searchers' and the 'marginalised' unemployed. Network searchers include individuals who rely on household members, family and friends to find and get them work and are thus searching through indirect means. The marginalised represents the remaining 'non-searching' unemployed. (Natrass, 2002: 14)

Wittenberg (2002) contributes to this debate by stressing the importance of including the not economically active when attempting to understand the dynamics of the labour force in South Africa. Dinkelman & Pirouz (2001) note the overlapping characteristics of people from 'strict' unemployed, 'Discouraged' and not economically active states. They find discouraged workers to be closer in age to searching unemployed than those outside the labour force, but closer to those outside the labour force with respect to education, household size, presence of a pensioner and/or migrant and location (Dinkelman & Pirouz, 2001: 11). Thus there is evidence that individuals in South Africa switch between discouraged and not economically active when the incentives from being in each state change.

The arguments presented emphasise the importance of including all four states when analysing the dynamics of the South African labour force.



Findings

Wittenberg's (2002) LOWESS⁶ graphical approach estimates both the levels and flows between states for the period 1993-1995. Two main unemployment problems are highlighted. First, the South African labour market has a severe long term employment absorption problem. The maximum proportion of the population employed hovers around 70 per cent for African males and 50 per cent for African females. This level is lower than that experienced by other races and the peak of unemployment is higher, indicating a higher maximum unemployment rate for Africans compared to other races. Unemployment levels remain above zero until approximately age 55, indicating a continued search initiative. Second, there is a short term unemployment spike around age 27. The African population is found to enter the workforce at a slower pace due to later school completion and frictions between the flow out of school and the absorption into work. (Wittenberg, 2002)

Dinkelman & Pirouz's (2001) model is used to determine broad characteristics of individuals that value certain labour market states in a specific way and the degree to which groups of jobless individuals differ. Both broad and narrow rates of unemployment are found to increase with age. The reason proposed for this is that with age, discouraged workers despair to the extent that they classify themselves as out of the labour force (Dinkelman and Pirouz, 2001: 8). The unemployed group of African individuals is found to have a lower average age than the employed, with discouraged workers closer in age to unemployed than to those out of the labour force (Dinkelman and Pirouz, 2001: 9).

Previous work experience increases the employability of an individual. Individuals with no previous work experience are at a disadvantage when searching. First, having never been employed their labour market knowledge is limited and second, the longer the period of never being employed the more their skills erode (Dinkelman and Pirouz, 2001: 9). While a surprisingly large proportion of searching unemployed are found to have never worked before⁷, more discouraged workers are found to have never worked before (Dinkelman and Pirouz, 2001).

Combining these observations, a change in the optimal labour force attachment strategy is observed over different ages. The young perceive the benefits from being out of the labour force to outweigh those of searching for work. But since the probability of finding a job and the expected wage increase with age, labour force participation becomes optimal as age increases (Dinkelman and Pirouz, 2001: 9).

Bhorat's (2004) comparison of aggregate employment, unemployment and not economically active participation levels between 1995 and 2002, show that while new jobs are being created and are in line with growth in output, the influx of new entrants to the market cannot be absorbed into employment. In particular, Bhorat & Oosthuizen (2005) find that Africans, especially females are entering the labour force at a rate faster than they are being employed. Casale and Posel's (2001) and

⁶ Description contained in methodology section A

⁷ 68-76 % in 1997 and 64-71% in 1999



Casale (2004) agree finding an increase in the proportion of the female population working or wanting to work between 1995 and 1999. This increase in the supply of labour is however not met equally by demand, resulting in a significant increase in unemployment among females.

Casale & Posel (2001) cite three factors contributing to the increase in the labour supply: First average education has increased, which along with declining fertility, increases the opportunity cost of having children. Second, there has been a change in the resources that women have access to outside the labour force. Between 1995 and 1999 a decrease in the proportion of women living with employed men was found. The main reason for this was an increase in the number of unemployed males. This is known as the 'added worker effect'. The supply of married women to the labour force increases with the loss of a husband's employment, due to the need to re-establish the household's resource base (Lundberg, 1985: 11). The high unemployment environment in South Africa could pressure women to seek work given insecurity regarding employment and hence household income. In addition, the number of women living without any men in their household has also increased, driven by a decrease in marriage rates. Thus the proportion of households headed by females has increased which could account for increases in labour force participation rates. Third, shifting societal norms can change the relationship a woman has with the labour market. These include norms regarding the appropriate economic role of a female and changes in expectations of labour force participation. Although expectations cannot be easily quantified, they are hypothesised to encourage labour force participation. (Casale & Posel, 2001)

Leibbrandt and Mlatsheni (2004) find that labour market conditions experienced by youth are different to those experienced by adults, especially in urban areas. Unemployment is higher among the young indicating slow transition from school to work. While high repetition rates have been cited for the late transition, the duration of youth unemployment can have serious repercussions for life long employment experience. Productive potential is stunted and the possibility of physical hardship and mental scaring increased. (Leibbrandt & Mlatsheni, 2004)

This paper extends Wittenberg's (2002) non-parametric LOWESS approach to incorporate the ten years post apartheid. Noting the limitations of the assumption underlying this approach (the South African labour market is not in equilibrium), the analysis will be complemented by the use of cohort data to investigate the reliability of the reported findings and attempt to elicit additional trends experienced by different generations.

Data

The October Household Survey (OHS), an annual survey, captured development indicators on a large sample of households in South Africa from 1994 to 1999 (Stats SA, 1998: 1). International Labour Organisation (ILO) standards were used in the collection of indicators such as unemployment rates (both narrow and broad) (Stats SA, 1998: 1). The Labour Force Survey (LFS), started in 2000, samples a rotating



panel of households twice yearly with a direct focus on the dynamics of the labour market (Stats SA, 2001: ii). These cross sectional datasets provide detailed information about the labour market, including both employment status and earnings in the particular year.

Cross sectional datasets provide a 'one shot' picture of the distribution of the population over the different labour force participation states. Any attempt to analyse a dynamic process experienced by an average person over their life, requires the assumption that the process is stationary (Deaton, 1997). This assumption takes the experience of older people as a model for younger people; people have a work experience over their lifetime that is similar over generations. In the South African economic environment with continually increasing unemployment, it is unlikely that this assumption holds. The opportunities facing a person just entering the labour force are unlikely to be similar to those experienced by their parents.

An alternative to making this assumption is to include retrospective questions in the survey. These questions elicit information from an individual about their past experiences. This information can be used for dynamic assessment. There are problems with this approach. First, people are biased to remember episodes of long duration over those of short duration. Thus an individual may remember a period when they were employed for a year but forget a two month period of unemployment. Second, the longest span of information comes from the oldest age group and therefore the sample is not random. Third, the question of interest, in this case employment, could be correlated with other factors. Unemployed people are more likely to have a lower lifetime earnings and die younger than employed people, resulting in a bias towards the employed in the sample (Wittenberg, unpublished; Deaton, 1997).

Panel data is constructed from repeated observations on individuals over time and therefore contains information on dynamic factors experienced by the individual that is not available in cross sectional data. South African panel data is limited. The Kwazulu-Natal Income Dynamics Study (KIDS) tracked African and Indians households between 1993 and 1998. However this panel only represents the experience of the Kwazulu-Natal province, and is not reflective of the South African population at large. The Cape Area Panel Study (CAPS) started in 2002 provides detailed information on the population in the Cape and surrounding areas with a specific focus on the youth. While this information is useful for detailing the progress of the Cape area youths into the labour market, it also does not represent the South Africa population at large. While the quality and scope of South African survey data is increasing, little panel data is available that captures the ten-year post apartheid period.

This analysis focuses on the dynamics of the labour market in the first ten years of South African democracy. With the data constraints mentioned, it seemed appropriate to use the consecutive years of the OHS (1995-1999) and LFS (2000-2004) to construct cohort data. Cohorts, defined by date of birth, are tracked through the subsequent years of the surveys. Although these surveys select different individuals over time, it is possible to observe the aggregate changes in the



proportion of the population in each employment state from one survey to another. Under the assumption that the cohort population is constant⁸ randomly selected people from successive surveys create a time series dataset (Deaton, 1997: 117).

Both panel and cohort data are composed of time series data and share similar usages. While panel data tracks individuals over time, cohort data tracks cohorts. Cohort data can describe the experience of a cohort over time but holds no information on the dynamics of an individual. Each survey describes the distribution of, for instance, employment across age for that period, but successive surveys, which use different samples, are not informative about the joint distribution of this characteristic over time (Deaton, 1997: 120). Information about the average distribution among the employment states over time and whether this distribution is changing can be determined, but information on how long an individual remains in one employment state or whether an individual unemployed in 1995 remains employed in 1996, cannot be determined.

Within cohort analysis of changes can determine whether young and old cohorts experience similar paths between and within employment states. With ten years of successive data, different cohorts can be observed at the same age. Thus the generational and life-cycle effects can be differentiated (Gruen, 2004).

Cohort data has some advantages over panel data. First, panel data suffers representatively from attrition. Attrition occurs when, for some reason, individuals or households are lost from the survey sample. Reasons for attrition include 'loss to follow up', refusal and death. Since the design requires the same individuals to be followed, as time goes on fewer individuals remain in the sample. Since those lost to the survey are not usually lost at random, the sample is vulnerable to representation problems. Cohort data is constructed from a new sample each time and therefore has less vulnerability to attrition. How representative the data is, is however conditional on the sample design remaining fairly constant throughout the period and the probability of being selected not being dependent on age. Second, the semi aggregate nature of the data forms a connection between individual and national representation. In the employment case, national aggregates show rising unemployment in an economy which is growing. This has stimulated accusations that the economic labour policy is ineffective at creating jobs. (Deaton, 1997) The cohort data facilitates analysis into what is actually driving rising unemployment. Are the number of people employed declining or are the proportions available to work increasing and if so from which state are these people coming?

The construction of cohort data is flexible in many respects. The choice of the characteristic on which the data is constructed, (in this case the proportion in each employment state) can be either a measure of dispersion or central tendency and in addition can be in a weighted or transformed form. This allows for analysis of skewed distributions and the ability to capture highly diverse data. In the sample used, the weighted proportions in each employment state were calculated. The weighting was necessary to account for the survey design such that the aggregate

⁸ i.e. the population sampled contains the same individuals since migration and death are assumed negligible



dynamics observed reflect the South African population. Cohort data can also be constructed from different sources. In constructing the ten-year cohort series, the OHS and LFS surveys were easily combined. (Deaton, 1997)

There are two main disadvantages in using cohort data. The aggregation of information leads to a loss of individual information and the underlying assumption of a constant population can be problematic. This assumption is required to ensure that random samples drawn from successive surveys represent a random sample from the same population each year. Aging, migration and death within specific cohorts can distort the population making this assumption unrealistic (Deaton, 1997). In restricting the cohorts to the working years 16-65, it is hoped that aging and death distortions will be avoided. However it is worth noting that the influence of the HIV/AIDS epidemic, with its concentrated attack on people in their productive years, may be problematic for the future use of cohort data.

The variable of interest in each survey was the proportion of people in each of the employment states. The population is divided into the Economically Active and the Not Economically Active (NEA). The economically active population is divided into Employed, Searching Unemployed (strict definition) and the 'Not Searching' Unemployed (expanded definition). The official definition used by Statistics South Africa (Stats SA) in the September 2004 LFS to define searching unemployment is, those people within the economically active population who: (a) did not work during the seven days prior to the interview, (b) want work and are available to start work within two weeks (one week was used until mid 2004) of the interview, and (c) have taken active steps to look for work or to start some form of self-employment in the four weeks prior to the interview. The expanded definition of unemployment excludes criterion (c) (Labour force survey, September 2004: xix).

These questions are susceptible to measurement error. Measurement errors occur due to: misinterpretation of the question, inaccurate reporting on the part of the respondent and inaccurate recording of results (Wittenberg, unpublished: 13). Employment status is assigned based on questions intended to extract, as accurately as possible, information on an individual's daily activities. However, these questions can be misinterpreted. Is the word "working" interpreted as it is intended? What entails "searching"? Some people might define work activities as those done specifically for an employer (Wittenberg, unpublished: 12). Developing a network of acquaintances in the formal sector to improve employment prospects may be the optimal strategy an individual uses to 'search' for work⁹ (Wittenberg, unpublished: 12). The later surveys have been more precise in defining the bounds of employed and unemployment.

Sample selection error might be another problem. Sample selection errors are caused by flawed sampling frames, non response and other sample selection biases (Wittenberg, 2005: 13). The OHSs are reported to have under counted small-scale and own-account agriculture (Casale & Posel, 2001: 5). The LFSs show an increase in the proportion of the population involved in this type of activity. This has

⁹ Natrass (2002) defines individuals that search through these indirect means, as 'network searchers'.



contributed to an increase in labour force participation in later years, especially among women. (Casale & Posel, 2001)

Measurement and data errors should be kept in mind when assessing aggregate dynamics over the ten-year period. Changes could reflect better collection techniques, rather than actual changes.

Methodology

The analysis is composed of two main sections. Section A expands Wittenberg (2002) graphical non parametric LOWESS investigation to cover the period 1995 to 2004. Section B creates a 'synthetic panel' from the consecutive years of the available surveys, analysing between and within cohort mobility and finally decomposes cohorts over the time period into age-year and age-cohort effects.

The African sub sample was chosen as the population of interest. Employment status was divided into four distinct categories: employed, 'searching' unemployed, 'not searching' unemployed and not economically active.

Section A

Following Wittenberg (2002), a non parametric LOWESS technique was used to indirectly approximate the empirical search approach. The advantage of a non parametric approach is that it does not impose a functional form on the data but rather allows the data to determine the parameters of the estimates and hence the shape of the curve (Deaton, 1997: 193).

The LOWESS technique which stands for locally weighted scatter-plot smoothing, summarises the trend of a response y as a function of a predictor x as follows:

∄ A bandwidth is chosen which specifies the fraction of the sample used to 'smooth' each point. A bandwidth of 0.3^{10} was chosen in this paper indicating that 30% of the sample was contained in each band

∄ Weighted least squares regression of y on x are calculated using the following weights

$$w_i = \frac{1}{14} \left(\frac{d_i}{d_j} \right)^4$$

where $u_i = \frac{|x_j - x_i|}{d_i}$ and d_i is the distance between x_j and its furthest neighbour within the band. This weighting allocates a value 1 for $x_j = x_i$ and declining weights for points further away reaching zero at the bands borders.

¹⁰ The bandwidth represents the tradeoff between bias and variance, the choice of 0.3 follows Wittenberg (2002)



€ The fitted x_i are used as $\hat{f}_{\text{TM}}^{\text{R}}(x_i)$ in the model $Y_i | f/x_i \text{ } \text{ } \kappa_i$ where κ_i is assumed to be a white noise process

The result of the above process is that the predicted smoothed y value for n observations is obtained by ‘stitching’ together n regressions (Hamilton, 2004; <http://health.bsd.uchicago.edu>).

f_{ji}/x_i is in this instance the proportion of the population aged i in each labour participation state j : employed, ‘strict’ unemployed, ‘expanded’ unemployed (discouraged) and not economically active controlling for gender. These proportions are estimated non-parametrically as described above, to create a scatter of points which are shown to follow a distinct trend. Such representations were drawn for each of the ten years.

Each year’s cross section gives a good first impression of the patterns and levels of those both in and out of the labour force. However, the main question of this paper, the changes in the labour market in the first ten years of democracy, can only be analysed under the stringent assumption that the system is in equilibrium. This allows the slope of each cross sectional graph to reflect the net flow from that state for that year.

This assumption is nevertheless unrealistic as it requires different generations to experience the same work profiles over their lifetimes. The solution is to introduce a cohort analysis, discussed in section B.

Section B

The question raised is whether there were changes in the distribution of individuals employed, unemployed and not economically active by age since 1995. The construction of a ‘synthetic panel’ allows age cohorts to be tracked throughout the period and differences between these cohorts to be observed.

The panel consisted of ten years of consecutive cross sectional surveys from the OHS and the LFS. Cohorts were defined by age in 1995 and the proportion of Africans in each employment state for each cohort observed graphically over the ten years.

Stacking these surveys back to back creates a ten-year dataset which enables not only the trajectory of each cohort to be observed but also allows comparison between different cohorts at the same age. Thus the fundamental contribution of the cohort analysis is its ability to expose both within and between cohort dynamics. Previous South African synthetic panel analyses have been limited in this regard due to the lack of consecutive surveys and the limited time period over which these surveys



have been run¹¹. The use of the cohort analysis therefore allows a more in-depth assessment of different generation's labour force experience.

Decomposition

The Age-Period-Cohort accounting model is a popular means to identify whether changes in human experiences are cohort-based or due to some other factor such as age or calendar year (Fu *et al*, 2004:3). The aim of the decomposition is to distinguish the different sources of the change in the distribution across the employment states evident from the cohort analysis between the younger and older generations. In other words, is the level of economic activity among the youth mainly a factor of age, the period over which these cohorts are in their youth or something unique to young cohorts, i.e. a combination of their age and the years of their youth?

The *age effect* represents different allocations between the employment states associated with different age groups. As an example, it is expected that employment and age are positively correlated up to retirement after which employment decreases with age. The *period effect* represents variation in the distribution across the employment states over time, associated with all age groups simultaneously. For instance, the proportion of women economically active at all ages has increased over the last century. The *cohort effect* measures the difference in the distribution across groups of individuals with the same birth year. (Fu *et al*, 2004)

A problem however arises due to the exact linear dependency of the age, cohort and period effects: Period = Cohort + Age. This produces a singular design matrix of one less than full rank. This means that a unique solution for each of the effects cannot be found (Fu *et al*, 2004: 4). Thus without strong prior information of the shape of the life cycle profile of employment, unemployment or economic activity in South Africa, the correct simplifying assumption could not be identified.

Acknowledging these constraints the following two-way decomposition models were used:

- 1) $Y_{ijk} = \eta + \zeta_{ik} + \nu_{jk} + \kappa_{ijk}$ -age and year decomposition
- 2) $Y_{izk} = \eta + \zeta_{ik} + \pi_{zk} + \kappa_{izk}$ -age and cohort decomposition, controlling for the 1995 year effect¹²

Y_{ijk} represents the proportion of the population in employment state $k =$ Employed, 'Strict' Unemployed and not economically active, in the i th age group for $i = 18, \dots, 65$, and in the j th period for $j = 1995, \dots, 2004$. Similarly Y_{izk} represents the proportion of the population in employment state $k =$ employed, 'strict' unemployed and not

¹¹ Gruen's 2004 wage analysis used only three cross sections spanning five years.

¹² See appendix A for details on the inclusion of the 1995 year dummy



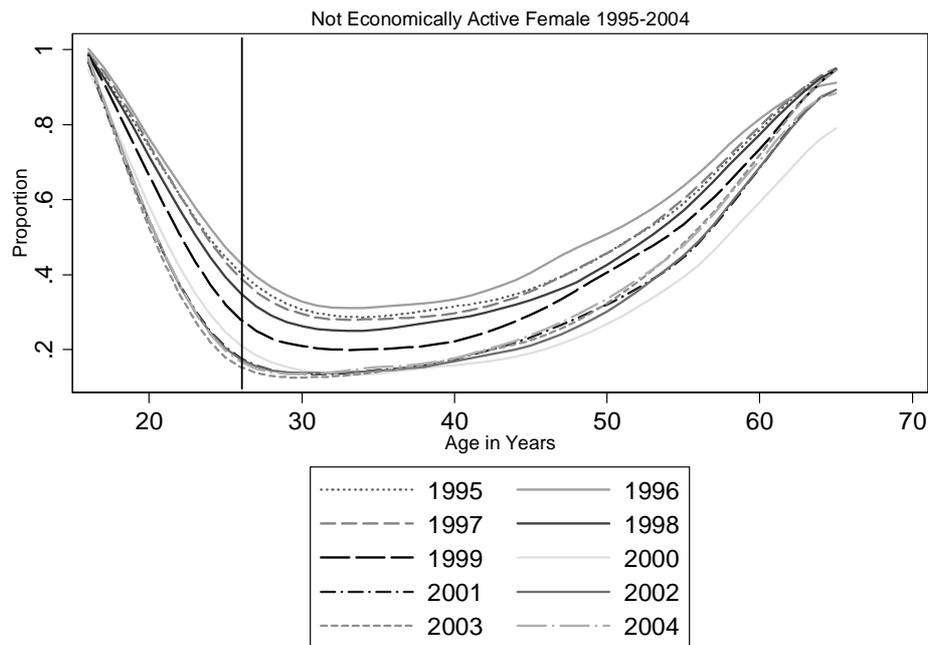
economically active, in the i th age group for $i = 18 \dots 65$, and the z th cohort for $z = 8, \dots, 65$ ¹³.

ζ_{ik} denotes the i th age effect, v_{jk} the j th year effect and π_{zk} the z th cohort effect for each employment state. 1995_k is a year indicator variable taking a value 1 in year 1995 and 0 in all other years. η represents the intercept, and κ_{ijk} and κ_{izk} the random errors for model 1 and 2 respectively.

Results

Cross Sectional Analysis

Figure 1



Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations

Each line in the graph represents the proportion of African females not economically active by age in a specific year. Note that the inverse of this graph is the proportion of economically active females. Thus a decrease in *not economically active* is an increase in *economic activity*, either into employment or unemployment.

¹³ Cohorts are defined by age in 1995. Since individuals between ages 18-65 are used in each year, those aged 18 in 2004 are 8 in 1995.

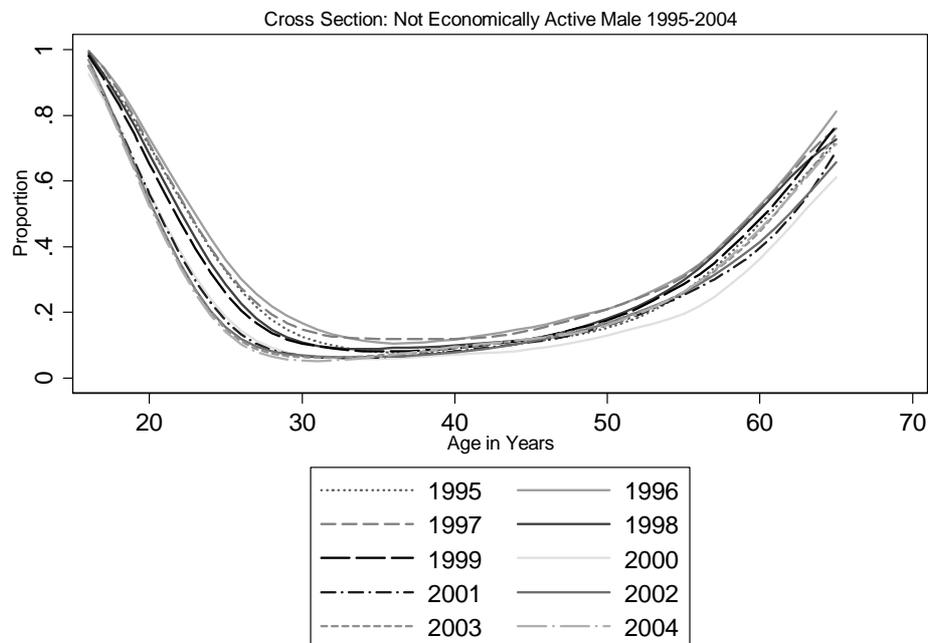


Looking at the solid black line representing the 1998 cross section, it is clear that economic activity increases in the twenties as people leave school and enter the labour force, remains fairly stable between age 30 and 50 after which people begin to drop out of the labour force as they retire, increasing the proportion not economically active. This pattern across age is apparent in each year.

What is noticeable is that while the general shape remains consistent across the years, the levels of economic activity reached at each age in each year is different and displays a systematic trend. Observing the proportion not economically active at age 30 across the years, there is clearly a continual decrease in the proportion not economically active between 1995 to 2000, indicating increased economic active over these years. This increase in economic activity is evident throughout the ages but is particularly marked at younger ages, evident in the continually increasing slope of the graph between age 20 and 30. The result is a decline in the age at which the maximum proportion of females are economically active, a shift from approximately age 30 to about age 25 in a short period of time. More people are economically active at younger ages.

The increase in economic activity at younger ages is even clearer when the same graph is depicted for males. See figure 2 below. Economic activity increases between 1995 and 2000 for ages 20 through 35, but remains fairly consistent across the years for other ages, with the 2000 trajectory following a distinctly different path.

Figure 2

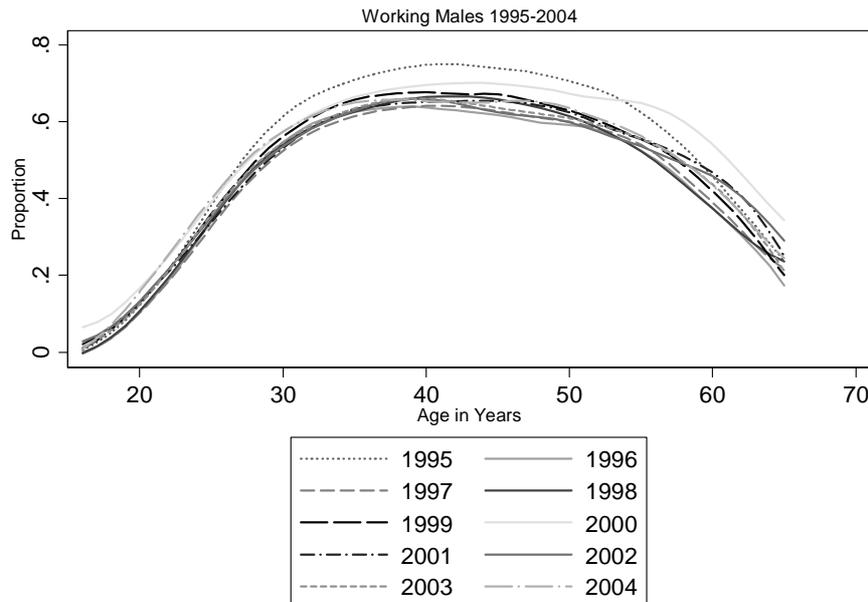


Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations



Since economic activity is divided into those that are employed and those unemployed, the question is whether this increase in economic activity, especially the increased supply of young people to the labour market, is resulting in increasing employment or just more unemployment?

Figure 3



Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations

Figure 3 gives the answer to the above question. The unemployment trajectory over age is extremely consistent across the years, except for 1995¹⁴ and 2000. The proportion of the population employed increases up until age 35, remains fairly constant at around 65% until age 50 and then declines.

This graph not only describes the enormity of the unemployment problem in South Africa - maximum employment only reaches 65% - but also shows that the increase in the supply of labour to the market seen in figure 1 and 2 is not being absorbed into employment. In particular, the pattern of employment is especially consistent between years for the ages 20 through 30, indicating that the increase in economic activity among the youth is not being absorbed and hence is just resulting in an increasing pool of unemployed youth.

¹⁴ The 1995 trajectory mimics the findings of Wittenberg (2002) which showed a peak just exceeding 70%.



Figure 4



Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations

Figure 4 shows this result. Observing African males at age 25, the age at which the maximum unemployment level is consistently reached, it is evident that unemployment rises continually and significantly between 1995 and 2002. The proportion of the population aged 25 who are unemployed increases from around 13% to 33% in just 8 years, a more than two fold increase. The rapid increase in the unemployment level is accompanied by a more rapid decline in unemployment between age 25 and 30, such that by age 30 the difference between the unemployment level in 1995 and 2002 is approximately half that experienced at age 25, emphasising that this problem is focused on the youth.

Each of these graphs portrays a feature of the total labour market picture. Thus looking at them in combination, they begin to tell a story. Increases in economic activity, especially among the youth, are increasing the supply of labour to the market. The rate of progression into employment has however remained stable over the entire period not responding to the increased supply. The increase in economic activity is therefore contributing to an ever increasing flow into, and thus an increase in the level of unemployment.

These results support and show a continuation in the trends observed by Wittenberg (2002), Borat (2004), Borat & Oosthuizen (2005) and Casale (2004). There is a severe long term employment absorption problem and females are particularly affected. Figure 3 shows that maximum labour absorption (65 per cent) is lower than Wittenberg's (2002) findings of 70 per cent. This trend of 65 per cent persists



throughout the period. What is noticeable from the graphs is that the problem is accentuated for younger people. Maximal unemployment is reached at an earlier age¹⁵, and continues to decline for females' year on year brought about by the increased speed at which young people are joining the labour force.

Employment Status for African Cohorts

The analysis of dynamics in the labour market in the first ten years of democracy, required that groups of individuals defined by their age in 1995, called cohorts, be tracked over the ten-year period.

Each trajectory in figure 5 displays the experience of a group of individuals defined by their age in 1995 over the ten-year period. Observing the trajectory labelled 'Male 20' it is evident that in 1995, 70% of 20-year old males were not economically active. This proportion continually decreases to just over 15% in 2000 when the cohort is 25 and decreases further to around 7% in 2004 at which time they are 29.

Each cohort can be followed in a similar manner and therefore differences in the proportion not economically active at a particular age can be observed. For instance, at age 25 close to 50% of the 'Female 24' cohort is not economically active, while only 17% of the 'Female 20' cohort is not economically active. A similar trend is evident for males, showing a continual increase in economic activity among the youth.

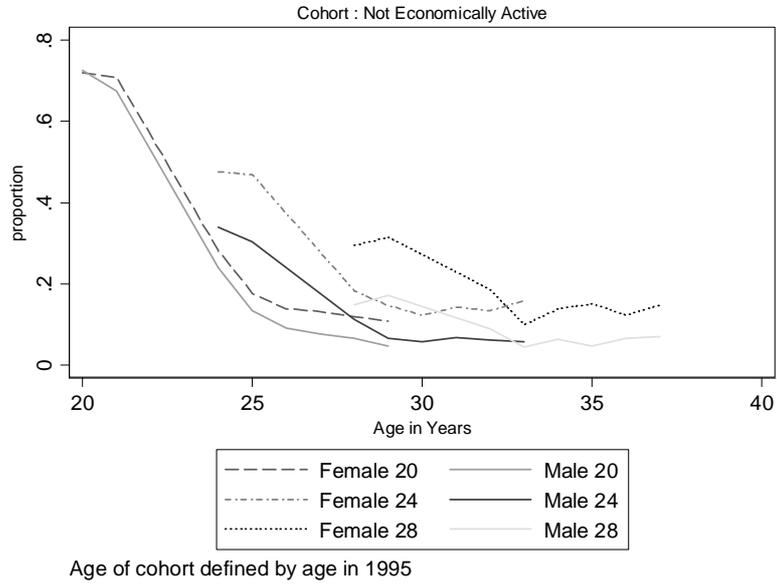
Note that in figure 5 the minimum proportion of not economically activity, i.e. the maximum economically activity remains constant around 7% for males and 13% for females, the age at which it is reached is continually decreasing. For instance while the 'Male 26' cohort reaches this level at age 31, the 'Male 18' cohort has already reached this level by age 25. The continually increasing slope of the graph over the twenties indicates a rapid and continual increase in economic activity for successively younger cohorts, a continually increasing supply of younger and younger people to the labour market.

Figure 6 shows that the economically active trend is isolated to male youths, but persists throughout female cohorts. A generational effect is evident; older generations have higher proportions of NEA at almost all ages. The generational effect appears to be confined to young cohorts for males but is prevalent throughout female ages. Figure 5 shows that the more rapid transition of youth into the labour force is evident for both genders until age 30. Thereafter the NEA level for males remains fairly stable, marked by the overlapping of different cohorts (see the solid lines in figure 6). For females the effect is evident at all ages. The 'Female 34' cohort has a 15% higher proportion economically active than the 'Female 38' cohort even at age 40.

¹⁵ Maximum unemployment spike observed by Wittenberg (2002) as being stable around age 27

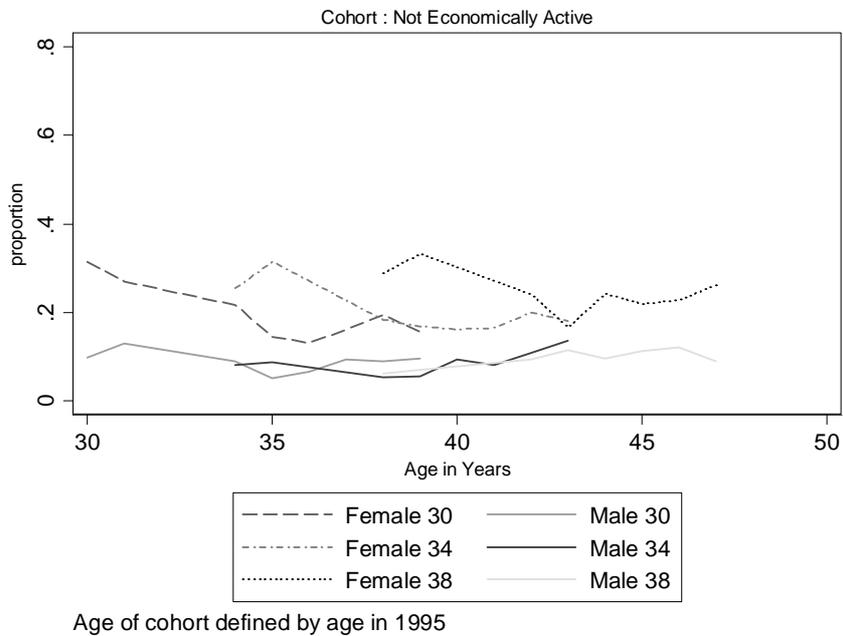


Figure 5



Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations

Figure 6



Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations



Figure 7:



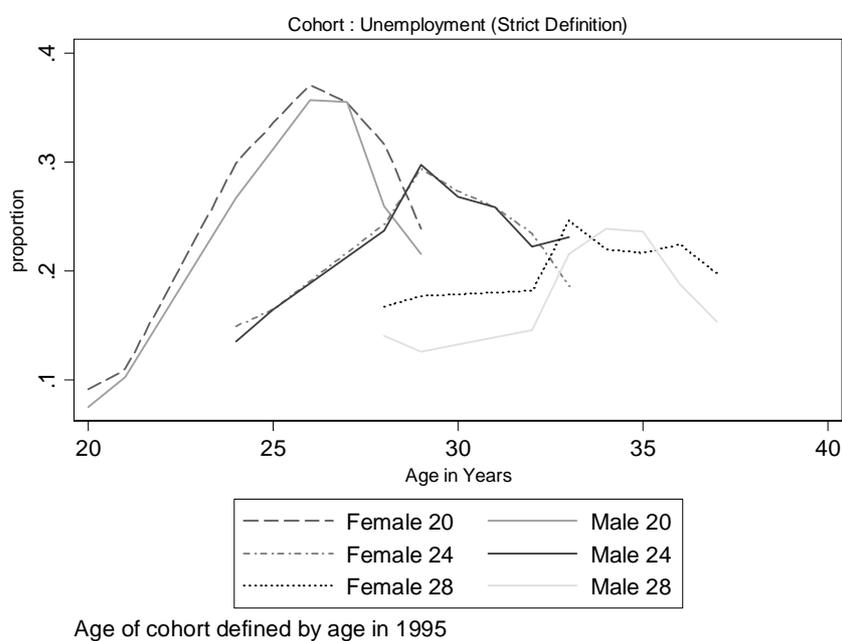
Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations

A continual increase in the labour supply needs to be absorbed into employment to avoid growing unemployment. The stability of the net flow between the working and other states is evident in the significant overlap of successive cohorts seen in figure 7. At each age the proportion employed in each cohort is roughly similar. Holding the outflow from employment constant, the proportion of the population joining the employment state has remained noticeably stable over the ten-year period. Examining figure 7, it is evident that the generational decline in NEA levels is not reflected in an increase in the proportion working. Younger working cohorts do not show higher levels of employment. In fact, the intersection and overlap of different cohorts is extensive, especially at young ages.

Note however that since these graphs portray the proportion of the total population that is working, the absence of an increase in the proportion employed does not indicate that the South African economic environment did not create jobs in the post-95 period. Rather the growth of employment opportunities has not been sufficient to meet the growing labour force. This is in line with Borat's (2004) finding that while 1.6 million new jobs have been created, this is insufficient to absorb the extent of the inflow into economic activity.



Figure 8:



Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations

The increase in economic activity is accounted for by a rising wave of unemployment, especially evident in the younger cohorts. Figure 8 shows how successively younger cohorts reach a successively higher maximum unemployment level. Thirty-five per cent of the 'Male 20' cohort is unemployed at age 26, while the 'Male 24' cohort reach both a lower maximum level of 30% at the older age of 28. In addition, the difference between the levels of unemployment for cohorts is especially significant at young ages. For instance the 'Female 20' cohort and the 'Female 24' cohort have a difference in unemployment levels at age 25 of over 15 per cent.

Discussion of Cohort Analysis

This section discusses possible explanations for the increase in economic activity among the youth. The aim of the section is to consider possible explanations for the results found but an in-depth analysis of these ideas is beyond the scope of this paper

The rising increase in economic activity is best explained by a decline in the age at which young Africans are leaving school and entering the labour force. The equilibrium level of not economically active (NEA) is also affected by flows from working and unemployment into NEA but these are predominantly flows experienced at older ages. The main question is about the experience of young people and therefore these older effects can be taken as negligible. It is unlikely that a young individual finding him/herself unemployed in one year would classify him/herself as



NEA the following year. In fact, the chance of young individuals classifying themselves as NEA is, in all cases, very slight.

Possible explanations for the increase in economic activity can be divided into three broad categories: measurement error, social and/or cultural changes and economic changes.

Measurement error could explain such dramatic changes. It is possible that the shifts observed are in fact distorted by measurement error. Measurement issues include the design of the employment status questions, the weighting of the sample to reflect the overall population as well as the validity of the assumptions required to construct the synthetic panel.

With regard to the employment status questions, their consistency over the ten-year period is vital. If they have changed in a way that would alter the probability of an individual classifying him/herself as NEA, changes across years will not reflect reality. For instance if it has become more difficult, especially for females, to be captured as NEA, then the increased economic activity observed is in part a function of the question and does not fully reflect an actual increase in economic activity. Section (b) of the September 2004 employment definition requires that people classified as unemployed, by both the strict and broad definitions must want work and be available to start work within two weeks of the interview. Until mid-2004, this time frame was only one week. This could account in part for an increase in economic activity in 2004. However this reflects a year effect and would not explain the cohort effect.

Incorrect weighting could distort the aggregate picture of the labour force. The sample aggregates used are “weighted up” to reflect the demographics of the population. These weights can interfere in the representation of the proportions in each labour market state.

The OHS sampling frame has been criticised for under counting small-scale and own-account agriculture (Casale & Posel, 2001: 5). This problem was accounted for in the LFS and was accompanied by an increase in labour force participation, especially for women. The higher levels of labour force participation could account for the decline in the NEA between 1999 and 2000, but again would not account for the year-on-year decline.

Failure of the constant population assumption to hold, contributes to measurement error. The assumption is in place to assure that the underlying population from which successive samples are drawn is constant, so that changes over time can be attributed to changes in the experiences of that specific population. When this assumption is violated, changes observed could in part be a function of a change in the actual population and not a change in the experience of a single population.

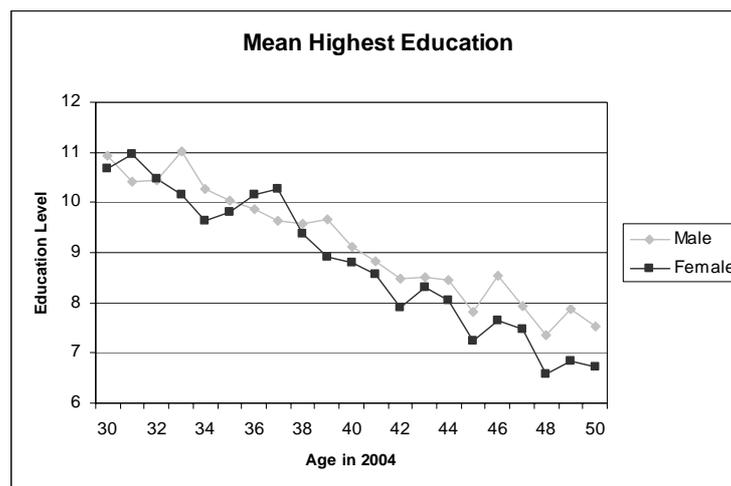
While awareness of such inaccuracy is important it is unlikely that improved data alone accounts for the dramatic decline in NEA and the increase in unemployment, especially when the consistency of these dynamics is considered.



If the data is taken to be a true reflection of economic activity, the question of why young people are entering the labour force at successively younger ages becomes important. A large proportion of the increase in unemployment seems to be attributable to an increasingly rapid transition from school or post school education to economic activity at a younger age. The minimum NEA state proportion is reached by the “Male 20’ cohort by age 27-28 while the ‘Male 28’ cohort only achieves its minimum by age 32-33. This effect is exaggerated even more for female cohorts.

Wittenberg (2001) notes that African youth leave school at, on average, a higher age than other races in the 1994-1996 period. Is the faster transition out of the NEA state evidence that the African population is completing school at progressively younger ages, converging to the experience of other races? This would be evidence of a strengthened education system. However, an alternative explanation is that school completion rates may be declining, accounting for the increase in individuals available to work.

Figure 9:



Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations

Examining figure 9 which displays the highest average education by age in 2004, it is apparent that school drop out rates have not increased. The ‘Male 28’ cohort is aged 38 in 2004 and has attained an education level of just over 9.5 years. The ‘Male 20’ cohort is aged 30 in 2004 and has attained an average of 11 years of education. Thus education levels are not declining, but rather increasing, indicating that young Africans are leaving school with increasing levels of education and on average at a younger age.

Rising levels of education may play a role in empowering young individuals, especially females to seek work, resulting in an increased probability of being classified as economically active at an increasingly younger age. Education augments the opportunities available to females as the scope of labour activity



increases. This would support Casale and Posel's (2001) argument that rising education increases the opportunity costs of having children as expected wages increase with educational attainment levels.

The role of the female has and continues to change, shifting from nurturer to shared financial provider. Increased involvement in and demands of urban culture blur the classification of tasks that define a women's daily routine. This could contribute to an increase in the number of females on the border between the broad unemployment state and the NEA state. Social structures could also pressure young females to classify themselves as unemployed or even serve to initiate search for work. Whether these social dynamics are widespread and rapid enough to account for the speedy decline in the levels of NEA by cohort would require future analysis which is beyond the scope of this paper.

Changing economic conditions are often the stimulus for changes in social structures. Is the South African economic environment demanding that females participate in the labour force? Are younger females being forced to join the labour market because economic circumstance prescribes this as the only solution? This is in line with the 'added worker effect' where economic circumstances pressure females to actively participate in the economic environment due to poor job prospects that limit the ability of more 'traditional' household providers to find work. The increase in the proportion of females living in households with unemployed males would support this theory (Casale & Posel, 2001).

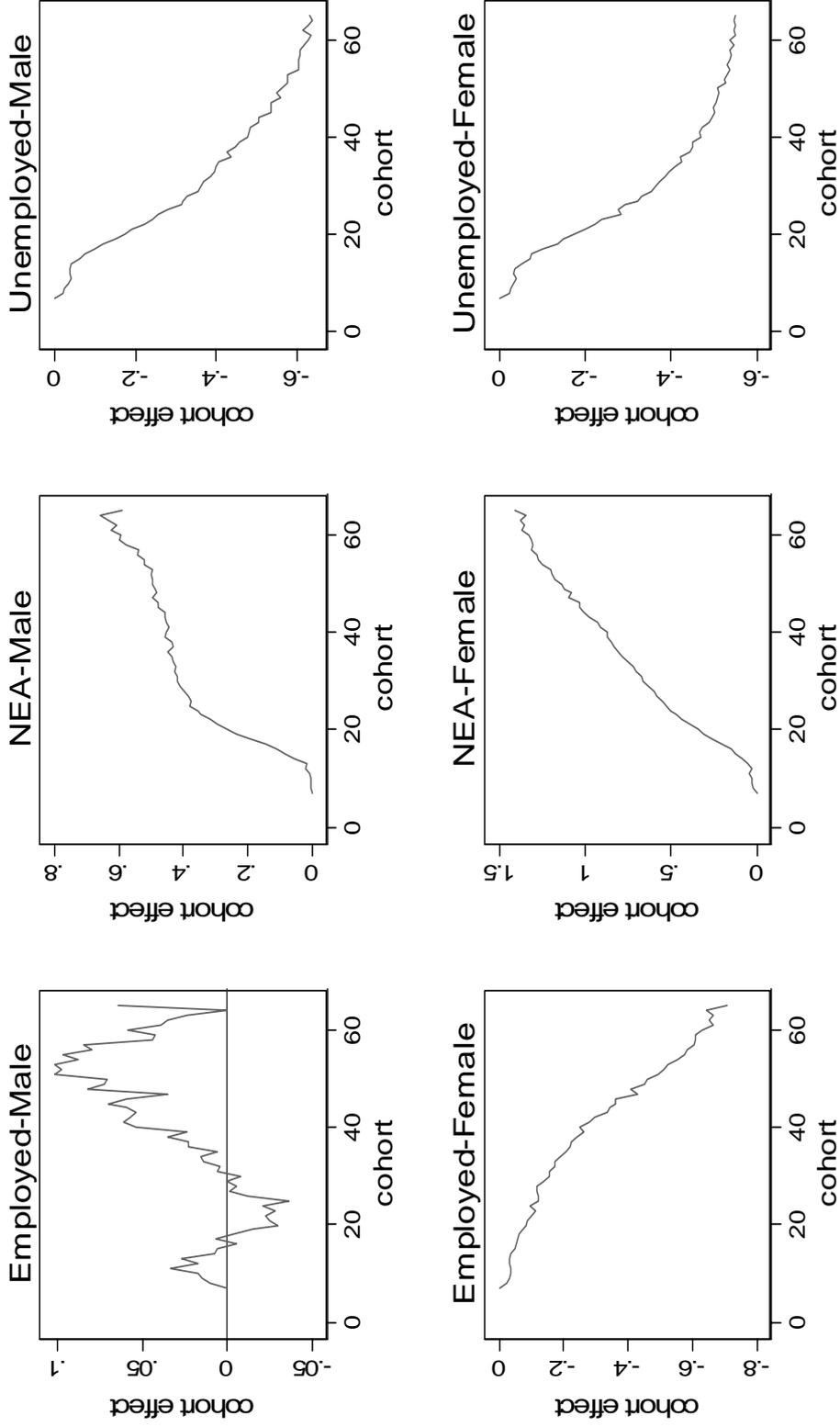
Decomposition

Figure 10 portrays the cohort effects from the age-cohort decomposition of the employment, not economically active and 'strict' unemployment states. The cohort effect represents the experience of different generations. The values on the y-axis are not directly interpretable.

The graph shows that younger generations are more likely to be economically active than older generations. In other words, a greater proportion of the successively younger generations classify themselves as part of the labour force. The decline in the proportion of not economically active individuals by generation is near linear for females, but is less so for males. There is a rapid increase in economic activity for successively younger male cohorts and a more gradual increase over older ones. This indicates that the increase in economic activity has been changing for some time, but has accelerated over recent generations.



Decomposition



Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations

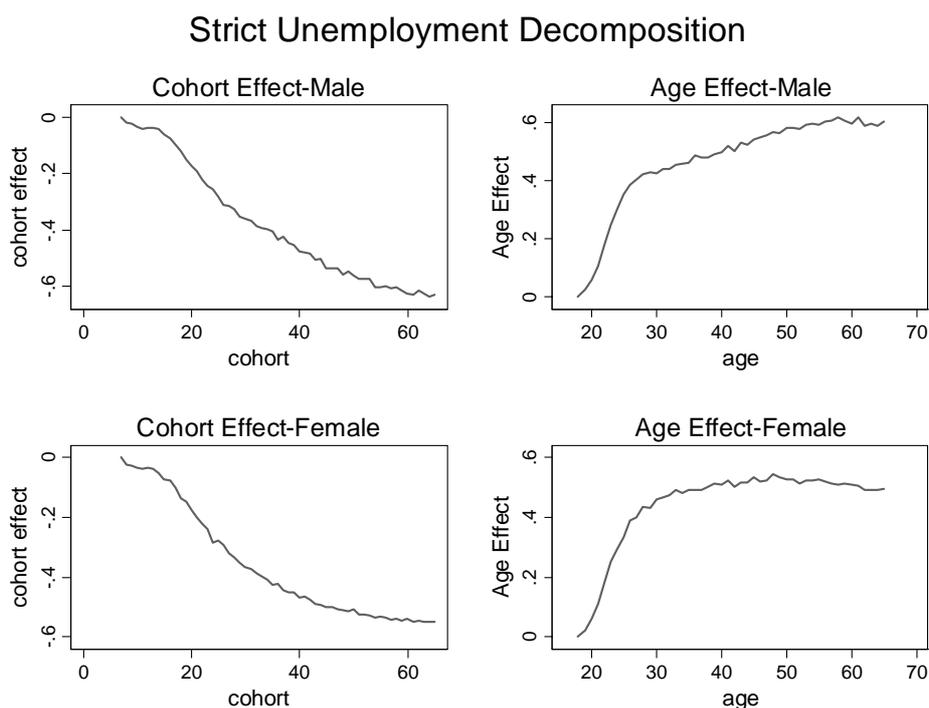
Figure 10:



For females the increase in economic activity among younger cohorts is associated with an increase in the proportion of the younger generations employed. A greater proportion of younger female cohorts are employed than successively older cohorts. The male employment experience is considerably different. The male employment cohorts between the ages of 18 and 30 in 1995 are less likely to be employed than the older cohorts between the ages of 30 and 65 in 1995. This effect does however appear to be changing with the experience of the youngest cohorts reverting to those of the older groups.

The age effects for the employed and not economically active states are consistent with previous findings¹⁶. The proportion of the population employed increases with age until approximately 35 years, after which it declines. The proportion of the population who are not economically active declines rapidly with age to a minimum level close to 30 years and then increases slowly. Both depict transition from school and/or study into work.

Figure 11:



Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations

The 'strict' unemployment age effect does not describe the age-experience of unemployment previously seen. Prior to decomposition, unemployment increased to a

¹⁶ See Appendix A, figures 1-4



maximum at age 27 and then declined. Once the generational effect is removed, the maximum level of female unemployment remains stable from age 30 but is only reached at age 60 for males. Figure 11 shows the decomposition of unemployment into age and cohort effects.

This reveals an added negative element to the unemployment picture. Unemployment does not reach a maximum level in the late twenties and then decline. It appears that those unemployed are joined at successive ages by more unemployed people, leading to a continual increase in unemployment with age. Thus the prospects of employment for an unemployed 30 year old are poor.

Conclusion

The literature¹⁷ shows that the growing unemployment problem in South Africa is a function of the economy's inability to absorb the expanding economically active population. Three features of this problem are characterised in this paper.

The labour force is expanding due to a decrease in the age at which young Africans become economically active. In other words, the expansion is primarily a result of more rapid transition from school into the labour force. For instance, the difference in economic activity between the 'Female 20' cohort and the 'Female 24' cohort at age 25 is over 30%.

This increasing supply of labour to the market is not being absorbed into employment. The proportion of the population employed is extremely stable over the entire ten-year period for all ages. This is especially true for people in their twenties. Since the population is growing, this signals that while jobs are being created¹⁸, they are not being created fast enough to absorb the expanding demand for jobs.

As a result unemployment is increasing and the mean age of the unemployed population is decreasing continually. Young people are feeling the burden of the unemployment problem.

These features are particularly pronounced for the African female population. Younger generations of females are more likely to be classified as economically active than older generations. This supports Casale and Posel's (2001) argument that females may be pressured to search for work given uncertainties caused by extensive unemployment.

The cross sectional and cohort approaches have fairly consistent overall findings. Unemployment has increased fed by an increase in the proportion of the population

¹⁷ Bhorat (2004), Bhorat & Oosthuizen (2005), Casale (2004), Casale & Posel (2001), Wittenberg (2002) etc

¹⁸ A result which is consistent with Bhorat (2004)



economically active. The two approaches do however find differences in the magnitude and distribution across age, of these effects.

The cross sectional analysis finds the peak unemployed level increasing in the first three quarters and decreasing in the last quarter of the ten-year period, indicating a possible reversal in the rising unemployment experience of the 1990s and early 2000s. This peak level is reached fairly consistently, especially for African males, at around age 27. The cohort analysis reveals a continual increase in unemployment for successively younger cohorts over the ten-year period, suggesting that the peak level of unemployment is continuing to rise. In addition, a marked decline in the age at which this ever increasing maximum level is reached, is found. In other words, the cohort analysis shows continually worsening employment prospects, felt particularly strongly by successively younger groups.

Similarly the cross sections identify a continual increase in the proportion of the population who are economically active, but do not clearly identify that the age at which this minimum is reached is also declining. This decline in the age at which young Africans enter the labour market is however extremely explicit in the cohort analysis, especially for females, young people are joining the labour forces at an earlier age year-on-year. A possible explanation for this is that Africans are leaving school and entering the labour force at, on average, younger ages. A positive finding given that they are found to be leaving with more education.

The decomposition identifies an additional feature of the South African labour market. Once cohort effects are controlled for, the proportion of the population unemployment across age is found to increase continually to age 30 and age 60 for females and males respectively, with no apparent decline thereafter. This signals that the average unemployed 30 year olds' prospects of employment are low; unemployment in South Africa is long term problem. This supports Leibbrandt and Mlatsheni's (2004) argument that the duration of youth unemployment can have life long repercussions for employability, due to the erosion of skills and physical and mental hardship.

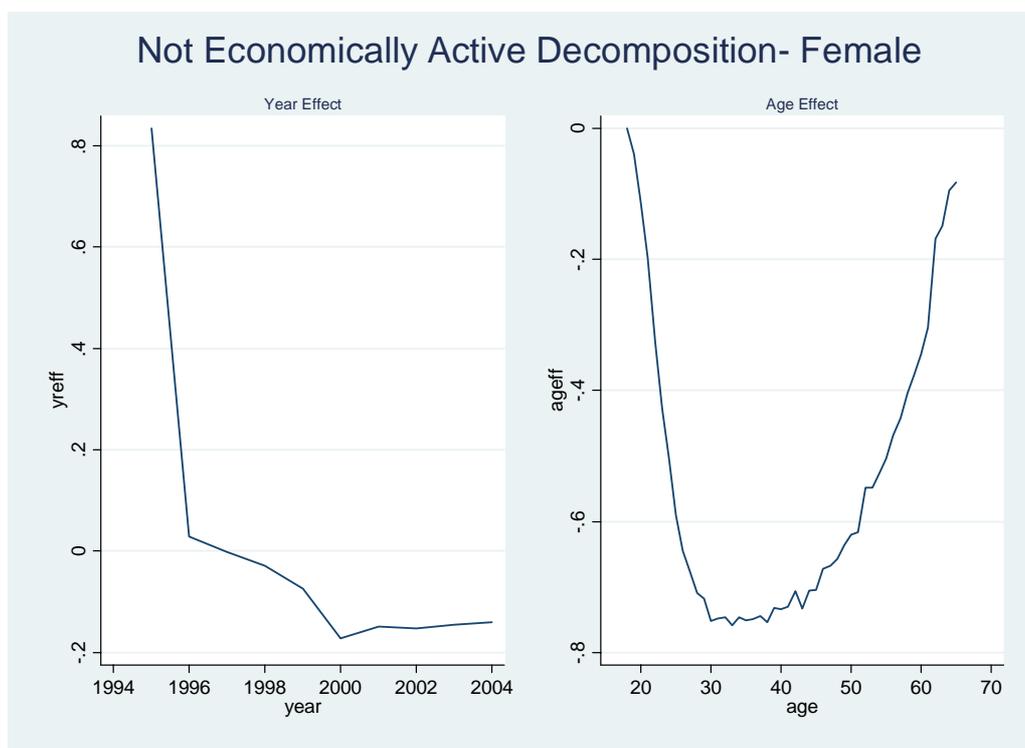
Measurement error and comparability of the surveys was raised. Of particular importance is whether the Stat SA weights used to make the sample reflect the population, are consistent across years. Stats SA weights are based on demographic trends but may distort the labour market picture. In addition, the distribution of the population across the employment states in the 1995 OHS is significantly different from the years that follow it. For these reasons the findings from these surveys should be assessed with care and further investigation into their robustness would be of value.

The findings of this paper have implications for future focus of labour policy. Rising unemployment is primarily a consequence of increased youth participation and not due to a decline in the availability of jobs. The number of jobs has increased but is not in line with the growth in demand for jobs. Consequently, questions about how to equip young people with the skills required to increase their marketability in the labour market are of importance.



Appendix A

Figure 1:



Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations

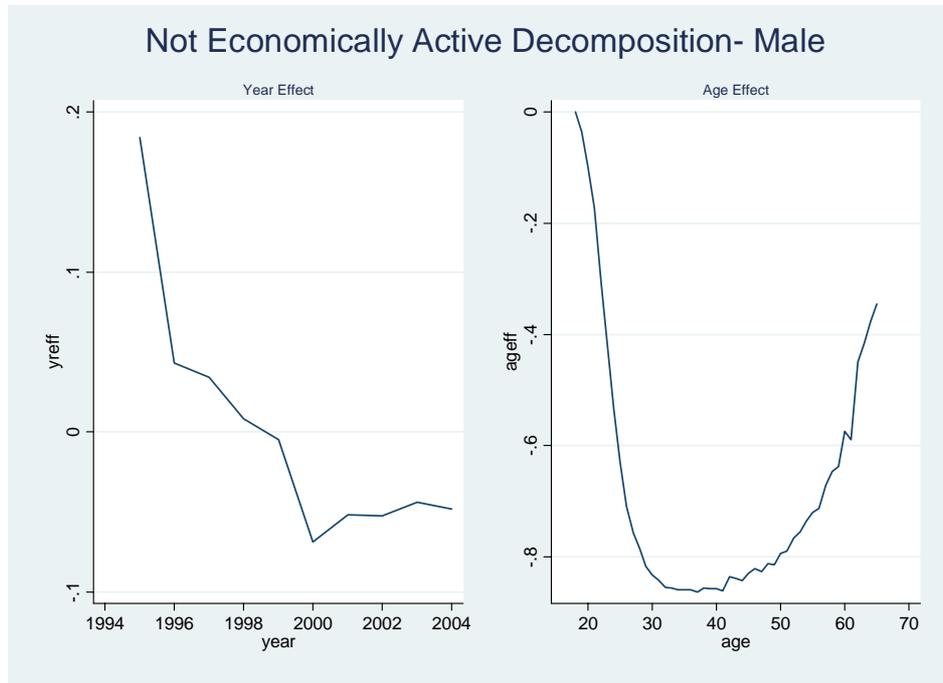
Figure 1 illustrates the age-period decomposition for the 'not economically active' state. As is evident from the left-hand panel, in 1995 the proportion of the female population captured as not economically active was significantly higher than any of the other years.

Similar inconsistencies for 1995 are found for all the employment states (see figures 2-4). The drastic differences cannot be attributed entirely to an actual change in the distribution of the population across the employment states. It is more likely that these differences capture measurement error from 1995; in 1995 the survey captured people as NEA more frequently than in other years.

On the assumption that 1995 was least effective in classifying individuals into the correct employment state, a 1995 year dummy was included.

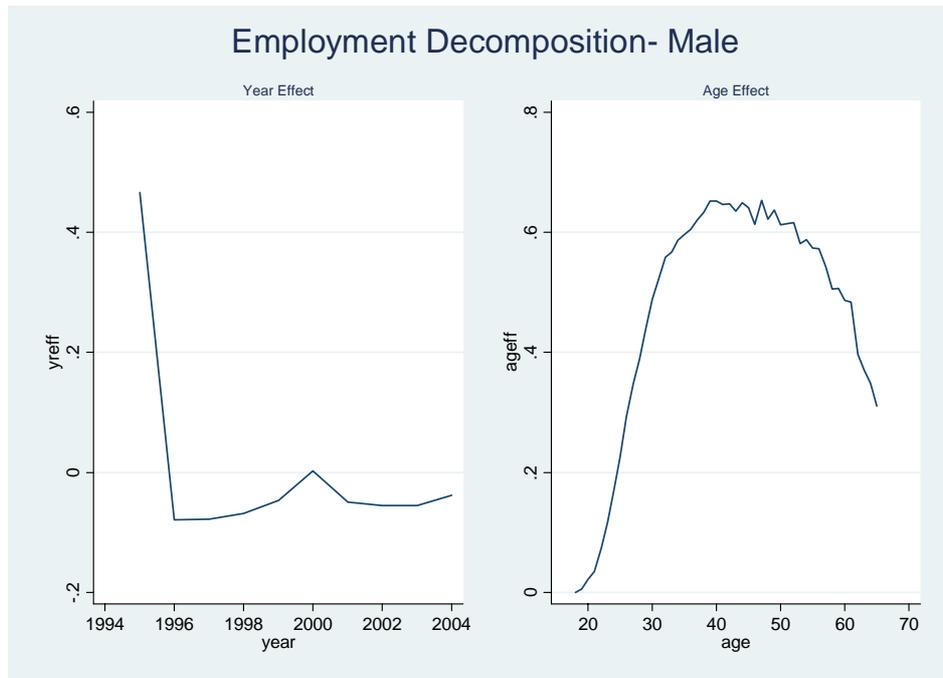


Figure 2:



Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations

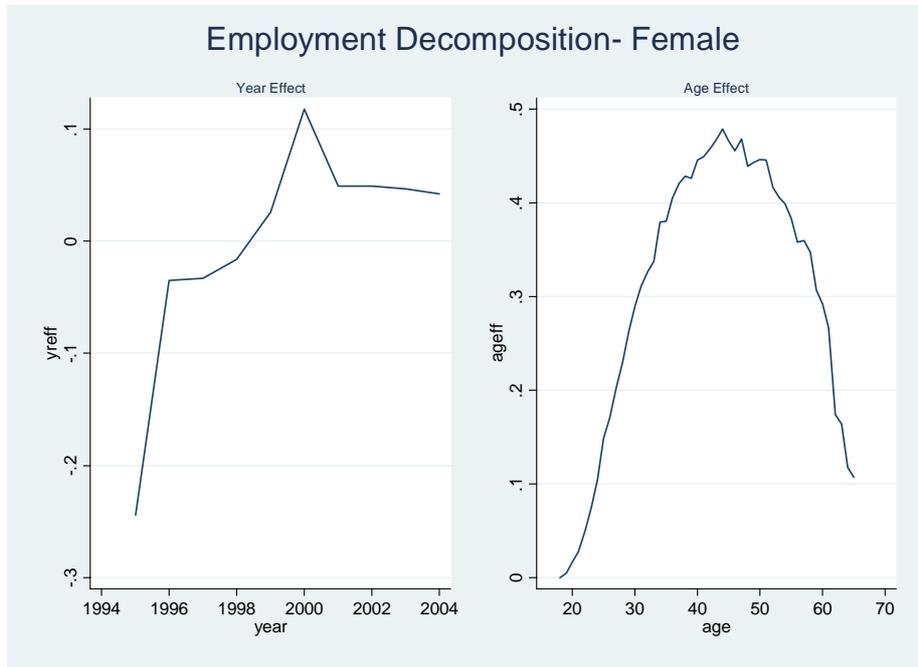
Figure 3:



Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations



Figure 4:

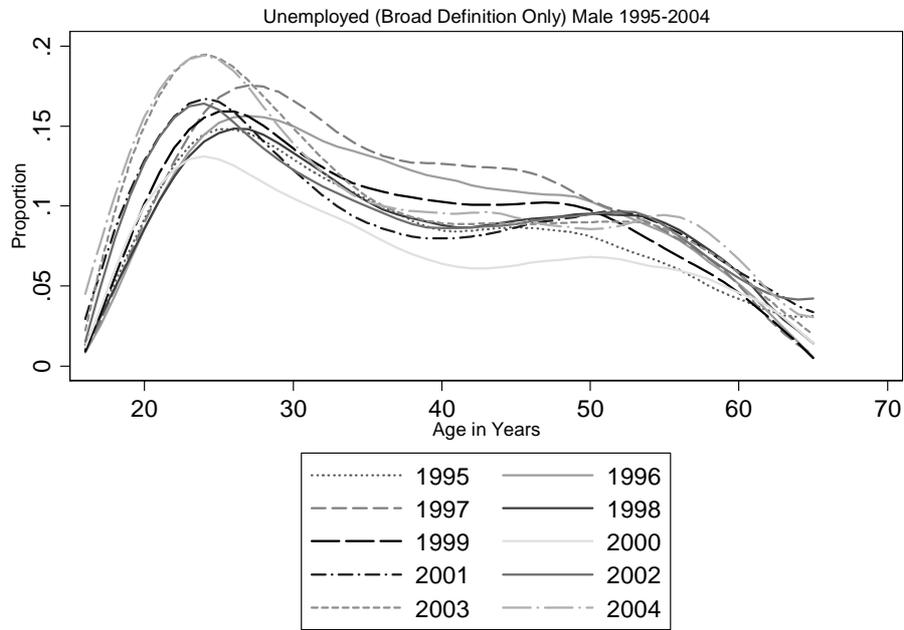


Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations



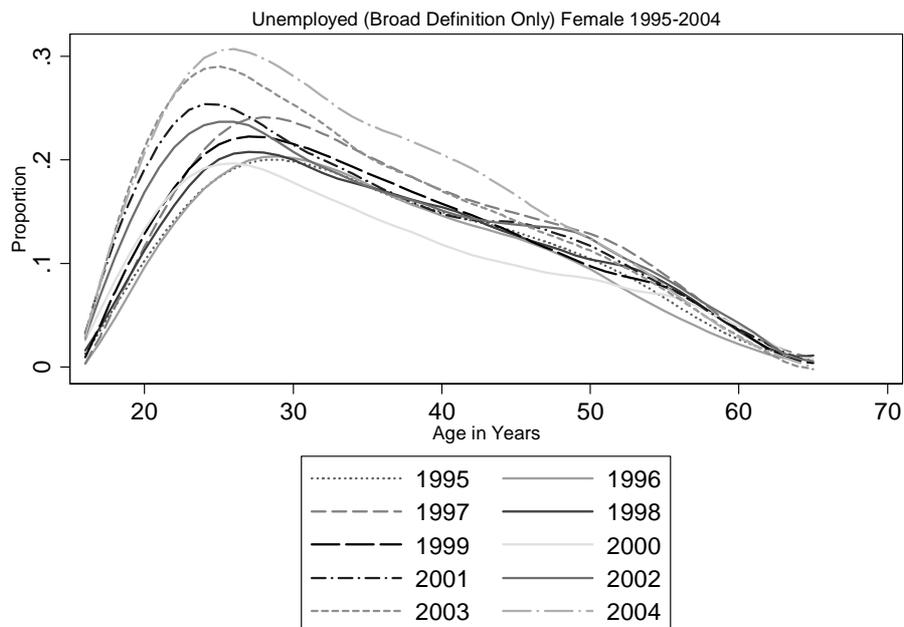
Appendix B

Figure 1:



Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations

Figure 2:



Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations



Figure 3:



Source: OHS 1995-1999 and LFS 2000-2004 September, own calculations



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