"Human Capital and Inequality: The South African Case"

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Abstract

Following the international literature, decomposition analyses of inequality in contemporary South Africa show that the labour market is the key driver of overall household inequality. Given this, the paper goes on to use national survey data to review changing returns to education in the South African labour market over the last 15 years; with a focus on both the returns to getting employment as well as the earnings returns for those that have employment. We show that South Africa has experienced a skills twist with the returns to matric and post-secondary education rising and the returns to levels of education below matric falling sharply. Based on a regression based decomposition of earnings inequality, we show that this has had a major impact on earnings inequality. Indeed the fall in returns to education has directly counteracted the gains that have been made in increased years of secondary schooling.

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1. Introduction

The need to invest in human capital has been recognised in development economics for a long time. While other fashions have come and gone the case for such investment has grown stronger over time. Increased globalization and the consequent changing international demand for labour patterns have strengthened this case in general but have changed it too. A dominant outcome of these patterns is that they have increased inequality within developing economies and a focus on inequality is an interesting and useful prism through which to view the contemporary case for investment in human capital in general and in South Africa specifically. Human capital typically includes both skills and health. These two aspects often have different causes and consequences, and both have extensive literature devoted to them. This paper will consider only education, to provide thorough coverage rather than a broad overview.

The paper starts with a review of international thinking on human capital, in the form of education, and inequality. This highlights the importance of forces coming from the labour market. It also looks at debates that have emerged about education policies in response to this situation. The next section turns to the South African case. It starts by reviewing contemporary national inequality trends at the level of the household, in order to highlight the importance of the labour market as a driver of these trends. It then looks at changing returns to education in the South African labour market over the last 15 years. The focus is on the returns to getting employment as well as the earnings returns for those that have employment. It shows that there have been important and daunting changes to both sets of returns over the post-apartheid era. The benefits of having a completed matric and especially some tertiary education have increased substantially while the returns to all education less than matric have fallen. This change is a key driver of inequality in access to employment and the in earnings.

The key insight from this discussion is that both more and better education is being demanded of the South African education system in order for it to become a more egalitarian force in the labour market and in general. Given this, the concluding section teases out possible education policy responses. Unlike much of the developing world, South Africa's school enrolment rates are very high into the middle secondary school years. The challenge is to build on the post-apartheid successes in increasing average years of schooling for the population so that most youth complete secondary schooling. This is doable. The harder issue, which arises in the international milieu and in South Africa too, is the centrality of improving the quality of education. In South Africa quality differences seem to undergird many lingering inter-racial earnings inequalities and the fact that considerable intergenerational educational mobility has not been matched by intergenerational occupational mobility. Not all of these quality differences can be addressed by school reform alone. International and South African evidence implies that many of the educational inequities are already in place before young people get to secondary school and that this is due to the very different home, community and school environments within which early schooling takes place. As these early life human capital inequities are hard to rectify, it seems that focused policies need to start at this level. With this in place, reforms to the secondary school environment are likely to generate more general and more equal outcomes than they have over the initial post-apartheid period.

2. Review of international literature

While there is a general consensus that investment in human capital is good both for growth as well as for the reduction in poverty and inequality, there is much disagreement over the precise quantitative effects of human capital on growth, poverty and inequality and over the most efficient forms of investment in education. At minimum though, there is agreement that it is important for governments to intervene to increase the quantity and quality of human capital being produced.[i]

Galor and Moav[ii] present a theoretical model that clarifies the problem of investment in education. During traditional industrialization periods, the highest returns are to physical capital. The returns to physical capital are the same regardless of its distribution or who owns it. As the wealthy have higher savings and investment rates, economies can achieve high efficiency with highly unequal income distributions. However, there are definite limits on the returns to education per individual – three workers with twelve years of schooling produce a higher level of output than one worker with thirty-six years – so the distribution of human capital within the population affects the productivity of, and thus the returns to, human capital. As the economy develops, the stock and complexity of physical capital increases and the returns to human capital increase, due to complementarity between human and physical capital. Despite this, the majority of the population, facing liquidity constraints, cannot invest in human capital as they lack finances and access to credit, so the economy remains at a sub-optimal point.

There are three ways out of this trap: wages can rise, reflecting the increasing returns to human capital and increasing the ability of the workers to save and invest in education; governments can intervene in recognition of efficiency goals to provide subsidized education; or the market can recognise the returns to education and choose to provide finance to those who are constrained by its absence. As this happens, human capital becomes more widely spread and inequality decreases. The authors argue that traditionally economies used a mixture of these three options to move from capital intensity to skill intensity. Their model predicts with success the long run patterns of inequality observed within countries in the past. The implications of this model are clear: if action is not taken by some sector to address the liquidity constraints facing the lower income deciles, human capital and income will remain unequally distributed and human capital investments will occur at sub-optimal levels for growth.

A paper by Klasen[iii] focuses on gender inequality in education but arrives at similar implications. Discrimination, whether on income or gender or racial grounds, results in a sub-optimal allocation of education. If education is distributed on any grounds other than merit, some able students will not have access to higher levels of education and their places will be taken by less able students from the favoured group. The less able students will become less able workers, lowering the average productivity of human capital. As human and physical capital is complementary, this results in lower returns to investment in physical capital. At a minimum, this will result in lower growth for a given level of investment, and other things being equal, will decrease total investment in the economy. Further, as these less able students require more resources to achieve the same education levels, there will be a smaller equilibrium number of educated workers in the economy, again

decreasing efficiency. Thus, even if we are interested only in the efficiency of overall production, the quantity and distribution of education available to the population is of concern.

However, this is not our only or even main interest. Development economics is deeply concerned with questions of poverty and income distribution, and the role of human capital in these areas is extremely large. Birdsall and Londono[iv] find that controlling for human capital and asset inequality removes the significance traditionally assigned to income inequality in hindering growth. This implies that the role attributed to income inequality is really a proxy for the effects of asset and human capital inequality. This supports the theoretical arguments referenced above. While inequality has a general negative effect on growth, its effect on the poor is particularly severe. The lower income quintiles typically experience lower growth in the presence of inequality than they would otherwise, and lower growth than the mean for their economies[v]. Thus, while growth might benefit the poor in the long run, in the short-run it contributes to increasing inequality. As inequality dampens growth, this creates a feedback loop which harms all members of the economy. This would not be such a concern from an ethical point of view if there was substantial change in the composition of the lower income quintiles. However, most developing countries have quite rigid economic stratifications. In the majority of cases, the poor remain poor and the rich remain rich. This holds true between generations, too[vi]. Economic status appears to be inherited, meaning that the children of the poor will generally remain poor, in line with Galor and Moav's[vii] model.

The poor are also especially vulnerable to the composition of change in the globalised world. Wage inequality in general is rising in the world, with increases between but also within the groups of educated and uneducated workers. The gap between skilled and unskilled workers is being increased by technological change, as the returns to education increase. This force drives rising inequality among educated workers too, as ability and certain types of education are more productive.[viii] Inequality among uneducated workers is driven more strongly by randomness, as unskilled workers are less able to shift between industries and technologies. This makes them more vulnerable to shocks to a particular technology or industry. Workers are aware of this, and thus the demand for education among the poor and unskilled workers is driven by risk aversion as well as by perceived high returns to education.[ix]

Thus, the literature on international development makes a strong case for the fact that inequality in access to education plays a central role in perpetuating and generating inequality in labour market earnings and in income inequality more generally. This case has strengthened in the increasing globalised world. Despite the obvious importance of equalising educational outcomes, the poor often seem unable to access education any more than they are able to break out of their poverty trap. Indeed this is a crucial mechanism in perpetuating poverty over time. Therefore, it is worthwhile to look to the international literature to learn more about the precise mechanisms of educational achievement.

While there is less agreement on these mechanisms than there is on the general importance of education, there is no longer a clear split between theories that stress genetic or environmental transfer mechanisms. Each channel appears to influence the other and both are extremely difficult to measure. A good starting point is to stress that genetic factors are by no means limited to intelligence, and social factors extend far beyond schooling. While it is certainly true that high income parents send their children to good schools, and tend to produce high income children, the inheritance mechanisms are not limited to inherited intelligence and expensive tutelage. Family

circumstances and the early health and schooling situations that confront young children tend to lay a foundation for progress - or the lack thereof - that is hard to overcome by subsequent social and educational developments.

Heckman has an extensive body of work on these issues[x]. One of his key conclusions is that government interventions typically occur during adolescence and by this time the damage is already done to disadvantaged students. He and others[xi] find that controlling for measured ability in mid-high school eliminates a large amount of the apparent difference in college enrolments and labour market outcomes between advantaged and disadvantaged groups in the United States. This suggests that by the mid-teens, the children of economically disadvantaged parents are well on their way to becoming economically disadvantaged themselves. Some of the potential transmission mechanisms identified by these authors include heritable factors such as 'soft' interpersonal skills and social factors such as expectations and parental educational support. Such a situation leads Heckman[xii] to conclude that educational interventions need to occur far earlier and continue for longer than often occurs. It is less efficient to provide social and financial support to disadvantaged students at college level than it is to provide support to pre-schoolers, and this in turn is less efficient than providing ongoing support from pre-school through to college.

In addition to interventions at the individual level, it is important to be aware of community level factors. According to the theory of social capital, certain family and community structures encourage the acquisition of human capital (among other things) while others discourage it. In this context, social capital refers to the way the members of a community can 'draw' on other members for support – ranging from help with childcare to psychological support offered by shared norms and values. In his seminal paper, Coleman[xiii] found that certain types of communities experience far higher rates of school completion and university enrolment than others, despite their similar economic status. Thus, being poor does not appear to be the only barrier to education. Communities which have certain expectations about educational attainment, and families which devote time as well as money to education produce far better educational outcomes than those which leave schooling up to the schools.

Both these points – the importance of early and continued support and the importance of non-school elements – are of global relevance. The World Bank Development Report of 2007[xiv] emphasises that many of the global youth feel seriously hampered by their lack of 'soft' skills, while the previous year's report stresses that decisions about education are often made by parents and families, not by students[xv]. In developing world situations, the costs of a child in school are usually twofold – direct costs of school fees, transport and school supplies, and indirect costs of foregone wages. Many children are withdrawn from school because of the latter costs, even when education is subsidized. This decision is typically taken by the child's family rather than the child, and will be influenced by the community's attitudes to education. Thus, the advantages of reaching out to the society surrounding the student should not be underestimated[xvi].The high rates of drop-out between primary and upper-secondary in much of the developing world highlight the importance of making this intervention below the level of tertiary education[xvii].

Additionally, the former problem of poorly developed soft skills is best addressed early. These skills include non-cognitive issues such as problem-solving and interpersonal relationships, which are often learnt outside the classroom and in which habits are formed young. Another concern is the increasing disparity within countries in terms of attainment (years of schooling) and achievement

(scores on standardised tests). More years of education do not necessarily translate into a better educated population, and South Africa is identified as a country which suffers from achievement rather than attainment problems[xviii].

3. South Africa within these international dynamics: Some empirical evidence on education, employment and earnings

3.1 Introduction: Household inequality and labour market inequality

This section of the paper moves from the international literature and the international context to the South African situation. It provides a detailed empirical analysis of the links between education and inequality in South Africa. The preceding international review emphasised the labour market as the central link between education and changes in national inequality and the focus falls squarely on the labour market..

There is strong evidence to affirm the fact that, in South Africa too, it is labour market developments that dominate changes in broader inequality. Leibbrandt, Woolard, Finn and Argent review the post-apartheid empirical work on the relative impact on household income inequality of different income sources including wage income, state transfers and remittances[xix]. They then bring this work up to date using data from the 2008 National Income Dynamics Study. Two key points emerge. First, from the start of the post-apartheid period onwards, the relative success (or lack thereof) of household members in the labour market is the dominant driver of their position in the household income distribution. Second, there are two prongs to the labour market's role; namely, whether the members of the household have employment at all and then, for those with such earnings, their position within the distribution of labour market earnings.

It is particularly important to emphasise both of these two prongs. International literature tends to focus on the link between education and the inequality of earnings for those that have earnings. However, given South Africa's acute and rising unemployment problem, a South African discussion has to balance this prong with one linking levels of education to whether or not a person is employed and has any earnings at all. We give attention to both of these issues by analysing changes in relationships between years of schooling and the probability of employment as well as the distribution of labour earnings in South Africa from 1997 to 2007.

We make use of data from a series of large household surveys collected by Statistics South Africa. In the 1990s the October Household Survey (OHS) was collected annually from 1994 to 1999. In 2000 the OHS was replaced with the Labour Force Survey (LFS), a rotating panel collected twice each year. Given concerns about data quality in the 1995 and 1996 OHS, we begin our analysis with the 1997 OHS, using the 1998 and 1999 OHS as well. We use the September rounds of the Labour Force Survey from 2000 to 2007, giving us data for a full decade of dramatic social, political, and economic change. We focus our analysis on men and women aged 25-59, the prime years for employment in the labour force.

Table 1 shows the sample size of men and women aged 25-59 for each year for each of the four major population groups – African (black), coloured, Indian (Asian), and white. Statistics South Africa continues to collect self-identified population group data using the same classifications used under apartheid. We will use these classifications in our analysis. As seen in Table 1, we have roughly 40,000 observations in each year. Using the sample weights provided by Statistics South

Africa, the South African population is roughly 75% African, 10% coloured, 3% Indian, and 12% white, with a slight increase in the proportion African and a slight decrease in the proportion white over the decade.

3.2 South African evidence on education, employment and earnings

Alongside South Africa's high income inequality, the country has long had one of the highest levels of earnings inequality in the world. As this section will show, earnings inequality has remained high since the end of apartheid, but appears to have declined since 2000. The section shows that the distribution of schooling has improved, with a smaller racial gap and with increases in schooling for non-whites. Taking advantage of the large national surveys collected for every year between 1997 and 2007, we estimate employment and earnings regressions that can be used to analyze the determinants on earnings inequality. We find offsetting effects related to education. On the one hand, the improvements in the distribution of schooling have tended to reduce overall inequality. On the other hand, increased returns to schooling for those with complete secondary or some post-secondary education, have tended to increase inequality. We also find that racial gaps in earnings, controlling for schooling, have increased, another factor working in the direction of increased inequality.

3.2.1 Changes in the distribution of schooling

Figure 1 presents cumulative distributions of schooling for men and women aged 25-59 for 1997, 2002, and 2007, with separate estimates for Africans and whites. The cumulative distributions provide a detailed summary of the changes across the full distribution of years of schooling. The most noticeable feature of Figure 1 is the large racial differences in schooling. For all the years, white men and women are far more likely to have more years of education than their African counterparts[1]. Another important feature of Figure 1 is that the distribution of schooling is very similar for men and women in both racial groups. As pointed out by Anderson, Case, and Lam and Lam, Ardington, and Leibbrandt[xx], women go through school somewhat faster than men in all racial groups in South Africa, and women end up with slightly higher schooling attainment.

Figure 1 also shows clear improvements in schooling for Africans over time, with much of the improvement reflecting schooling that was completed before the end of apartheid[2]. The percentage of men completing 12 years of education has remained much the same, while African and white women have both seen a slight improvement. The percentages of white men and women with more than 12 years of schooling have both shifted slightly during the decade, but the major changes for African men and women lie below grade 12. As we will see below, there are very high returns to post-secondary schooling in terms of both earnings and employment. The lack of improvement in post-secondary schooling among Africans is thus important in understanding the lack of progress in closing the racial gap in earnings.

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[1] Fewer than 10% of white men and women had less than nine years of schooling in 1997 (with little change over time), while almost 60% of African men and women had less than nine years of schooling in 1997.

[2] The percentage of African men with less than nine years of schooling, for example, fell from 61% in 1997 to 47% in 2007. The percentage of African men with less than 12 years of schooling fell from 83% in 1997 to 73% in 2007, with similar changes for women.

3.2.2 Schooling and earnings

Key to this paper is the link between the changes in the distribution of schooling and changes in the distribution of earnings. Figure 2 shows the relationship between years of schooling and log earnings for white and African men in 1997 and 2007[3].

The figure shows that returns to schooling are relatively modest until the completion of secondary school. Returns to completing grade 12 (versus grade 11) for Africans are very high – 26% in 1997 and 29% in 2007. Returns to post-secondary education are even higher and increase over time. Men with two years of post-secondary schooling have log earnings that are 0.53 higher than grade 12 men in 1977 and 0.69 higher in 2007, which means that in 2007 a man with 14 years of education earned almost twice as much as one with 12 years of education[4]. Comparing grade 15 (completing university) with grade 12 (completing secondary), increases in returns are very similar for Africans and whites in 2007 – an increase in log earnings of about 1.15, implying a 218% increase in earnings.

Figure 2 also makes it clear that there is a large racial gap in earnings even after controlling for schooling. The gap is somewhat larger for those who have not completed secondary schooling, but is large even at university level. In 2007 the gap in log earnings for men who have completed at least 15 years of schooling is almost exactly 1.0, implying roughly a 170% white earnings premium.

3.2.3 Schooling and employment

In addition to high earnings inequality, South Africa has a large unemployment problem. A crucial connection between education and inequality in South Africa is the role of education in determining who is employed. With a large pool of potential workers, education may influence employers' decisions about job allocations.

This theory is borne out by the evidence. Figure 3 shows the proportion working by years of education for African and white males in 1997, 2002, and 2007, as a proportion of the total population at each education level (not the labour force). South Africa's high unemployment rates are starkly revealed in the figure. Only about 50% of African men aged 25-59 with less than secondary school education were working in the first two years – although there is some improvement in 2007 – and we know from Figure 1 that roughly 80% of all men have less than secondary schooling. Employment rises rapidly for those who complete secondary school and go beyond. In 2007, the percentage working rises to about 70% for African men with grade 12, and to over 90% for those with university education in 2007, similar to the employment level of university-educated white men.

These are simple descriptive statistics. It is important to make sure that this descriptive picture of education and employment is borne out when we control for race and age (at least) as we did in the earlier analysis of earnings. For this we make use of a study by Branson, Leibbrandt and Zuze on

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[3] Whites are only shown above grade 8 due to low observation numbers. The figure is based on separate regressions for each population group and year using dummy variables for single years of schooling along with age and age squared. The figure shows real log earnings for each education group relative to Africans with seven years of schooling (end of primary school) in the given year.

[4] $e^{0.69}=1.99$

educational attainment and the probability of finding employment[xxi], which analyzed the effect of education on the probability of being employed fulltime or self-employed, relative to being unemployed[5].

Figure 4 presents graphically the full set of relative ratios from the tertiary (in the right hand panel) and matric (in the left hand panel) variables from this paper. The results show the different odds of an individual being wage employed or self employed relative to unemployed for different education levels. For example, in 2000 there is a 1.28 value on the matric variable in the wage employment equation which indicates that individuals with matric are 28% more likely to be in wage employment than individuals with less than matric in 2000, all else equal. It is clear from the graph that the return to finding employment from tertiary study is well above the return from completing matric only. However, the returns to both tertiary and matric are high relative to incomplete secondary. There appears to have been marginal increases in the return of finding formal employment as a result of completing matric and tertiary over the eight year period 2000-2007, especially for tertiary scholars. In 2000, individuals with tertiary were twice as likely to be formally employed compared to individuals with less than matric. By 2007 this had increased to around 3 times. Completing matric has a fairly constant effect on the probability of finding formal employment between 2001 and 2006. A marginal increase appears in 2007 but it is unclear whether this is the start of a trend or a result of measurement error in the data.

Matric is not found to increase the probability of self employment relative to unemployment. On the other hand, tertiary study increases the probability of self employment relative to unemployment significantly in most years. Individuals with tertiary qualifications are up to two and a quarter times more likely to be self employed than unemployed.

Although they are not shown in Figure 4, the estimated model includes differences across race groups and across gender that are worth reporting. Controlling for education, economically active females (i.e. females who are part of the labour force) are around 60 percent less likely to have formal wage employment than their male counterparts. This did not change much over the eight year period. Coloured, Indian and white individuals are much more likely to find formal employment or to be self employed than African individuals, with whites having the largest advantage. While racial differences appear to increase between 2000 and 2004, from 2005 onward the difference between population groups diminishes.

3.3 Schooling and earnings inequality

[5] In this study the role of education in predicting the probability of having fulltime wage employment and self employment relative to the probability of being unemployed is estimated using a multinomial logistic regression. Education is coded as a set of dummy variables for less than matric, completed matric and a tertiary qualification. They select less than matric as the benchmark (omitted) dummy variable. Therefore their results estimate the effect on the odds of employment of having a matric or having any tertiary qualification rather than having an educational level below matric. As in our earlier analysis of earnings, they make use of the September LFS data for 2000 to 2007 and control for race, age (and age squared) and sex. In addition they control for province and whether the respondent is married. The key difference between their estimates and our earlier estimates is that they restrict their sample to those aged 25-30 in each year.

3.3.1 Trends in earnings inequality

Figure 5 shows three standard measures of earnings inequality for each year from 1997 to 2007 – the standard deviation of log earning, Theil's L[6] and the Gini coefficient. In each year the measures are calculated using the full sample of men and women from all population groups. While variations in some years may simply be due to sampling variability, the overall picture is of modest increases in inequality in the 1990s, followed by decreasing inequality from 2000 to 2007. Since the 2000 to 2007 estimates are based on relatively consistent data from the Labour Force Surveys, we think it is reasonable to conclude that overall earnings inequality has declined since 2000. In the case of the standard deviation of log earnings and the Gini coefficient, the 2007 level is only slightly below the 1997 level. In the case of Theil's L, the measure fell substantially from 2004 to 2007, reaching levels well below the 1997 level.

3.3.2 Earnings regressions and counterfactual simulations of inequality

While overall inequality may be falling, inequality may be increasing for specific groups. It is thus important to assess the role of schooling, race and gender in explaining the trends in earnings inequality shown in Figure 5. Table 2 shows the effect of various determinants on the log of earnings in 1997, 2002 and 2007[7].

Before discussing the coefficients on education, we first look at the impact of race and gender on earnings. As suggested by Figure 2, we estimate a large white premium in earnings, with the premium rising from 1997 to 2002, then falling to 2007. Figure 6 plots the coefficients on the race and gender dummy variables for every year from 1997 to 2007. The white coefficient increases from 1997 to 2003, then declines to a level that is still above the 1997 level. The coloured and Indian coefficients also tend to increase over most of the period, followed by a decrease around 2005. Taken together, these results suggest that Africans have actually lost ground relative to white, coloured and Indian workers since 1997, once we control for schooling.

As shown in Figure 6, the male premium also increases in the 1990s and then declines slowly since 2000. The male premium stays in a range of about 0.45 to 0.55, implying that men earn about 65% more than women, controlling for schooling, age, and population group.

Decomposing Earnings Inequality

Earnings inequality is typically examined by looking at the variance of log income – the greater the variance, the higher the inequality. Variance can be split into explained and unexplained (residual) components. Figure 7 shows the decomposition of variance into explained and residual components. When explained variance falls, the explanatory power of our analysis is lower, as the variables we are examining can explain less of the observed inequality.

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[6] The Generalized Entropy measure with $\alpha = 0$, or mean log deviation.

[7] Table 2 shows Ordinary Least Squares regressions using the log of earnings as the dependent variable, with the sample including all men and women aged 25-59 with positive earnings. The independent variables include dummy variables for each single year of schooling through grade 12, a dummy for grade 14 (including technical university training and other post-secondary education short of a university degree), a dummy for grade 15 (including university degrees and anything beyond university), a dummy for white, coloured, and Indian (African is omitted), a dummy for male, and a quadratic function of age. We have estimated identical regressions for every year from 1997 to 2007, but display only three years for brevity.

As noted above, the total variance declines from 2000 to 2007. As seen in Figure 7, this decline can be seen in the explained variance component. Residual variance rises to 1999, falls to 2001, and then is relatively constant. The decline in explained variance after 2000 could occur through either changes in the distribution of characteristics (Xs) or changes in the coefficients in the regressions. As noted above, the schooling distribution became more equal over time, with a smaller racial gap and with declining inequality in schooling among Africans. This potentially had an equalizing effect. At the same time, the returns to schooling increased for those with post-secondary education. This potentially could have a disequalizing effect. Racial gaps appear to have increased, creating another potential disequalizing effect. In the next section we use counterfactual simulations to try to identify the contribution of these effects to overall inequality.

Predicting Changes in Earnings Inequality

When assessing the changing roles of various factors in inequality, a useful technique is the creation of counterfactuals. We can use the information obtained from the above regressions to assess how much of the change in inequality observed from 1997 to 2007 is due to changes in the distribution of variables in the population, and how much is due to changes in the returns associated with education, race, gender and so on.

Figure 8 summarizes one set of interesting simulations that use 1997 as a baseline.[8] The top line shows the simulated variance of log earnings if we hold the distribution of all characteristics at their 1997 level and then use the regression coefficients for each year to predict earnings. As can be seen in the figure, if the 1997 characteristics stayed constant but returns to characteristics altered, inequality would have increased substantially from 1997 to 2003, then declined from 2003 to 2007.

The second line in Figure 8 changes only the coefficients for race and schooling, demonstrating that it is changes in these coefficients that explain most of the pattern shown in the top line. The third line changes only the schooling coefficients, leaving all other coefficients at their 1997 level. In this case the increase in inequality in the 1990s is more modest, and inequality returns to roughly its 1997 level in 2007. The fourth line does a similar exercise with the race coefficients, allowing them to vary over time but holding the schooling, age, and male coefficients constant. We once again get a modest increase in inequality to about 2003, followed by a decline. The results for the third and fourth simulations imply that it took both the changes in schooling coefficients and the changes in race coefficients to generate the steep increase in inequality shown in the top line of Figure 7.

The bottom line in Figure 8 presents the counterfactual in a different way; i.e., holding the coefficients at their 1997 level while allowing the distribution of characteristics to change in every year. In other words, we take the actual distribution of characteristics and predict earnings using the 1997 regression coefficients. The results of this simulation are quite interesting. They show a steady decline in inequality from 2000 to 2007, with no evidence of the sharp increase shown in the other simulations. This implies that the changes in characteristics had a substantial equalizing effect on earnings. Since the racial composition remained almost constant, as shown in Table 1, it was the improvements in the schooling distribution that generated this decrease in inequality.

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[8] Note that this is essentially an exercise in simulating the explained variance component, since residual variance is ignored. The variance for each year is constructed by using the regression coefficients for each year to predict earnings for the 1997 sample, then taking the variance of the predicted earnings.

Taken together, these simulations imply that there were offsetting effects on earnings inequality in South Africa from 1997 to 2007. Changes in the distribution of characteristics, primarily improvements in African schooling, tended in and of themselves to reduce earnings inequality. If coefficients (i.e., the returns to the difference years of schooling) had remained at their 1997 level, the improvements in the schooling distribution would have caused a 13% decline in the log variance of earnings[9]. This was offset by trends in the coefficients in earnings regressions that tended to increase inequality. Increased earnings premia for whites, coloureds, and Indians relative to Africans were one important component. Another important component was increased returns to schooling at the post-secondary level, a factor that tended to pull the highest earners even farther away from those in the middle of the distribution.

[9] The improvements generate a 30% decline in the explained component of the log variance of earnings according to the decompositions. Since the explained component is about 45% of total variance (see the R^2 values in Table 2), this would have implied about a 13% decline in the log variance of earnings

4. Integrating the South African and international evidence: What are the implications for policy?

4.1 A summary of the South African evidence

South African's large national household surveys allow us to get a good picture of what has happened to both the distribution of education and the distribution of earnings since the end of apartheid. Taking advantage of what we consider the most reliable data, we have analyzed data from the 1997, 1998, and 1999 October Household Surveys in combination with the Labour Force Surveys (September rounds) from 2000 to 2007. We show that there continue to be large racial gaps in education, although African schooling for the 25-59 population improves in important ways between 1997 and 2007. There is very little change in the proportion with post-secondary schooling, however, and this is an important factor in the large racial gap in earnings. We show that returns to post-secondary schooling in terms of both earnings and employment are very large and have risen substantially in the last decade.

Overall earnings inequality appears to have risen in the 1990s and then declined slightly after 2000. We estimate earnings regressions for every year in order to clarify the determinants of these changes in inequality. We show that the changes in the distribution of characteristics, primarily the improvements in the schooling distribution, would have caused a decline in inequality (as measured by the variance of log earnings) of roughly 13% had wage returns to various characteristics remained constant. This is about twice as large as the decline that actually occurred. The reason for this is that the improvements in schooling, which had an equalizing effect, were offset by changes in the returns associated with race and education characteristics, particularly. White, Indian and coloured individuals still earn considerably more than do African individuals with the same number of years of education.

While there have been significant improvements in average levels of education of the South African population over the post-apartheid period, these improvements leave the bulk of the South African population with incomplete secondary education. If the labour market had remained as it was in the early post-apartheid years, there would have been a high return to these improvements as seen through declining earnings inequality. However, the labour market has not stayed the same. In line with trends elsewhere in the world South Africa has experienced a skills twist with the returns to matric and post-secondary education rising and the returns to levels of education below matric falling sharply. This is particularly cruel in the South African case as the fall in returns has directly counteracted the gains that have been made in years of secondary schooling.

Our analysis of the changing effect of education on the probability of employment shows that the same forces are at work here too. The relative returns to any tertiary qualification in terms of a higher probability of formal or self-employment have risen sharply through the 2000s. That said, very few black South Africans reach the tertiary level, so these returns serve to increase within-race inequality without necessarily decreasing overall inequality. The relative returns to completed matric in terms of accessing formal employment did not rise, though they remained high. Completing matric does not increase the probability of self-employment relative to an individual with less than matric, but a tertiary qualification does. If one regards much informal employment as self-employment, this result is a cause for concern as secondary education is clearly not equipping South Africans to make their own employment in the labour market.

4.2 What educational policies does South Africa need to lower inequality?

A major education policy focus in the international literature is the need to increase primary school enrolments. This is not a particular concern in South Africa. Indeed, South Africa enjoys close to universal primary school enrolment and we have shown that the post-apartheid era has been characterised by even further advances in the average years of schooling being acquired by South African youth. This is in line with findings that intergenerational transmission of educational inequality is lower in South Africa than in other high-inequality countries[xxii]. As low levels of education have been identified as one of the main poverty traps in the South African economy, this is a potentially promising conclusion[xxiii]. Rising returns to complete secondary and tertiary education make a case for the continuation and extension of such policies. It seems that the average young South African must acquire at least complete secondary schooling,

Yet our empirical work also raised issues that caution against an exclusive focus on years of education. First, there is the fact that that South Africa combines one of the highest levels of inequality in the world with these high primary and secondary school enrolments. This suggests that somewhere along the schooling path, something goes wrong. High education levels ought to result in lower inequality and high growth. Instead, South Africa has exceptionally high income inequality, high unemployment and relatively low growth rates. Second, it is a concern that our data suggest that, even controlling for years of education, there have been strong increases in premia for white, coloured, and Indian labour market participants relative to Africans both in terms of employment probabilities and in terms of earnings. Our empirical work shows that these premia would have led to substantial increases in inequality in the 1990s, followed by modest declines after 2003. On initial examination, this suggests the persistence and even strengthening of racial discrimination in the South African labour market. However, in post-apartheid South Africa this seems unlikely and controlling for school quality removes a great deal of this discrimination[xxiv]. This implies that much of the discrimination in the South African labour market can be attributed to differences in characteristics of workers rather than explicit discrimination; i.e., racial disadvantage based on high inequality of functional years of education.

Indeed, school quality has been identified as a major contributor to labour market outcomes. The World Bank identifies South Africa as one of the countries which faces achievement rather than attainment challenges in education[xxv], a criticism which is widely repeated throughout the literature and acknowledged by the South African government. Case and Yogo[xxvi] find that factors such as pupil/teacher ratios and general school resources have significant impacts on the years of completed schooling, the probability of employment and returns to education of South African workers. Low school quality results in students completing fewer years of school, having a lower chance of employment when entering the labour market, and experiencing lower returns to education when employed, than do students who attended higher quality schools. Thus, even if enrolments and completion rates are good by developing country standards, inequalities in terms of school quality can undermine efforts to reduce earnings and income inequality. Similarly, several authors[xxvii] have found that much of the difference in unemployment rates among racial groups can be attributed to differences in characteristics rather than outright racism in the marketplace.

This suggests that increased public investment in education to increase school quality would be a sensible policy response. However, this is not as definitive a solution as it may seem. Greater investment in education may result in increased inequality, as the children of the already-privileged

are most likely to benefit from it – these students stay in school longer, thus capturing more of the expenditure relative to underprivileged students, and benefit more from the high returns to higher levels of education. Empirical analysis has shown that this effect is particularly strong when there are clearly delineated groups in society – undoubtedly the case in South Africa[xxviii].

This provides an important counterpoint to the implications of high returns to tertiary education in the South African labour market. While increasing rates of access to higher education should, other things equal, decrease inequality, increased public funding of tertiary education is not necessarily a path to lower inequality. Heckman's argument, presented earlier, about selection bias into tertiary education supports the case for careful targeting of educational expenditure, as does evidence from the World Development Report of 2006[xxix]. Despite the high returns to black South Africans who finish tertiary education, extensive government funding for tertiary education may not be the most equitable or efficient use of resources, as whether a student can enter and succeed in tertiary education is largely determined by their membership of the financial or social elite.

The third escape from Galor and Moav's[xxx] sub-optimal equilibrium is credit, and an alternative to government funding is to improve the credit markets available to students contemplating tertiary education. Heckman identifies the lack of ability to borrow against future earnings as a constraint on disadvantaged students' access to education (though this is less important than other disadvantages of poverty)[xxxi]. Improved access to loans would allow able students to enter tertiary education, and would complement policies to improve primary and secondary education.

However, it is important not to over-emphasise the curriculum and the school environment. Cognisance needs to be given to Heckman's work showing that educational disadvantages created by early childhood educational, familial and social environments are near permanent and very hard to reverse later on. Recent work on the progress through secondary schools in Cape Town[xxxii] has strongly endorsed these findings in the South African context. To address problems relating to low early-childhood investment, policies such as the Progressa grant in Mexico and programmes that combine health, pre-primary education and parenting skills, implemented successfully in Argentina, Jamaica and the Philippines, seem promising. Programmes that address non-academic issues such as behavioural and health skills also have positive outcomes when implemented effectively, but are often more effectively run by third parties than by governments. As is generally the case, education cannot be considered in isolation, and to improve performance other social issues must be addressed concurrently.

However, certain policies to better the formal education system can be adopted from international experience to address South Africa's specific problems. Given South Africa's limited resources, it is important to evaluate what spending options deliver the best results for the lowest cost. South Africa performs extremely poorly on international numeracy tests, and produces very low numbers of school leavers with mathematics and science education[xxxiii]. This is particularly a problem given the results of Moll, who found that the highest returns in the South African labour market were to computational skills, rather than comprehensive or soft skills[xxxiv]. This suggests that greater investment in mathematical skills is worthwhile. However, South African schools vary markedly in their ability to convert resources into outcomes[xxxv], so how precisely to invest effectively remains an open question.

Various countries have tried different approaches to improve school quality, and thus educational achievement. These include policies designed to increase school accountability to the community, such as increasing the information available to school communities and encouraging parent and youth management of schools, and policies which can improve teacher performance. Some countries have had success with financial incentives based on individual teacher performance, but these typically encounter implementation problems. Alternatives include financial incentives for entire schools, to promote teamwork, and broad improvements in working conditions. Finally, continual training of teachers during their working careers has been shown to improve performance greatly[xxxvi]. The general message that education must focus on producing valuable workplace skills rather than abiding by outdated syllabi is strongly emphasised.

At the end of the day it seems there are no obvious quick fixes to the education system that will make it an egalitarian driver in South African society. Increasing access to education is the one domain in which we have made progress but, apparently, without much of a return. We need to push on with this until most South Africans have at least complete secondary schooling, which is associated with higher probability of being employed and higher returns in employment. However, accumulating years of education is not an end in itself. It is the increased potential and productivity that each extra year of schooling adds that is the real social return on the investment in increased education. Without these increases in South Africa's human capital, increases in years of schooling are without value. This is why there is such intense focus on ensuring that young learners walk into school in a state that is receptive to quality education and that the schooling and university milieu then provides this quality education.

Tables and Figures

Table 1. Sample size and population distribution, men and women aged 25-59, South Africa October Household Survey and Labour Force Survey, 1997-2007

Year	African (black)		Coloured		Indian		White		Total
	N	Weighted percent	N	Weighted percent	N	Weighted percent	N	Weighted percent	N
1997 OHS	36,362	73.5	6,895	9.8	1,442	3.1	4,402	13.7	49,101
1998 OHS	22,199	73.3	3,823	9.9	860	3.1	3,157	13.7	30,039
1999 OHS	30,390	73.8	5,114	9.7	1,099	3.2	4,141	13.4	40,744
2000 LFS	31,063	73.8	4,941	10.1	1,026	3.3	3,236	12.8	40,266
2001 LFS	31,293	73.1	5,122	10.0	1,073	3.7	3,910	13.2	41,398
2002 LFS	29,431	73.9	5,033	9.9	1,182	3.3	4,122	13.0	39,768
2003 LFS	28,587	75.1	4,878	10.0	1,158	3.5	4,228	11.5	38,851
2004 LFS	30,707	75.0	6,239	9.7	949	3.1	3,784	12.3	41,679
2005 LFS	30,765	75.3	6,172	9.7	1,001	3.1	3,406	11.9	41,344
2006 LFS	30,390	75.6	6,239	9.6	984	3.2	2,998	11.6	40,611
2007 LFS	30,201	76.1	6,055	9.7	996	3.2	2,852	11.0	40,104

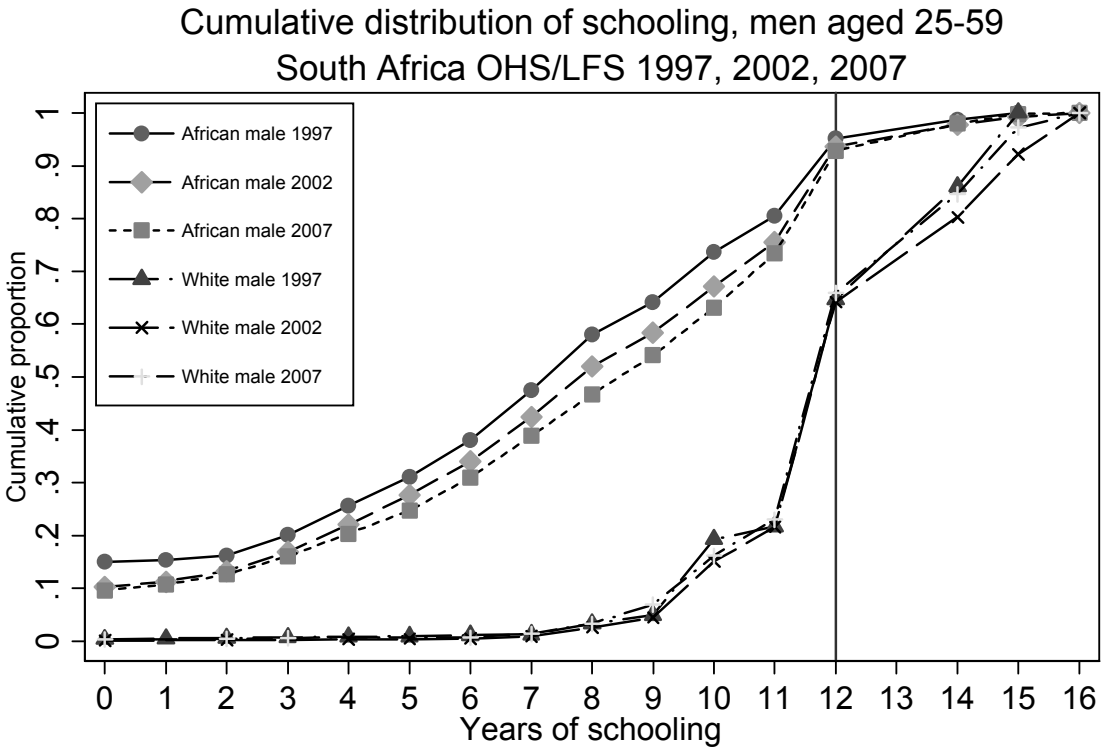
Note: LFS is the September round in each year

Table 2. OLS regression of log earnings, OHS and LFS, age 25-59

Variable	1997	2002	2007
Years of schooling at least:			
1 year	0.262	0.0463	-0.376***
	[0.17]	[0.084]	[0.14]
2 years	-0.158	0.0395	0.238**
	[0.19]	[0.10]	[0.12]
3 years	0.0155	-0.0409	0.122
	[0.10]	[0.077]	[0.11]
4 years	0.136**	0.160***	-0.0124
	[0.054]	[0.054]	[0.080]
5 years	0.0611	0.0356	-0.0556
	[0.048]	[0.049]	[0.084]
6 years	0.0723*	0.117**	0.185**
	[0.043]	[0.047]	[0.073]
7 years	0.0846**	0.0102	0.0718
	[0.033]	[0.041]	[0.050]
8 years	0.158***	0.246***	0.131***
	[0.028]	[0.037]	[0.049]
9 years	0.107***	0.0776**	0.0674
	[0.031]	[0.039]	[0.046]
10 years	0.190***	0.183***	0.0672
	[0.032]	[0.040]	[0.044]
11 years	-0.0367	0.192***	0.190***
	[0.032]	[0.039]	[0.045]
12 years	0.341***	0.254***	0.297***
	[0.029]	[0.035]	[0.042]
14 years	0.409***	0.692***	0.654***
	[0.025]	[0.037]	[0.062]
15 years	0.0736	0.274***	0.473***
	[0.045]	[0.058]	[0.10]
Population group (African omitted):			
White	0.602***	0.922***	0.808***
	[0.024]	[0.033]	[0.076]
Indian	0.404***	0.621***	0.505***
	[0.034]	[0.039]	[0.050]
Coloured	0.136***	0.290***	0.314***
	[0.017]	[0.023]	[0.040]
Male	0.440***	0.559***	0.534***
	[0.013]	[0.016]	[0.027]
Age	0.0780***	0.114***	0.0611***
	[0.0067]	[0.0081]	[0.012]
Age squared	-0.000811***	-0.00118***	-0.000572***
	[0.000084]	[0.000099]	[0.00016]
Constant	4.223***	3.269***	5.107***
	[0.13]	[0.16]	[0.22]
Observations	21916	14187	15717
R-squared	0.37	0.48	0.44

Robust standard errors in brackets; *** p<0.01, ** p<0.05, * p<0.1
Coefficients on schooling show marginal increase relative to next lower level.

Figure1


Cumulative distribution of schooling, men aged 25-59
South Africa OHS/LFS 1997, 2002, 2007
African male 1997
African male 2002
African male 2007
White male 1997
White male 2002
White male 2007
Cumulative proportion
0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Years of schooling

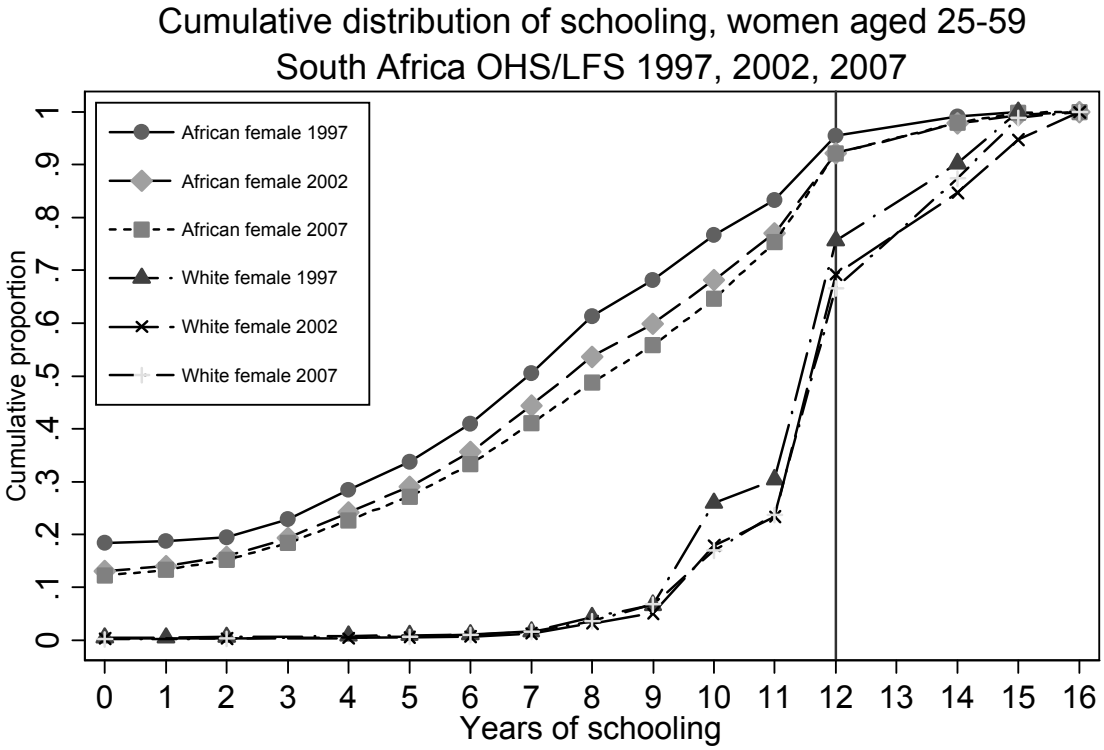

Cumulative distribution of schooling, women aged 25-59
South Africa OHS/LFS 1997, 2002, 2007
African female 1997
African female 2002
African female 2007
White female 1997
White female 2002
White female 2007
Cumulative proportion
0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Years of schooling

Figure 2

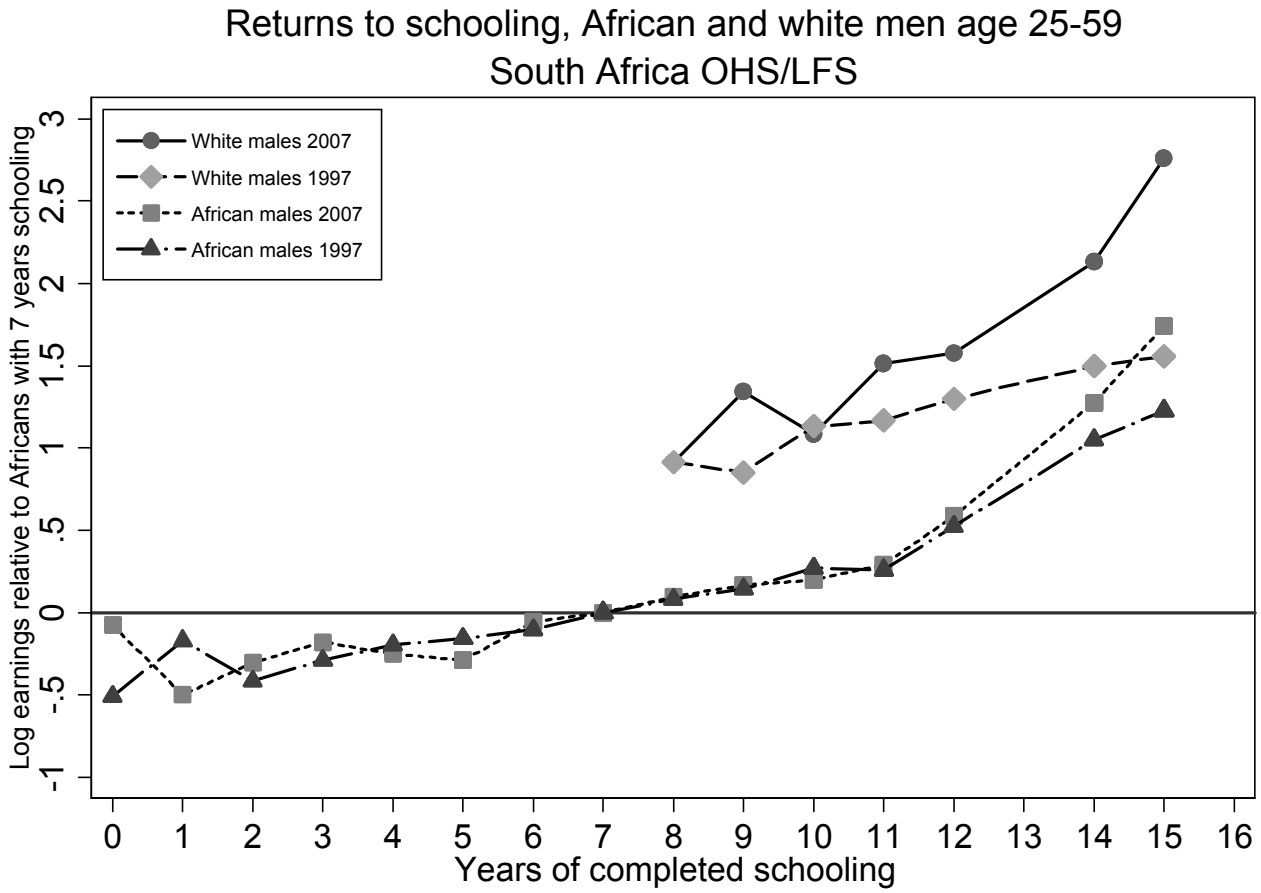

Returns to schooling, African and white men age 25-59
South Africa OHS/LFS
White males 2007
White males 1997
African males 2007
African males 1997
Log earnings relative to Africans with 7 years schooling
-1
-.5
0
.5
1
1.5
2
2.5
3
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Years of completed schooling

Figure 3

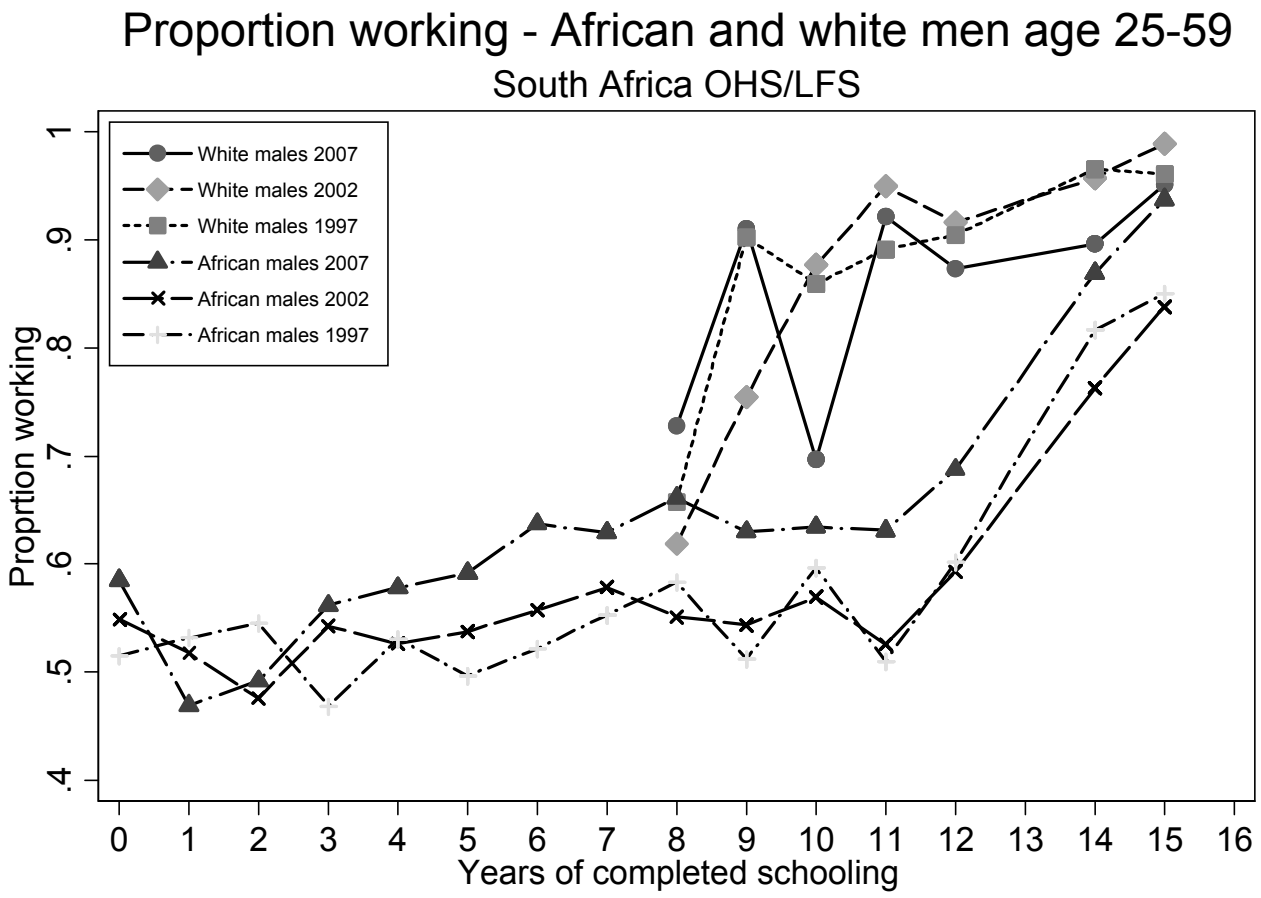
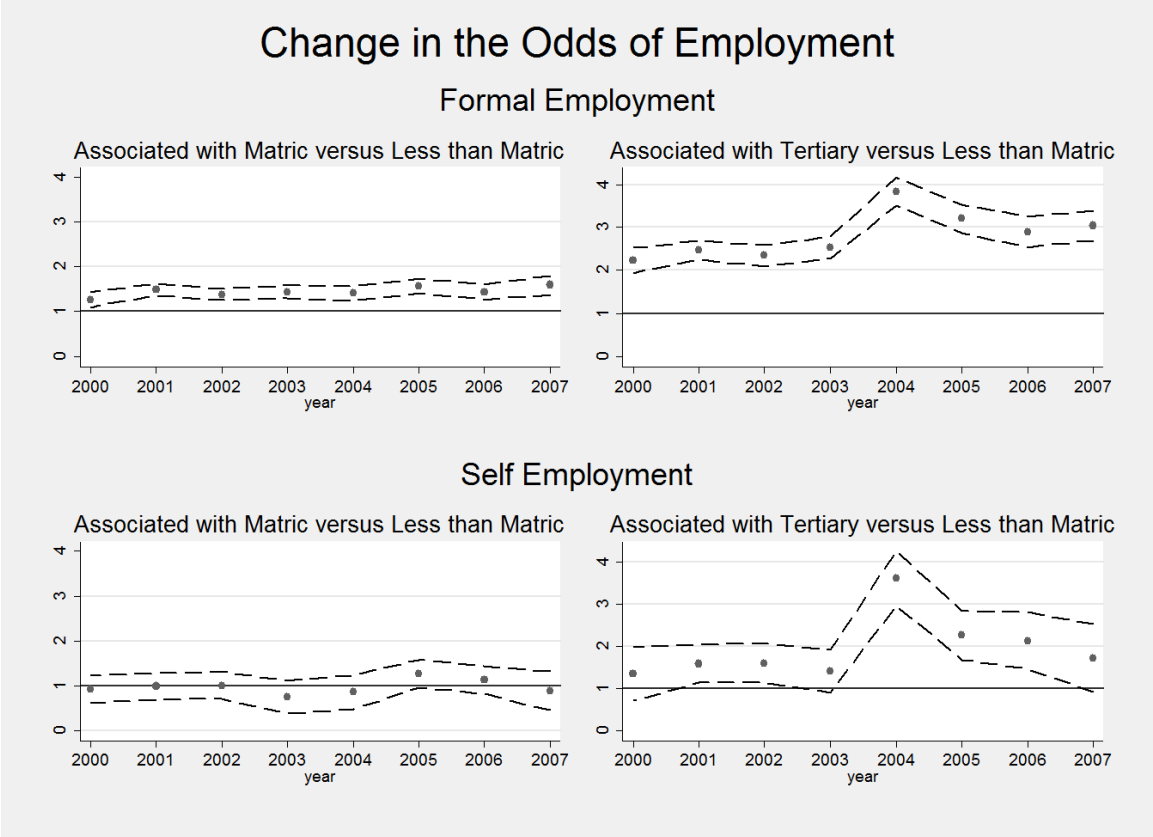

Proportion working - African and white men age 25-59
South Africa OHS/LFS
White males 2007
White males 2002
White males 1997
African males 2007
African males 2002
African males 1997
Proprtion working
.4
.5
.6
.7
.8
.9
1
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Years of completed schooling

Figure 4



Source: Branson, Leibbrandt and Zuze. P. 10 using September Labour Force Surveys.
Notes to figure: Point estimates (dots) and 95% confidence intervals (dashed lines) for the odd of finding employment given specified education level from multinomial logit model (Formal employment, self employment and unemployment) controlling for population group, gender marital status, province and a quadratic in age

Figure 5

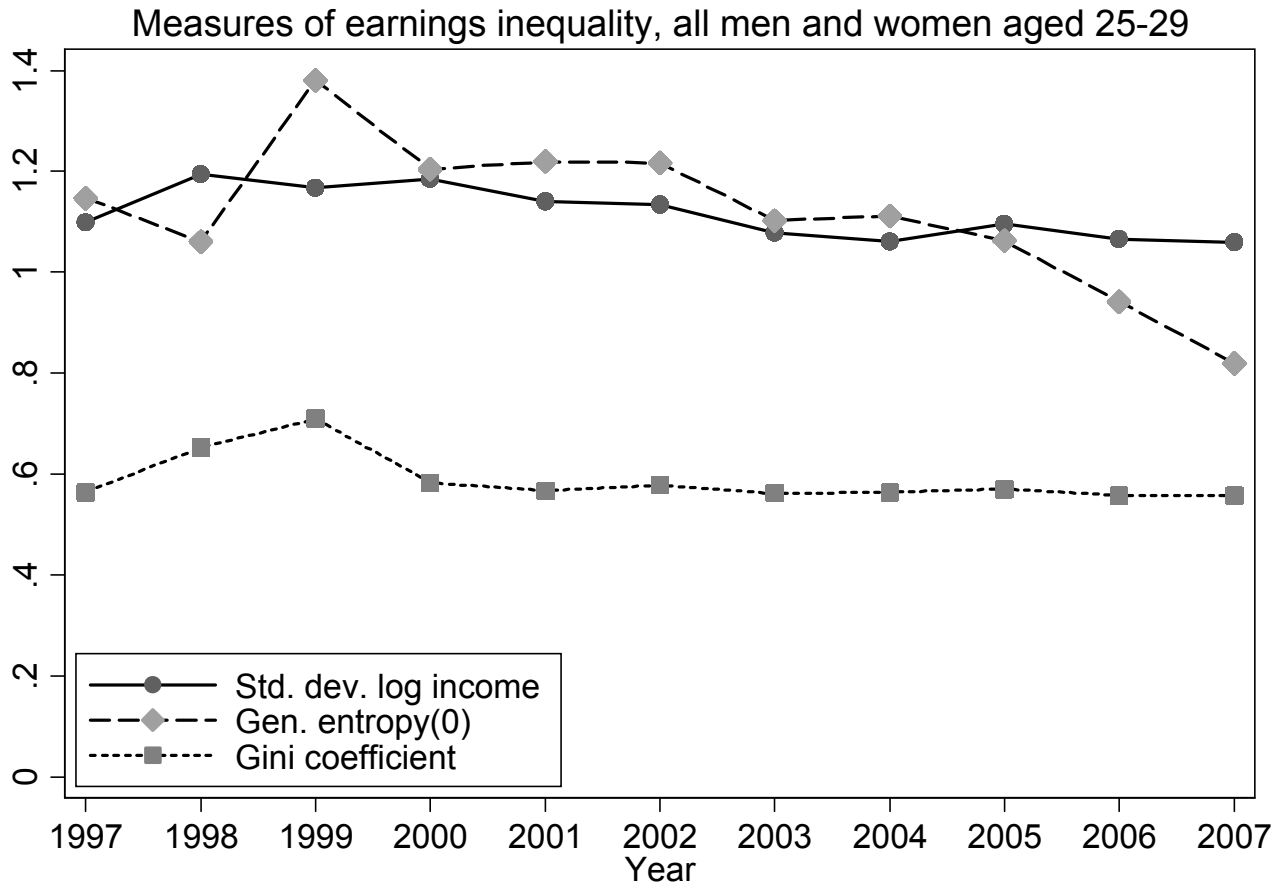

Measures of earnings inequality, all men and women aged 25-29
0
.2
.4
.6
.8
1
1.2
1.4
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Year
Std. dev. log income
Gen. entropy(0)
Gini coefficient

Figure 6

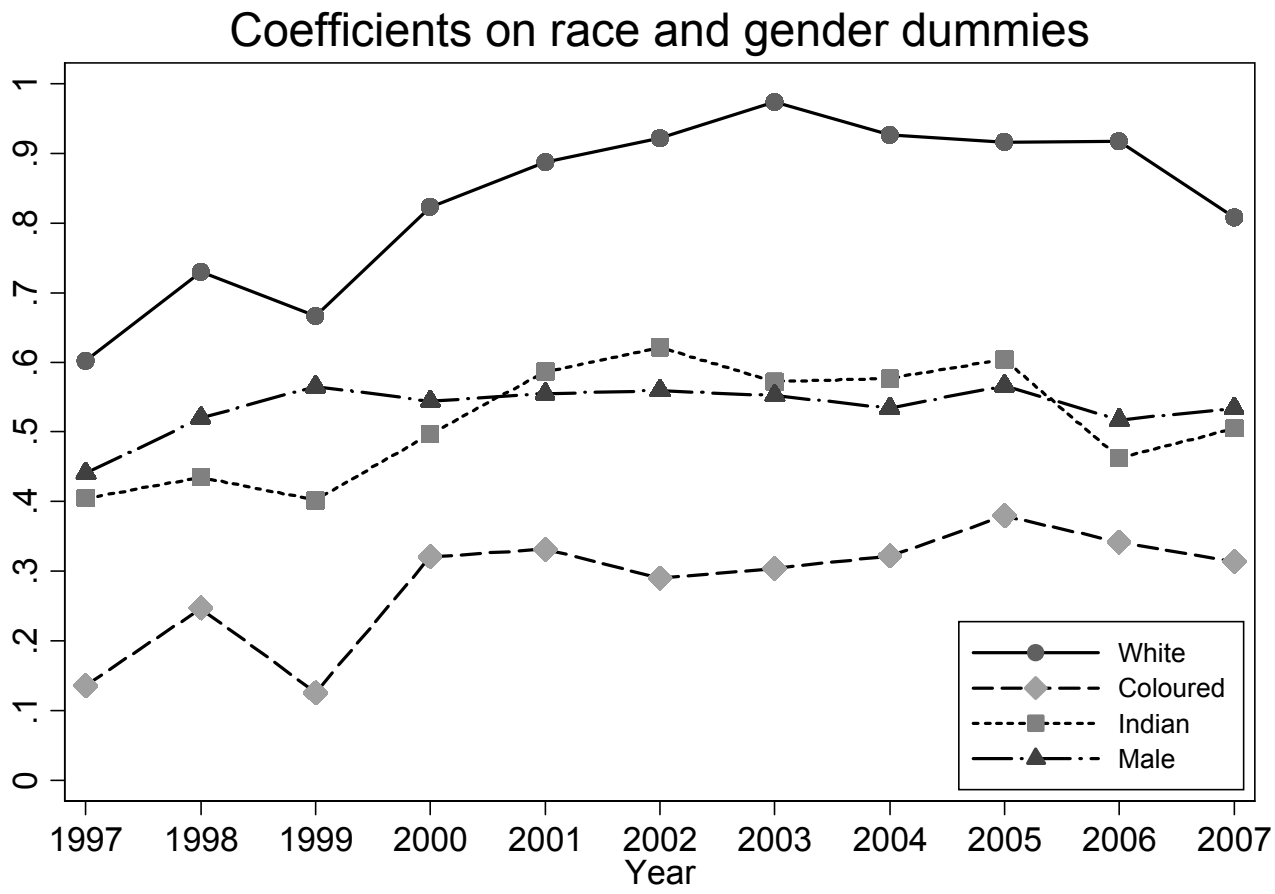

Coefficients on race and gender dummies
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Year
White
Coloured
Indian
Male

Figure 7

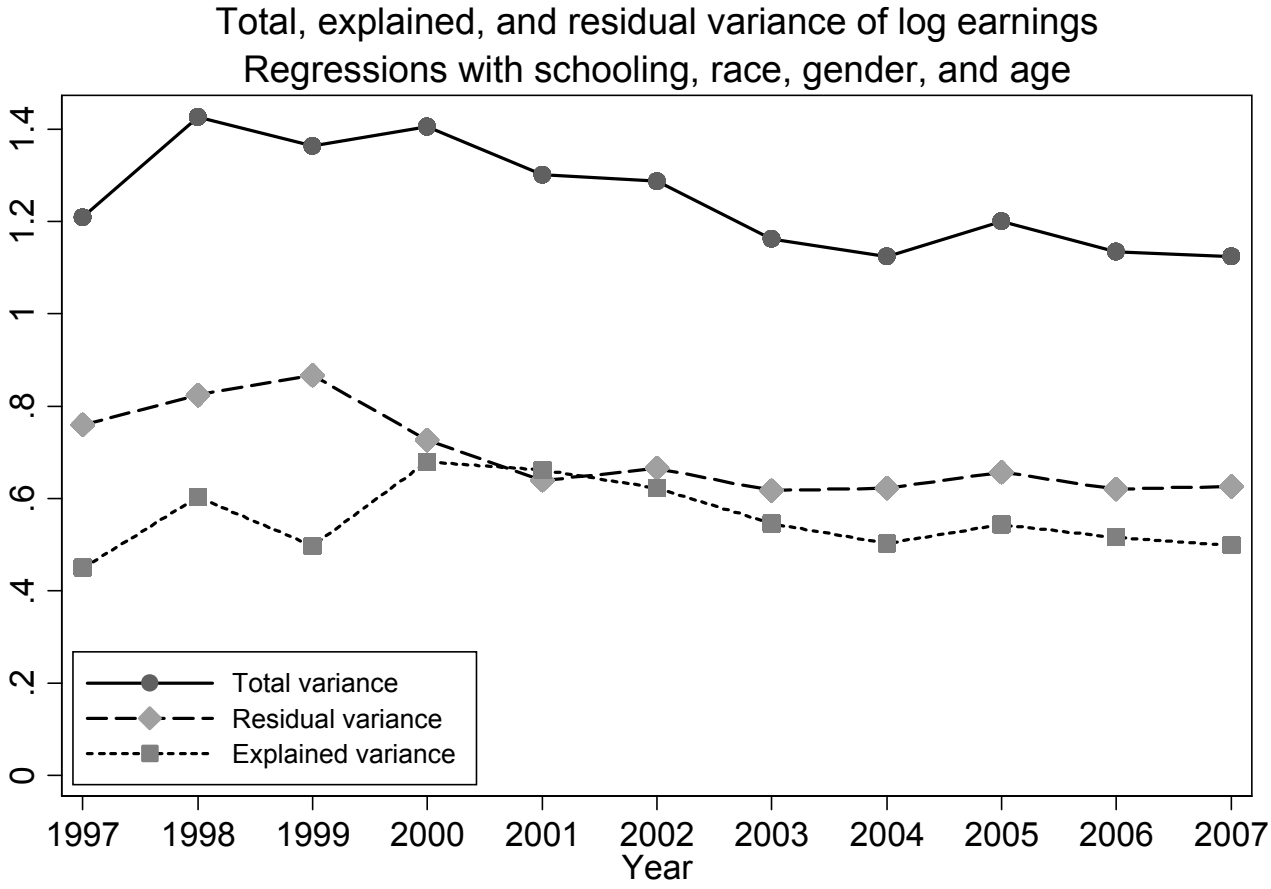
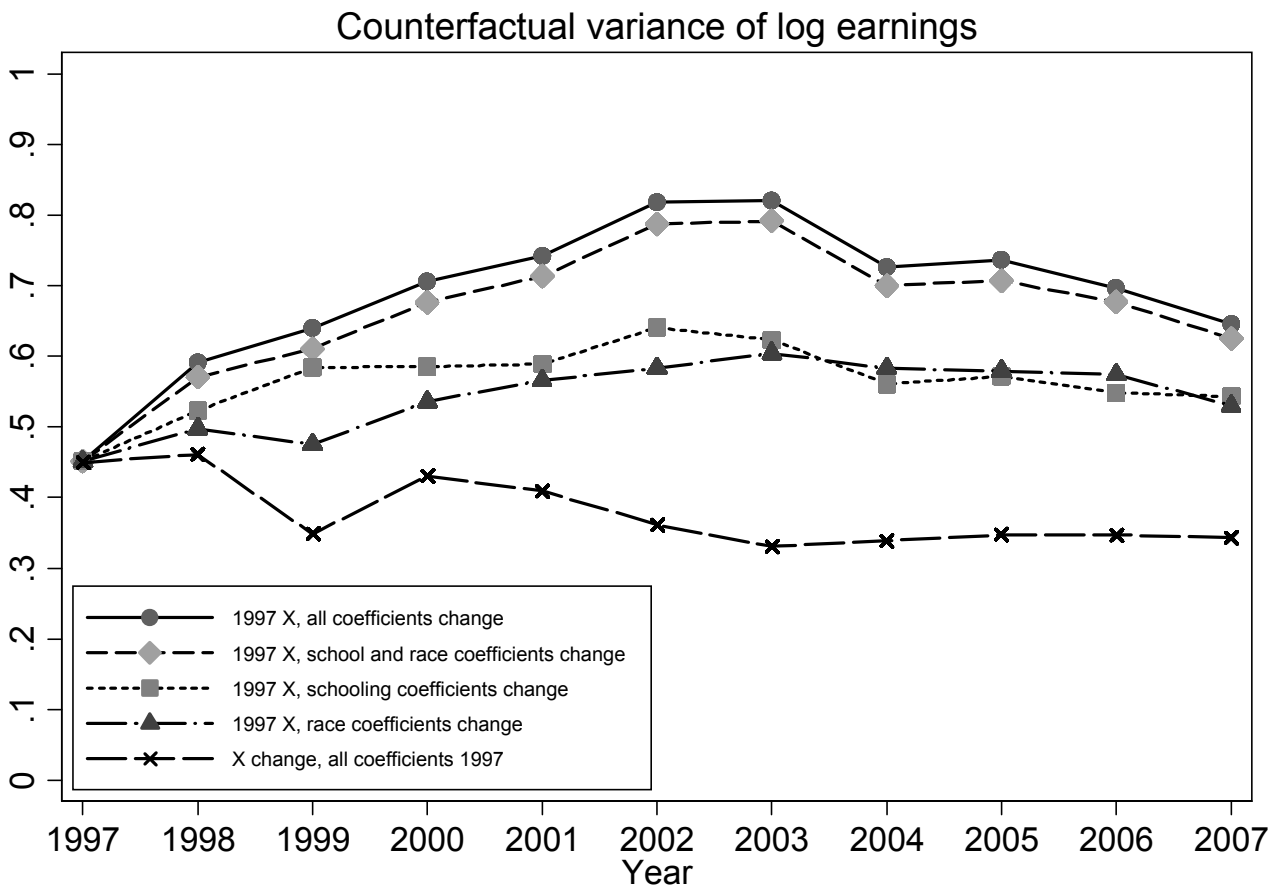

Total, explained, and residual variance of log earnings
Regressions with schooling, race, gender, and age
0
.2
.4
.6
.8
1
1.2
1.4
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Year
Total variance
Residual variance
Explained variance

Figure 8


Counterfactual variance of log earnings
0
.1
.2
.3
.4
.5
.6
.7
.8
.9
1
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Year
1997 X, all coefficients change
1997 X, school and race coefficients change
1997 X, schooling coefficients change
1997 X, race coefficients change
X change, all coefficients 1997

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