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Stellenbosch Economic Working Papers: 09/06

KEYWORDS: ANALYSIS OF EDUCATION, INTERGENERATIONAL MOBILITY  
JEL: I21

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A WORKING PAPER OF THE DEPARTMENT OF ECONOMICS AND THE  
BUREAU FOR ECONOMIC RESEARCH AT THE UNIVERSITY OF STELLENBOSCH

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## ABSTRACT

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To a large degree, the notoriously high levels of income inequality in South Africa have their roots in differential access to wage-earning opportunities in the labour market, which in turn are influenced by family background. This paper therefore investigates the role that parents' education plays in children's human capital accumulation. The study analyses patterns of educational attainment in South Africa during the period 1970-2001, asking whether intergenerational social mobility has improved. It tackles the issue in two ways, combining extensive descriptive analysis of progress in educational attainment with more a formal evaluation of intergenerational social mobility using indices constructed by Dahan and Gaviria (2001) and Behrman, Birdsall and Szekely (1998). Both types of analysis indicate that intergenerational social mobility within race groups improved over the period, with the indices suggesting that South African children are currently better able to take advantage of educational opportunities than the bulk of their peers in comparable countries. However, significant racial barriers remain in the quest to equalise educational opportunities across the board for South African children.

JEL codes: I21

## **INTRODUCTION**

South Africa's racially segregated past has left it with an income inequality level that ranks amongst the highest in the world, representing a key policy challenge for the current government. Underlying the disparity in income, however, is a deeper source of inequality: differential access to income-earning opportunities in the South African labour market. Large segments of the working age population remain excluded from formal sector employment in a relatively skills-intensive economy as a result *inter alia* of insufficient educational attainment. In contrast, individuals with high levels of education are able to find work more easily, to command higher wages within a given occupation, and also to improve their chances of upward occupational mobility. Studies by Blau and Duncan (1967) and Featherman and Hauser (1978) suggest that educational attainment is the main observed determinant of occupational status<sup>1</sup>, which directly influences earnings.

We are interested in intergenerational social mobility – as influenced by educational status – because it indicates access to opportunity and therefore the ability of the current black generation to overcome its historical disadvantage. From a broader welfare analysis perspective, we are also interested in this topic since social mobility represents one of the major forces that drives change in the aggregate income distribution over time. Analysing the income distribution at any one point in time using cross-sectional data provides one with only a static picture.

The focus of this study is on analysing the extent of intergenerational social mobility in South Africa over the period 1970 to 2001. Within this framework, its purpose is to determine the extent to which parents' schooling outcomes feed through into children's schooling. This allows one to evaluate the degree to which the more distant history of weak education in the formerly black schooling system has influenced schooling outcomes of recent generations through intergenerational transmission of educational status. The potential efficacy of policy interventions aimed at improving schooling outcomes of black students currently attending school is limited by the degree of social immobility that exists in contemporary South African society. The bulk of these students have poorly educated parents, which may impair their own progress through school via a number of mechanisms. However, it may be argued that such students are precisely the ones policy should continue to target, particularly if one shares the view of Dahan and Gaviria (2001: 537) that levelling the playing fields may be more effective in terms of achieving equity in the long run than redistributing incomes *ex post*.

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<sup>1</sup> Both studies are conducted on data for American males.

The paper begins with an explanation of the theoretical explanation for why we would expect educational attainment to influence the schooling of future generations, and briefly presents the findings of authors who have conducted research into this issue. It also touches on other factors which research has identified as important determinants of educational attainment in South Africa. Next, attention turns to a description of the data sets and methodology employed for purposes of empirical analysis. Preliminary analysis indicates that mean educational attainment has risen substantially, reflecting steady progress for almost a century that in the case of the black population has accelerated after the 1940s. Turning to a formal enquiry, the South African estimates for two social mobility indices are presented together with comparable values for Latin American countries, a number of which have inequality levels similar to South Africa's. Finally, the paper concludes with implications for policymaking.

### **ON SOCIAL MOBILITY**

Intergenerational social mobility is determined by all of the factors which comprise an individual's family background, although parents' education and household economic status – proxied by income or wealth measures – are the two highlighted most often in the literature (see for instance Behrman et al. 2001; Case & Deaton 1999; Filmer & Pritchett 1998b). In this paper, we are predominantly interested in the extent to which educational status is transmitted across generations, and the policy implications of related findings. In South Africa there is a strong relationship between an individual's level of education and his or her standard of living, given that unemployment rates are strongly positively related to education levels (Bhorat 2003), and that those with tertiary qualifications are able to command a substantial premium in the labour market (Keswell & Poswell 2002). Education both increases the probability of upward occupational mobility and the possibility of upward income mobility (Burns 2001: 1).

Before analysing the reasons why parent's education and household income might matter for child's educational outcomes in more detail, a theoretical framework explaining investment in education is required as a point of departure. Becker's human capital model (referred to in Behrman et al. 1998) views schooling as a pure investment, and hypothesises that individuals invest in education until the marginal private benefit from their investment equals the private marginal cost. In the presence of complete markets, family background matters very little,

with the notable exception of intergenerational transfers of genetic endowments that determine children's inherent abilities.

Introducing market imperfections changes the picture through resulting in private marginal benefit and cost curves that differ across households as a result of various household-level factors. Behrman et al. (1998:6-7) list a number of these, amongst which three are highlighted here. Firstly, education policy may affect households differently depending on education and income levels: schools may provide higher quality education to better educated, more affluent parents in response to their greater economic and political strength. This raises marginal private benefits for these households, making education investments more profitable. Secondly, households may decide to make complementary investments in schooling directly (through help with homework, for example) or indirectly (through maintaining good child health outcomes, for example). One might argue that such costs are lower for wealthy households containing well-educated parents, thus raising the marginal private benefit of schooling. Third, rich well-educated parents may have prestigious social networks that assist their child in obtaining profitable employment after completing schooling, thus again increasing the marginal private benefit of schooling. Factors such as these explain why there may be persistence in educational outcomes across generations.

Such considerations aside, a further assumption made by Becker's model is that households are able to borrow as much funding as required to invest in children's schooling, given their expectations of future returns to investment in the form of wages. However, studies by Gormly and Swinnerton (2003) and Edmonds (2004) have shown convincingly that liquidity constraints bind with respect to schooling investment decisions in the South African context – as they might be expected to do more generally in the developing world. The presence of these constraints leads to sub-optimal investment in schooling by impoverished households that are unable to invest up to the point at which the profitability of their investment is maximised. The extent to which liquidity constraints operate is influenced strongly by parent's education, since educational attainment determines household income levels directly through its impact on the labour force participation decision and earnings<sup>2</sup>. It should also be borne in mind that the South African earnings schedule is convex rather than concave, and therefore that an individual needs to complete a considerable number of years of schooling in

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<sup>2</sup> Hausman and Szekely (1999) find that children in Latin America who have better educated mothers that participate in the labour force reach higher education levels than other children do. Quantifying this effect, the authors argue that the probability that a child remains in school increases by 5 per cent as a result of the mother's decision to join the labour force.

order to reap substantial gains from his or her investment. In fact, Hertz (2001) points out that returns to education in South Africa are lowest at 5-6 years of schooling, increasing thereafter. Consequently, a large education budget may be necessary if schooling is evaluated as a human capital investment, and one would therefore expect household income to matter in a very direct way when evaluating educational outcomes.

Our focus here lies on the importance of intergenerational transmission of educational status for social mobility, so we do not consider the role of household income as a determinant of mobility in great detail. A study by Hausman and Szekely (1999) provides some empirical support for this position. The authors find that parents' educational attainment is a more important determinant of child's educational attainment than even household income is, accounting for approximately 30 per cent of variation in schooling. However, measuring the impact of parents' educational attainment on the schooling achievements of their offspring is not a simple exercise. Simple OLS estimates measuring the importance of parental education for child's schooling are typically plagued by upward bias<sup>3</sup>, since they ignore intergenerational transfer of ability and the possibility of assortative mating. Furthermore, they only provide snapshots of the population at a given point in time, and thus are not useful for analysing the dynamics of social mobility.

To avoid these shortcomings, a number of recent studies measure the impact of family background on social mobility using other methods. Behrman, Birdsall and Szekely (1998) define intergenerational mobility as the degree to which the schooling gaps<sup>4</sup> of children cannot be explained by family background (a composite of both parents' educational attainment and household income). Constructing an intergenerational schooling index for Latin American countries, they find that family background explains up to 32 per cent of the variation in age-group specific schooling gaps, and that this proportion increases with age (Behrman et al. 1998: 17). Dahan and Gaviria (2001) tackle the issue from another perspective, defining social mobility as the extent to which a child's success in schooling is not explained by common factors reflected in his/her sibling's schooling outcome. They propose a sibling correlation index which evaluates sibling performance relative to mean

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<sup>3</sup> One would expect ability and educational attainment to be positively correlated, given that more able children are likely to progress more rapidly and at lower cost through the schooling system. Their education may also be rewarded better in the workplace, raising the marginal private benefits of their educational investment. Regarding assortative mating, more educated women are likely to marry more educated men. Their children may achieve better academically and in the workplace as a result (Behrman & Rosenzweig 2002).

<sup>4</sup> The schooling gap is defined as the expected educational attainment of a child on the basis of his/her age (measured in years of schooling) less the child's actual educational attainment.

educational attainment for the sample. Applying this methodology to Latin American countries, the authors find that sibling correlations for the late 1990s range between 0.30 and 0.60, in comparison with 0.21 for the USA.

Existing studies on social mobility in South Africa are very limited in number. Using data for 1995, Lam (1999) addresses the issue of intergenerational transfer of educational status but without analysing mobility dynamics. Comparing South Africa with similarly unequal Brazil, he shows that child's schooling is in fact dependent on parents' schooling in South Africa, but to a lesser extent than it is in Brazil. Further, the current distribution of education in South Africa is more equal than in Brazil. Interestingly, the impact of parents' education is non-linear: children whose mothers have a university degree progress through 0.22 more school grades per year than children whose mothers have no schooling. This translates into an education advantage of almost three years by age 18. In contrast, the education of mothers with incomplete primary education has a very small impact on child's schooling. A second study, conducted by Burns (2001), analyses determinants of schooling gaps in Kwazulu-Natal using panel data for 1993 and 1998. The author finds that higher levels of parents' education significantly reduce schooling gap ratios. However, this effect is non-linear in another dimension: having a poorly educated mother and a highly educated father appears to be as beneficial for a child's schooling outcomes as having two well educated parents. Both studies find that household income is also important for success in schooling, although substantially less so than parental education.

Given the dearth of mobility studies for South Africa, it is also worth reviewing one of the best known education production function studies for South Africa. Applying OLS regressions to 1993 data, Case and Deaton (1999) show that having a household head with completed secondary schooling may raise a child's educational attainment by more than a quarter of a grade per year relative to children who live in households headed by individuals who have only completed primary schooling. The size of this effect is confirmed in a study conducted by Thomas (1996) that uses 1991 census data.

## **DATA AND METHODOLOGY**

The present paper utilises the full data sets for the 1970, 1985 and 1991 population censuses, as well as 10 per cent samples drawn from the 1996 and 2001 censuses. For the 1970 census, Statistics South Africa only sampled 5 per cent of blacks, and the 1991 census only contains

data for blacks living outside the former TBVC states<sup>5</sup>. Furthermore, there are no income data for blacks in 1970, and no income data for members of any race groups for 1985. In the more recent censuses, a substantial number of households reported zero incomes. This is a form of misreporting, since it is not possible to sustain a household without any form of income. To deal with this problem, one can adopt either of two approaches: to throw zero-income households out prior to analysis, or to slot these households into the remaining income categories. The former is particularly appropriate if it can be assumed that households that report zero income are in reality distributed randomly across the income distribution. Leibbrandt et al. (2001) made use of this approach in their recent poverty and inequality study, but reported results for welfare indicators both including and excluding the zero-income households from their datasets. In contrast, Whiteford and McGrath (1994) divided zero-income households in the 1991 census equally into the 5 lowest household income categories, assuming that these households received little rather than no income.

Investigating the characteristics of households reporting zero incomes in census 2001 reveals that these are likely to be poverty stricken households. Heads of zero income households have lower educational attainment (only incomplete primary schooling) and are more likely to be female than heads of other households. They are also highly unlikely to be employed – only 2 per cent have managed to secure waged employment. Therefore, it seems that households that report zero income rather receive zero *wage* income, and are consequently likely to be dependent on remittance or social grant income for survival. However, we remain unable to estimate the exact levels of income of such households from census data. Given this uncertainty, zero income households are excluded from all analysis where the household income variable is required as an input.

In this paper, two types of data analysis are applied. The first is descriptive analysis, tracking changes in educational attainment over time in South Africa and linking these to characteristics including race, parental education and household income. The second is the calculation of two social mobility indices that separately measure absolute and relative social mobility in the South African population. The former type of mobility is linked to the level of economic development since it will reflect a rise in average educational attainment caused

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<sup>5</sup> The TBVC states are Transkei, Bophuthatswana, Ciskei and Venda - the four former homelands that were nominally independent under apartheid policies. To weight up the black population to compensate for the missing TBVC data, each of the observations for this group for 1970 is given a weight of 20. For 1991 it is assumed that blacks in the other homelands share similar characteristics to those in the TBVC states, and observations are weighted up accordingly given information on the black population in South African Labour Statistics (Statistics South Africa 1994).



by a policy-driven expansion of schooling, while the latter highlights differentials in access to opportunity and is thus not influenced by the level of socio-economic development. Absolute social mobility may be measured by intergenerational schooling indices, as estimated by Behrman et al. (1998), while relative social mobility may be measured by sibling schooling correlation indices, as proposed by Dahan and Gaviria (2001). The reasoning behind these measures is that if family background matters for schooling, a correlation will be observed between both parent and child's schooling outcomes and between siblings' educational attainment.

### *Progress in educational attainment*

In order to investigate historical trends in educational attainment, we analyse the educational attainment of different birth cohorts from the 2001 census<sup>6</sup>. As educational attainment is a permanent personal characteristic that can be supplemented but not decreased later in life, this allows a fairly accurate picture of historical patterns of educational attainment and therefore of the historical flows through the school system. For older cohorts, the picture may be less accurate, however, if there are differential mortality patterns. These are known to exist between race groups, although we have no information about differential mortality between less and more educated groups within any population group (except for strong evidence of higher mortality within the rural part of the black population). Nevertheless, we largely accept this census-based picture of educational attainment as a snapshot of the past, although the availability of an older census – that of 1970 – allows us to supplement some of the data from the 2001 census with the data from three decades earlier for some of the same birth cohorts.

Figure 3 illustrates educational attainment in terms of mean years of education completed according to birth year from these two censuses for all population groups, areas and income groups combined. We see that the 2001 census shows a more volatile picture for earlier years. This is to be expected, given a smaller sample for this census and as a result of mortality amongst older cohorts reducing the number of individuals in these age groups considerably, making measurement less accurate. On the other hand, the closer one gets to the census date, the less true it is that mean attainment reflects the final attainment of a particular birth cohort, as many may still be studying or be likely to do so in future. This is illustrated by the 2001 census: attainment peaks in the 1978 cohort, but the decline observed in the most recent birth

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<sup>6</sup> In this paper, the qualifications included in census questionnaires are converted into formal education grade equivalents. For purposes of this conversion, educational attainment of less than matric with a diploma or certificate is counted as completion of grade 11 at most, to reflect the fact that the final hurdle of the matriculation exam (the only real hurdle in the school system) has not been cleared.

cohorts is likely to be artificial, reflecting the fact that some of the people in this age group were still engaged in education at the time the 2001 census was collected. For the same reason, we also expect the data for cohorts in the late 1940s to show lower attainment than those cohorts eventually reached. The vertical line at 1940 is where we splice the two datasets, using attainment data for the years before 1940 from the 1970 census, and thereafter from the 2001 census. This gives relatively smooth data, although it will become clear later that measurement at higher education levels (matric and above) differs more than it does at lower educational levels between the censuses.

### *Sibling correlation index*

The sibling correlation index, as constructed by Dahan and Gaviria (2001), is based on the assumption that those children who have fallen behind their peers in schooling outcomes by their late teens are the ones who are most likely to experience low socio-economic status during their adult lives. This seems to be a fair assumption to make in a country such as South Africa, where formal sector employment – which is more closely tied to worker’s educational attainment than informal sector employment is – dominates the market for labour.

Formally:

$$\rho_a = 1 - (1 - \rho_g) \frac{S - 1}{S - F}$$

$$\text{where } \rho_g = \frac{\sum_{f=1}^F \sum_{s=1}^{S_f} (g_{sf} - \bar{g})^2 \sum_{k=1}^{S_f} (g_{kf} - \bar{g}) / S_f}{\sum_{f=1}^F \sum_{s=1}^{S_f} (g_{sf} - \bar{g})^2}$$

Here  $F$  is the number of families in the sample,  $S$  is the number of teenage siblings in the sample, and  $S_f$  is the number of teenage siblings in family  $f$ .  $g_{sf}$  is a dummy variable taking a value of 1 if sibling  $s$  in family  $f$  has passed a pre-determined benchmark grade – set here as the median schooling for each age cohort, and  $\bar{g}$  is the average value of the dummy taken across the entire sample.  $\rho_a$  corresponds to the adjusted R-squared from a regression of schooling gaps on a set of dummy variables relating to all the families in the sample (Dahan and Gaviria 2001: 543-4). While the simple correlation coefficient  $\rho_g$  provides a noisy measure of intergenerational transmission of education, positive values of the adjusted correlation coefficient ( $\rho_a$ ) provide unambiguous evidence that family background affects children’s schooling outcomes. Sibling correlation coefficients reflect all common factors

affecting education of siblings (including community characteristics such as school quality and neighbourhood factors), but omit family influences not common to siblings, including varying parental treatment on the basis of birth order<sup>7</sup>. Consequently, the lower these correlation coefficients are, the more intergenerational social mobility exists.

To compute the index, one needs to identify the children aged 16-20 who have fallen behind in schooling, and then determine the extent to which family background is responsible for this through analysing the adjusted sibling correlation coefficients. An index value that is close to zero suggests that perfect social mobility holds and therefore that family background is irrelevant for the determination of children's educational attainment; conversely, the higher the index value, the less social mobility and thus the more children's schooling depends on parents' schooling. Note that sibling correlations represent an upper bound on intergenerational correlations rather than reflecting the true unbiased intergenerational correlation (Behrman et al. 2001:28).

The advantages of using the sibling correlation index over the methodologies relying on OLS regression are as follows. Firstly, the index does not depend on income variables that are drawn from surveys – these are more prone to measurement error. Secondly, econometric problems arising from the endogeneity implied by intergenerational transfer of ability are avoided. Thirdly, the incorrect omission of all unobserved family or household specific factors that occurs in regression model specification is avoided. However, there may be a selectivity issue resulting from low fertility households falling out of the sample. This is relevant to analysis if there is a quantity-quality trade-off and parents with fewer children thus devote more resources to their schooling (Behrman et al. 2001: 28).

In this paper, sibling correlation coefficients are estimated for the whole population as well as for each of the race groups for 1985, 1991 and 2001.

#### *Intergenerational schooling mobility index*

Behrman et al. (1998) calculate an intergenerational schooling mobility index to measure the extent of absolute social mobility in the population. The index is constructed by determining what proportion of variance in the schooling gap for each of a number of child age groups is associated with the weighted average of both parents' schooling and household income. Here

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<sup>7</sup> Note that these factors may be important determinants of investment in children's schooling in South Africa. However, it is not within the scope of this paper to investigate the issue further.

the schooling gap is defined as the number of years of schooling that a child should have given his or her age (i.e. age less six pre-school years) less the number of years of schooling that the child has obtained. To calculate the index, the schooling gap is regressed on three indicators of family background, namely father's schooling, mother's schooling and household income. Control variables are also added. The coefficients on parents' education and household income are then used as weights to estimate the predicted schooling gap of each child. The variance of this variable is divided by the variance of the actual schooling gap variable to obtain a ratio that is independent of the absolute magnitude of the schooling gap. As above, an index value that is close to zero indicates a high level of mobility, while a value that is close to unity indicates low levels of mobility.

Following Behrman et al (1998), we also divide our sample of children and youth into the following age groups: 10-12, 13-15, 16-18 and 19-21 years. This is to allow for potentially different effects of family background on educational attainment depending on the distance to a child's marginal schooling decisions. The mobility index is estimated for the total population, by race and age for 1991 and 2001. Given the large number of single parent households in South Africa, we do not specify mother and father's education as separate regressors (since this would cause a large number of observations to be dropped), but instead create one variable reporting the maximum level of education attained by either parent. This seems a reasonable route to take, given that assortative mating is reflected in a correlation of approximately 0.80 between spouses' education in both census years. While we are unable to identify gender-related differences in the impact of parents' education on their children's schooling, the constructed variable provides the best available indication of genetic ability, the importance decision-makers in the household attach to education, and the educational support that a child benefits from. The control variables that are added are the number of household members aged 25 or less, and two dummies that indicate whether the household is headed by a female or located in a rural area.

The South African situation involves an important peculiarity that should be borne in mind when viewing the index values calculated for this country. During the late 1980s there was a shift in school policy towards discouraging children younger than 6 from entering grade 1. As a result, children started to enter school up to a year later than they would have previously (although this policy was not applied equally across all provinces, KwaZulu-Natal being a notable exception). However, the same rule regarding expected educational attainment is maintained across all years for the sake of consistency. We calculate expected education as

years of age less the sum of 6 pre-school years and one additional year reflecting that the child is reporting highest grade completed. This implies that the rate of progress through school will be somewhat overstated for children contained in the two earlier census datasets (1985 and 1991) relative to those in the 2001 dataset.

Another issue that may affect the reliability of our estimates of progress through the schooling system is measurement error. The census asks individuals what their highest education grade/qualification is, implying that children in school should report the last grade that they have completed (i.e. the grade in which pupils should report the grade they were enrolled in a year ago, provided they passed the exams at the end of that year). However, some individuals may not have answered the question correctly, instead reporting the level of education in which they were currently enrolled. In 1991, 12.1 per cent of individuals in our sample of 10-21 year olds report having completed more than 2 years of schooling above the level expected for their age. In 2001, 10.9 per cent of the 10-21 year old age cohort report similar unlikely achievements. We are unable to correct for these forms of reporting error due to the difficulties associated with modelling them, and instead provide this information only as a caveat to the usefulness of our results.

### **DESCRIPTIVE ANALYSIS**

Figures 3 to 12 in the Appendix show patterns of educational attainment by year of birth over the past century. Figures 4 and 6 show the result of the splicing exercise described above, for the total population and black population respectively. Note that the curves follow each other quite closely, justifying the splicing exercise. Rising educational attainment over time, particularly for the group of individuals born from 1950 onwards, is clearly visible.

Figure 7 disaggregates mean educational attainment patterns by race. White individuals exhibit the smallest increase over time, although starting from a much higher base of 8 years of education in 1890. The educational attainment of Indians born during the second half of the 20<sup>th</sup> century reflects a very rapid rise, with Indians born just before 1980 attaining similar mean schooling levels as whites (i.e. just less than 12 years). Coloureds and blacks show a more modest increase, to a level of grade 10 for the most recently included cohort. Note how the black and total population curves converge for cohorts born in later years, with the fairly rapidly growing black population becoming a larger proportion of the total. Figure 8 further disaggregates the black population by location-type: clearly urban individuals have substantially better educational attainment than rural individuals. However, a qualification

should be added here. The census divides individuals into locations according to where they are living at the time the census is taken. Consequently, there may be a self-selection issue: more educated people are more likely to migrate to urban areas if they perceive that they stand to gain more from participating in urban labour markets.

We turn next to patterns of educational attainment by level of schooling. Figure 9 shows that when the lowest schooling hurdle – completed primary education – is used, the racial gap in attainment has narrowed very considerably. There is only a difference of 14 per cent between the proportion of the best performing race group (whites) which have completed primary school and the proportion of the most poorly performing one (blacks) which have achieved the same. Moving on to higher hurdles – completed matric and tertiary qualifications (see figures 10 and 11) – the picture looks rather different. Note first that the pre-1940 data, taken from the 1970 census, appears to be incompatible with the data from the 2001 census for these higher levels of educational attainment. Racial gaps remain large, although at matric-level substantial gains have been made by younger Indian cohorts; the proportion of Indians born in 1980 who have passed matric is approximately the same as the proportion of whites born in the same year who are in the same position. Note however that the gap between Indian and white attainment at tertiary level remains large, suggesting that access to tertiary institutions is constrained by factors that are not as limiting at secondary school level. The most significant of these may well be finance, since university or college education is considerably more expensive than secondary schooling. Figure 12 highlights the differential performance of blacks across rural and urban areas once again. When viewing figures 10-12, it should be remembered that the steep drops for birth cohorts around 1980 are due to individuals not having completed their education by 2001 (the most recent census from which data is extracted) rather than having dropped out.

Figures 13 to 19 continue in this line of analysis, but show educational attainment by year of education rather than the level of schooling completed. Figure 13 places progress through the South African schooling system in international context by plotting the attainment of 15-19 year old youth in this country against that of their peers in selected Latin American countries. The rationale for this choice of Latin America for comparative purposes lies in the frequent parallels drawn between these countries and South Africa, both in terms of education systems and income distribution (see for instance Lam 1999). Observe that patterns of progression through the South African system are favourable within the group of countries for which data

are available. Note that the steep decline in educational attainment in Panama following grade six can be explained by dropout following completion of primary schooling.

While figure 13 is informative, it does not tell the whole story in terms of total investment in schooling. For this purpose, it is necessary to view the attainment of those who have already completed their education. Figure 14 shows the educational progress of South Africans aged 21-25 in 2001, disaggregated by race. Note that whites and Indians follow similar patterns of attainment, with modest dropout at higher secondary school grades. Coloureds perform better than blacks at passing lower grades, although this is largely due to there being larger numbers of blacks that never enrol. By grade 9 coloureds have lost their initial advantage, pointing to high dropout rates for this group between grades 4 and 8. Factors that may be responsible for high dropout rates in the South African context include illness, pregnancy and cost – as identified by Case and Deaton (1999) in their study using data from a 1993 survey, the Project for Statistics on Living Standards and Development.

Viewing attainment curves of individuals aged 21-25 years across each of the census years (Figure 15), one can see that there has been an upward shift in attainment between each of the census years, although this progress has slowed in recent years. A particularly interesting feature of the graph is that almost 30 per cent of individuals aged 21-25 years old in 1970 had never enrolled in school. This had changed drastically by 1980, with almost universal grade 1 enrolment achieved by the similarly aged group in that year. The pattern that applies to the total population also applies to blacks (see figure 16), although the rise in attainment over time is more dramatic. 40 per cent of 21-25 year old black individuals from the 1970 census had never enrolled in school and less than 1 per cent had passed matric. By 2001, these figures had improved to nine per cent and 36 per cent respectively for the same age group. While non-enrolment has not been as large a problem for them, coloureds appear to drop out in large numbers in secondary school, generally around age 15. This phenomenon has been observed for a long time, and appears to be at least in part linked to earlier labour market access due to better labour market links and networks relative to blacks, given the greater degree of urbanisation of the coloured population (see figure 17). Whites and Indians have approximately 80 per cent matric pass rates, an achievement that is the result of rapid catch-up at higher education levels by Indians and more modest improvement by whites. Individuals aged 21-25 years old in 1970 had already achieved virtually universal education up to grade 8 (see figures 18 and 19).

The third set of graphs links family background (captured in this analysis by income and parents' education) to children's schooling. These attainment profiles by age follow the approach taken by Filmer and Pritchett (1998a, 1998b), who evaluate child's attainment on the basis of economic status. Firstly we evaluate schooling performance on the basis of income, as these authors do. For this purpose, we divide the black population into five quintiles according to income, and the smaller white and coloured populations into an upper and a lower half each.<sup>8</sup> Figures 20-22 show the attainment profiles for 1991 for 16-20 year old children<sup>9</sup> belonging to different race groups, disaggregated by household per capita income quantile. Note the strong link between family background and schooling outcomes that is evident in these graphs – in each one, children in the upper quintiles perform markedly better than those in the lower quintiles, although for whites the difference between upper and lower quintiles is smaller than for other race groups. Figures 23-25 reflect the same information, but for 2001. There is clearly substantially less stratification by socio-economic status amongst blacks in more recent years, and also slightly less amongst coloureds.

Figures 26-29 show educational attainment for 16-20 year old children in each of the census years from 1985 to 2001, disaggregated by average parental educational attainment<sup>10</sup>. Note the large differences in attainment by average parents' education level in 1985: only 12 per cent of children who had parents with no education managed to pass grade 10, while 83 per cent of children whose parents' average schooling level was matric achieved the same. This intergenerational transmission of schooling outcomes appears to have weakened somewhat by 1991, when a considerable shift upward in the performance of children whose parents had less than complete primary education is visible. From that time onwards, however, there does not seem to be any significant change in attainment patterns by parental education level, suggesting that these remained largely static after the expansion of secondary schooling during the 1970s and 1980s. Figures 30-33 reveal similar patterns for black children, although an even more dramatic upward shift in attainment profiles is apparent over the period 1985-1991. The table below reflects average educational attainment for all children

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<sup>8</sup> The Indian population's cohort sizes are too small for further subdivision.

<sup>9</sup> The age group 21-25 was selected for the earlier analysis, because individuals in this group should already have completed secondary school. However, many of these individuals would already have left their households of origin. For the present analysis we need to select cohorts that are still likely to reside with their parental households, in order to measure the impact of household characteristics (parental income and socio-economic status) on attainment.

<sup>10</sup> For 1985 the results are slightly less reliable, since it is not possible to identify who the parents of children in a household are. For purposes of this paper, we assume that the household head and his/her spouse are the parents.



aged 16-20 years on the basis of their parents' educational attainment, for the period 1985-2001.

Table 1: Mean Education Attainment by Race and Parent Education Category							
Data set	Race group	Average Parent Education Category					Total
		0 yr No Schooling	1-6 yrs Incomplete Primary	7-11 yrs Incomplete Secondary	12 yrs Complete Secondary	>= 13 yrs Tertiary Qualifications	
Census 1985	Black	4.94	6.86	8.36	7.84	7.19	6.65
	Coloured	5.49	7.10	8.93	9.09	8.50	7.72
	Indian	9.61	10.07	10.74	11.40	11.57	10.44
	White	9.75	10.16	10.81	11.26	11.43	11.00
	All	5.20	7.16	9.28	10.45	10.55	7.79
Census 1991	Black	6.80	8.04	9.33	10.04	10.64	8.06
	Coloured	6.55	7.94	9.62	10.88	11.34	8.81
	Indian	10.15	10.59	11.06	11.40	11.63	10.93
	White	10.56	10.74	10.94	11.39	11.59	11.20
	All	6.85	8.12	9.76	10.98	11.32	8.64
Census 1996	Black	7.55	8.41	9.48	10.17	10.64	8.54
	Coloured	7.46	8.44	9.93	10.94	11.31	9.35
	Indian	10.46	10.81	11.13	11.41	11.72	11.12
	White	10.40	10.60	10.86	11.27	11.51	11.16
	All	7.58	8.46	9.77	10.80	11.18	8.92
Census 2001	Black	7.56	8.86	9.83	10.40	10.81	8.87
	Coloured	7.23	8.74	10.17	10.93	11.43	9.73
	Indian	9.54	10.71	11.32	11.49	11.86	11.30
	White	8.39	10.24	10.72	11.21	11.49	11.13
	All	7.56	8.87	10.04	10.82	11.23	9.23

To summarise: in South Africa, there is much lower schooling inequality within younger cohorts than within older cohorts. Most of the recent improvements in schooling have disproportionately benefited students in the lower deciles of the schooling distribution (Lam 1999). The remaining intra-racial inequality is largely driven by socio-economic status – family background appears to be a relatively important determinant of educational attainment, although this applies somewhat less to whites. Most of the interracial inequality in schooling derives from variation in secondary schooling attainment: the vast majority of whites complete grade 12, while less than 40 per cent of blacks complete this level of schooling.

Despite the observed improvements in educational attainment over the past few decades, however, Lam (1999: 6) comments that South Africa has performed relatively poorly in expanding schooling, given the country's level of per capita income. Furthermore, the increase in quantity of education has not been accompanied by an equally large improvement in school quality in the former black schooling system. Crouch and Magoboane (1998) investigate performance amongst poor schools, and find that their quality is highly variable. The fact that still so few blacks and coloureds pass matric suggests that schooling expansion has not necessarily benefited individuals in a way that will serve them well in South Africa's skills-hungry labour market.

## **RESULTS**

Attention turns next to calculation of the indices described earlier, to allow for more formal analysis of the visible rise in intergenerational mobility.

### *Sibling correlation index*

Firstly, the results for the sibling correlation index are presented. Figure 1 below shows estimated values of the adjusted correlation coefficient  $\rho_a$ , once again placing South Africa in an international context alongside Latin American countries. At a level of 0.37 in 2001, South Africa's schooling mobility appears to be relatively high; this value of the index is on par with the most mobile country in Latin America (Paraguay) and not far above the value for the USA. Interestingly, South Africa is much more mobile by the sibling correlation measure than is Brazil – a country with which it is often compared. This is in line with Lam's (1999) findings regarding schooling mobility across these two countries.

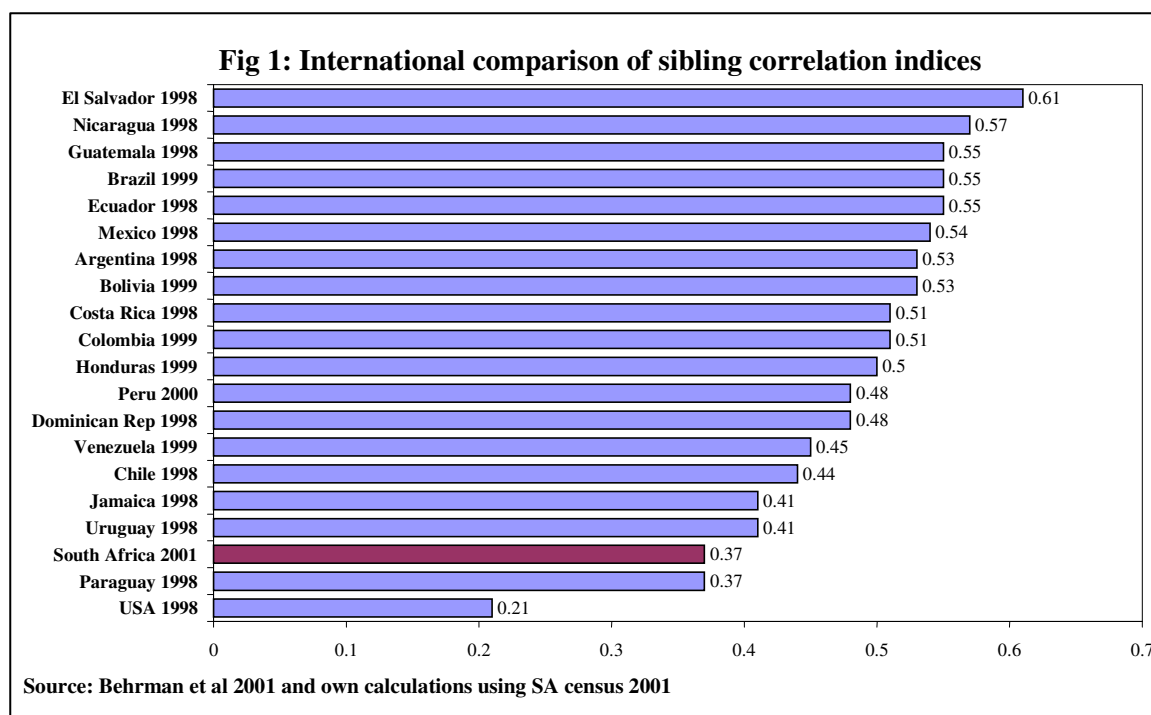
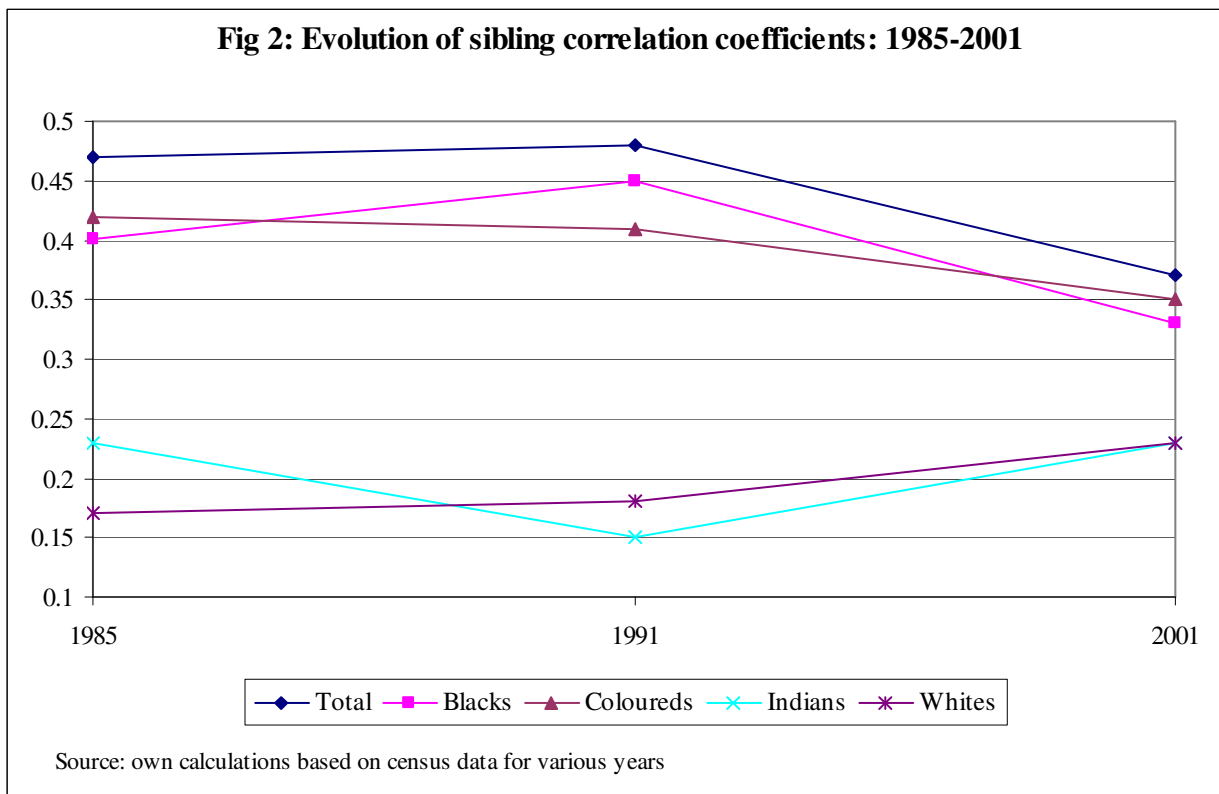


Figure 2 below presents the evolution of sibling correlation coefficients over time, both for the total population and for each population group. Social mobility for the total population has increased substantially since 1991, a phenomenon which appears to be driven by the schooling outcomes of coloured and black children. This is an encouraging finding, particularly for black children who must overcome both low levels of household resources and low levels of parent educational attainment during their schooling careers. Although not presented here, quintile estimates for blacks indicate that the values of these sibling correlations are remarkably stable across the black population. It is clear that Indian and white children are most socially mobile – as one might expect given their access to relatively good quality schooling and substantial private household resources. However, the social mobility of both of these groups as measured by sibling schooling correlations appears to have been declining since 1991, in contrast with the other groups. Note that while this might at first glance appear to be a shift to the detriment of some white and Indian children, the truth is the opposite. If family background plays an increasingly important role in the schooling of children in more affluent households headed by better educated parents, then this implies that white and Indian children have become more likely to continue to enjoy the high socio-economic status of their parents during their adult lives.



**Table 2: Sibling correlation coefficients: 1985-2001**

	Total	Blacks	Coloureds	Indians	Whites
1985	0.47	0.40	0.42	0.23	0.17
1991	0.48	0.45	0.41	0.15	0.18
2001	0.37	0.33	0.35	0.23	0.23

Source: own calculations based on census data for various years

### *Intergenerational schooling mobility index*

We turn next to estimates of the intergenerational schooling mobility index. Firstly, we once again place South African social mobility – as estimated by this index – in international context. Table 2 below presents values of the index for the South African population against comparable values for Brazil (which has the lowest social mobility in Latin America by this measure) and the Latin American country that displays the highest levels of social mobility by this measure, Chile. Readers who are interested in comparing South Africa with other Latin American countries are referred to Behrman et al. (1998) for further estimates of the magnitude of this index for a broad spectrum of Latin American countries.

**Table 3: International comparison of intergenerational schooling mobility**

Country	Year	Intergenerational schooling mobility index by age cohort				
		10-12	13-15	16-18	19-21	10-21
South Africa	1991	0.10	0.14	0.19	0.19	0.14
	2001	0.04	0.07	0.10	0.13	0.10
Bolivia*	1995	0.11	0.08	0.09	0.12	0.10
Brazil*	1995	0.25	0.25	0.29	0.32	0.28
Chile*	1994	0.04	0.05	0.12	0.17	0.09
Nicaragua*	1993	0.15	0.18	0.13	0.20	0.17
Panama*	1995	0.10	0.14	0.21	0.21	0.16
Peru*	1996	0.18	0.20	0.21	0.22	0.20
Venezuela*	1995	0.11	0.14	0.18	0.22	0.16

Note: an index value closer to zero indicates greater social mobility

\* Source: Behrman et al (1998)

Source for South Africa: own calculations based on census data

For both years for which we have data, South Africa exhibits substantially more mobility than Brazil does. The index also rises more rapidly with age in South Africa than in Brazil. Once again, a large increase in social mobility over the 1990s is evident in the estimates for South Africa. In 1991, levels of schooling mobility in this country were close to the Latin American average on the basis of this index, while by 2001 South African learners appeared to benefit from education equalizing opportunities on par with those in Chile.

Observing this large increase in mobility naturally leaves one curious about the nature of the mobility. Where in the distribution of parents' education is social mobility increasing, and is the mobility all upward? The table below divides children aged 14 to 18 in each of 1985, 1991 and 2001 into three groups: those in the correct grade for their age, those who have fallen 1-2 years behind, and those who have fallen more than 2 years behind. Children in the last category would be least likely to enjoy upward social mobility in later life, following the argument of Behrman et al. (2001). Children in the three education performance categories created here are then also grouped by the maximum education level attained by either of their parents<sup>11</sup>. Note that the proportions of children who are "on target" in 1985 and 1991 are

<sup>11</sup> In the 1985 census, there is no information linking children with their parents. For purposes of our exercise, we therefore assume that the head of a household and his/her partner are the parents of children living in the same household, provided the household head is at least 14 years older than the child.

somewhat overstated given the change in school entry age mentioned earlier, implying that the rise in schooling mobility between 1991 and 2001 is understated.

**Table 4: Performance of 14-18 year old cohort by parents' level of education, 1985 - 2001**

(italicised figures are column percentages)

Child's schooling performance	Education level of parents (maximum)				Education level of parents (maximum)			
	Primary	Secondary	Tertiary	Total	Primary	Secondary	Tertiary	Total
<b>1985</b>								
Lagging well behind	88%	12%	1%	100%	<i>46%</i>	<i>11%</i>	<i>5%</i>	<i>33%</i>
Lagging slightly behind	72%	27%	1%	100%	<i>29%</i>	<i>20%</i>	<i>5%</i>	<i>25%</i>
On target	36%	56%	8%	100%	<i>25%</i>	<i>69%</i>	<i>90%</i>	<i>42%</i>
Total					<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>
<b>1991</b>								
Lagging well behind	86%	14%	0%	100%	<i>36%</i>	<i>9%</i>	<i>3%</i>	<i>25%</i>
Lagging slightly behind	70%	29%	1%	100%	<i>31%</i>	<i>21%</i>	<i>8%</i>	<i>27%</i>
On target	40%	52%	7%	100%	<i>33%</i>	<i>70%</i>	<i>89%</i>	<i>49%</i>
Total					<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>
<b>2001</b>								
Lagging well behind	80%	18%	1%	100%	<i>30%</i>	<i>10%</i>	<i>4%</i>	<i>21%</i>
Lagging slightly behind	64%	32%	3%	100%	<i>36%</i>	<i>27%</i>	<i>15%</i>	<i>31%</i>
On target	40%	49%	11%	100%	<i>35%</i>	<i>63%</i>	<i>81%</i>	<i>49%</i>
Total					<i>100%</i>	<i>100%</i>	<i>100%</i>	<i>100%</i>

Source: own calculations

This table reveals at least two encouraging findings. The first is that the proportion of children who are lagging far behind in terms of expected school grade, appears to be declining over time. However, this can only be a tentative conclusion, given the differing coverage of each census. Secondly, the proportion of children whose parents have only primary education and who are lagging behind at school is declining. This suggests that the rising social mobility reflected by the index calculated above is both positive (i.e. upward) and that the improvement is occurring for children at the bottom of the distribution of parents' schooling.

**Table 5: Intergenerational schooling mobility by race**

	Year	Intergenerational schooling mobility index by age cohort				
		10-12	13-15	16-18	19-21	10-21
Blacks	1991	0.10	0.12	0.13	0.13	0.10
	2001	0.04	0.06	0.07	0.09	0.07
Coloureds	1991	0.07	0.11	0.13	0.14	0.10
	2001	0.03	0.06	0.12	0.14	0.09
Indians	1991	0.00	0.01	0.03	0.05	0.04
	2001	0.00	0.00	0.02	0.06	0.03
Whites	1991	0.00	0.00	0.02	0.05	0.02
	2001	0.00	0.00	0.01	0.07	0.02

Note: an index value closer to zero indicates greater social mobility

Source: own calculations based on census data

Returning to analysis of sibling correlation coefficients, table 4 shows the index calculated by race and age cohort. Note the dramatic drop in immobility within the black population group during the 1990s. It is interesting to observe that the indices for the total population show greater immobility than the indices for individual population groups. This suggests that a large part of the observed aggregate immobility is due to the differential progress of different groups, rather than to differential educational progress within groups (as reflected by the regression coefficients on income and parent education). This accords with Lam's (1999) finding that, despite high levels of overall schooling inequality, inequality within race groups is relatively low. The explanation here is that the indices for the total population span a broad range of levels of social mobility associated with the different race groups comprising the total group aged 10-21, while levels of social mobility within race groups are less variable.

## **CONCLUSION**

Studies on intergenerational mobility in South Africa usually use cross-sectional datasets. Though illuminating, such methods do not allow investigation of another time dimension, viz. changes in intergenerational mobility over time, or in intergenerational transfers of educational characteristics.

This paper has set out the evidence from censuses covering a time span of thirty years regarding progress with educational attainment, and in particular it tried to focus on whether

such progress is curtailed by strong intergenerational education immobility. The evidence appears to be mixed. Whilst attainment rates have been rising over a long period, they are still highly skewed by race. Moreover, intergenerational immobility appears to play a smaller role than is the case in some other similarly unequal societies, yet race still appears to act as a strong barrier to improved performance for many. Given that race differentials have historically been large, any immobility amongst those groups with the least education – that is blacks and coloureds – is bound to reduce attainment progress of future generations.

Yet the South African evidence also points to one group amongst whom educational attainment increased very rapidly, namely Indians. Their experience is an interesting example, although it is surprising that their gains at tertiary level have been somewhat smaller than at school level.

What is unexpected about the descriptive results is the evidence they provide that for many of the groups there has been little improvement since the mid 1980s in the patterns of progress of children with parents holding a given level of education. This implies that some of the progress in attainment that we are now witnessing amongst blacks may be the result of earlier progress: Higher parent education is driving higher child education. Acceleration would be possible if there were further increases in continuation rates at higher standards for children whose parents have given levels of education, but such progress seems to have slowed. This problem may be particularly acute at the highest school levels, where the matric hurdle still seems to be a major one for many to clear. This indicates that there need be continuing concerns with the quality of the education that children receive, despite the progress in raising the quantity of education obtained.



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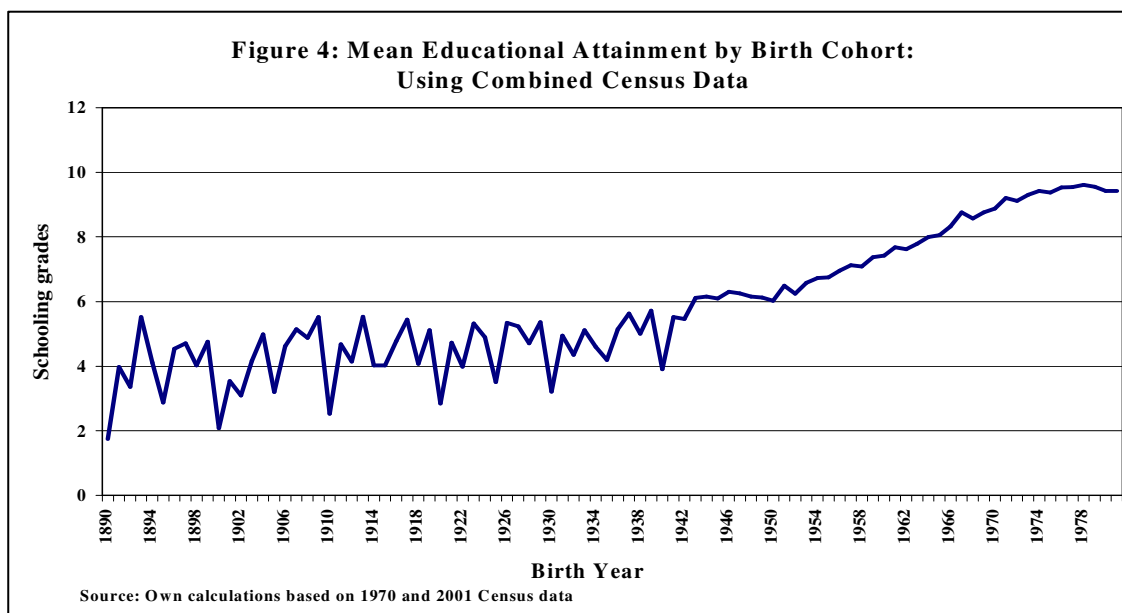
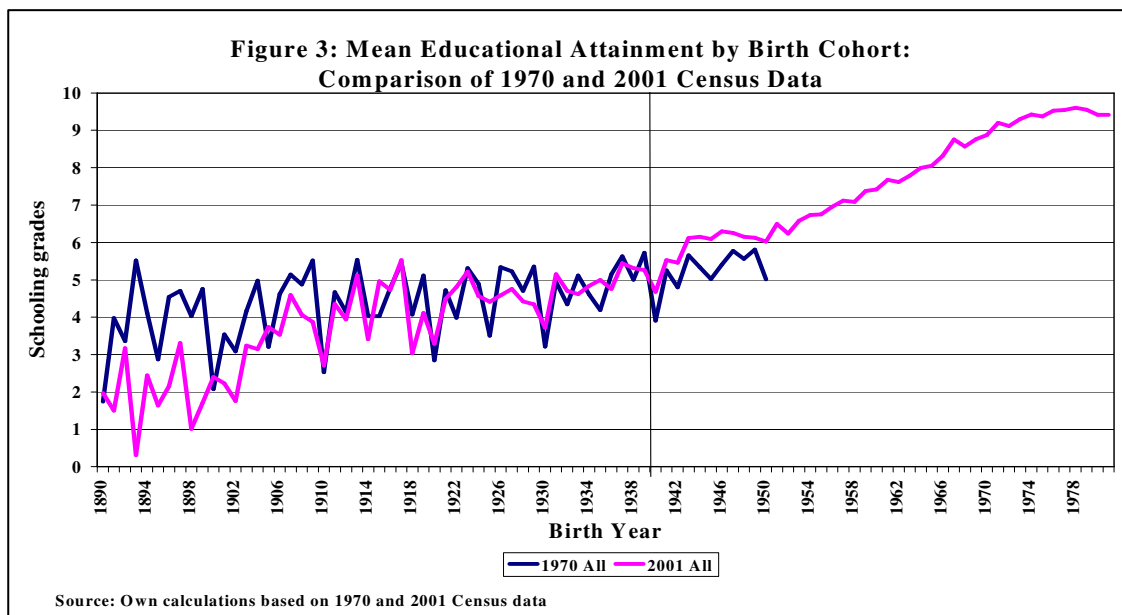
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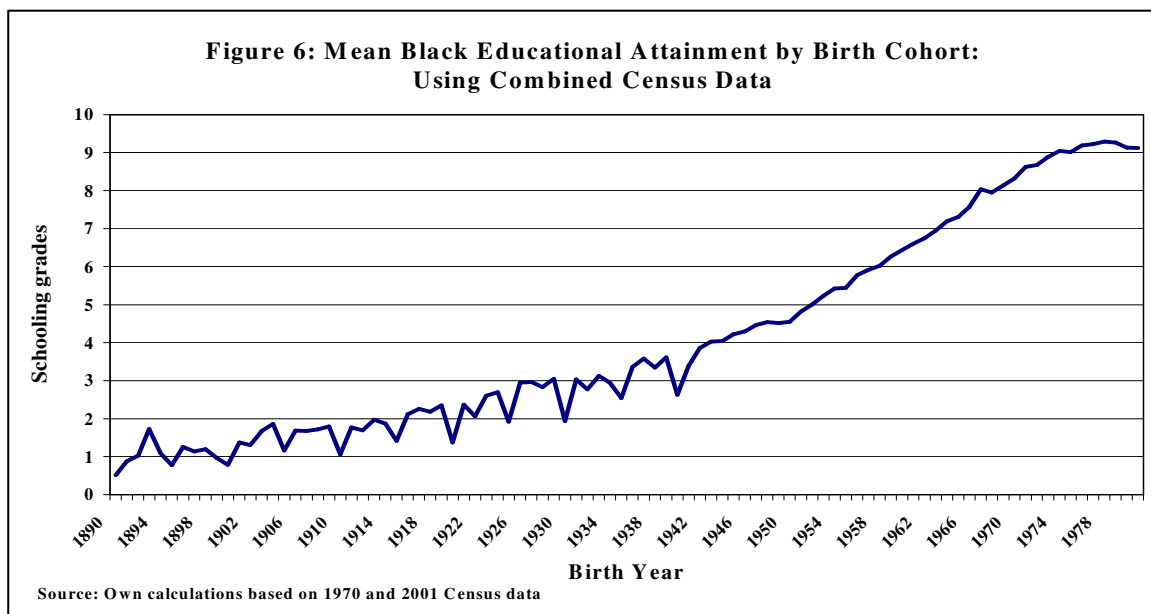
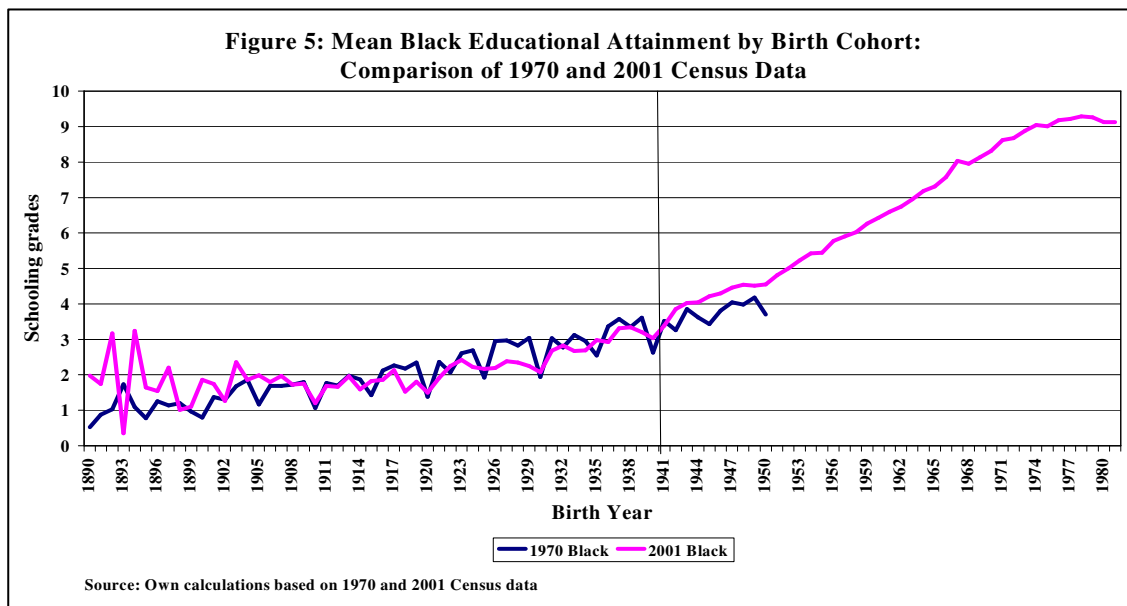
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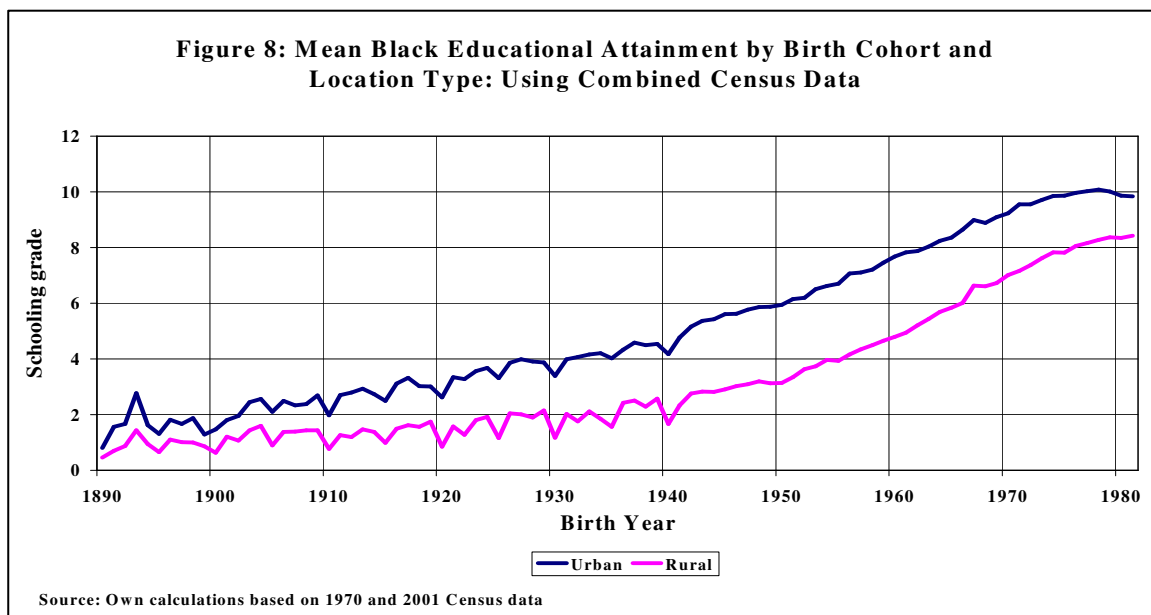
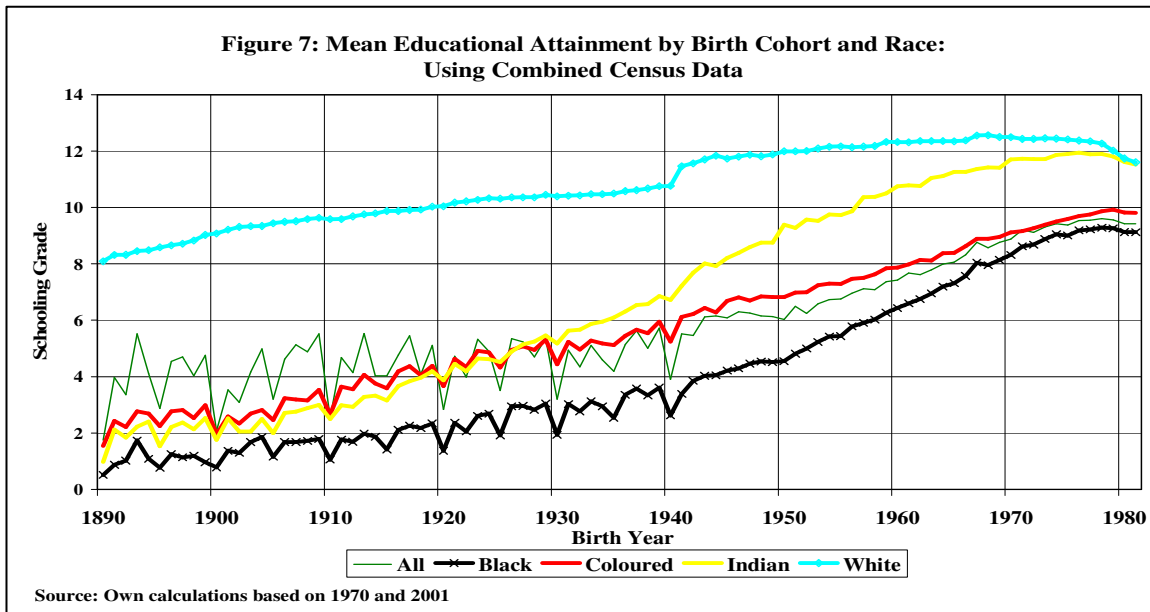
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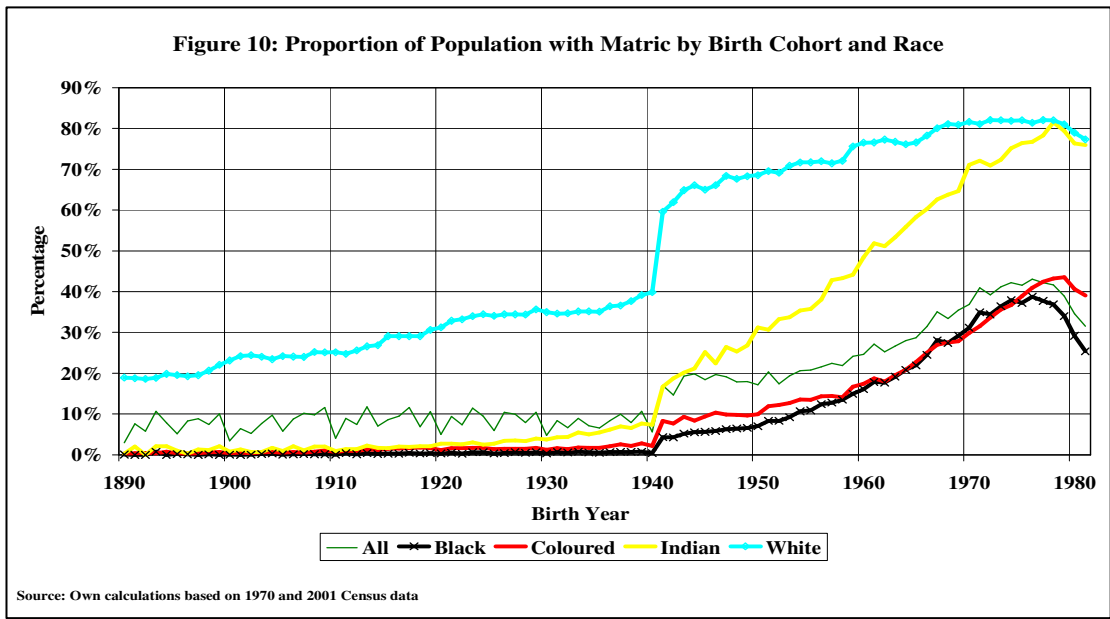
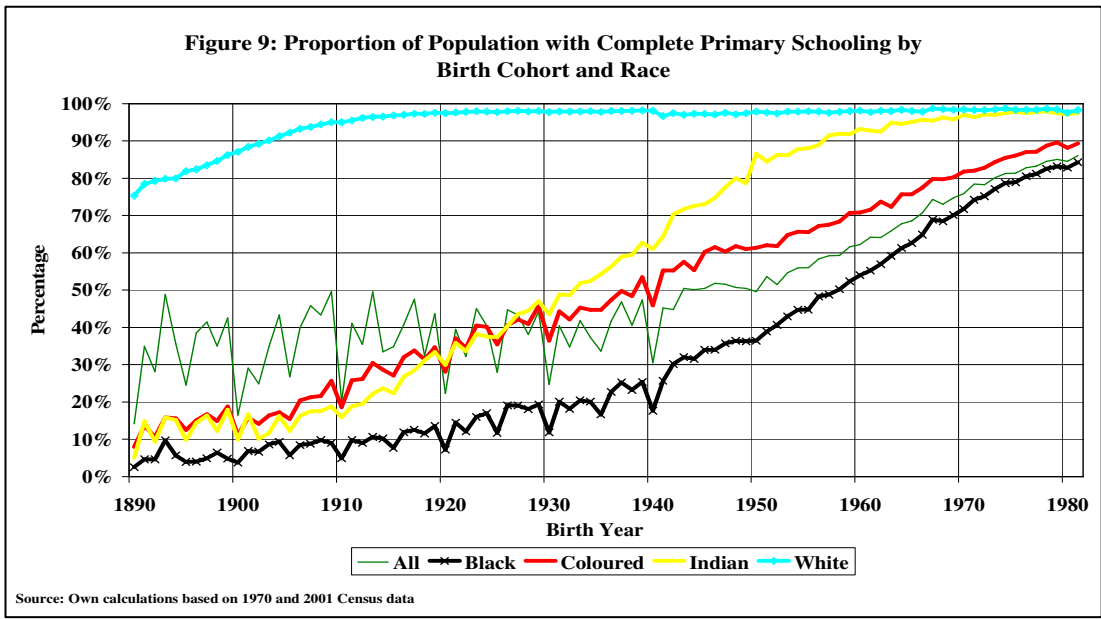
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**APPENDIX**



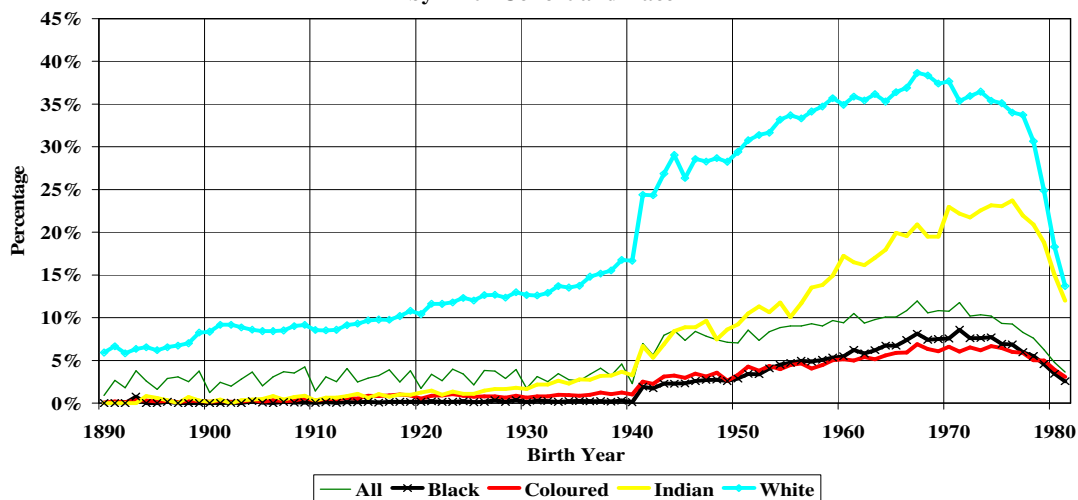






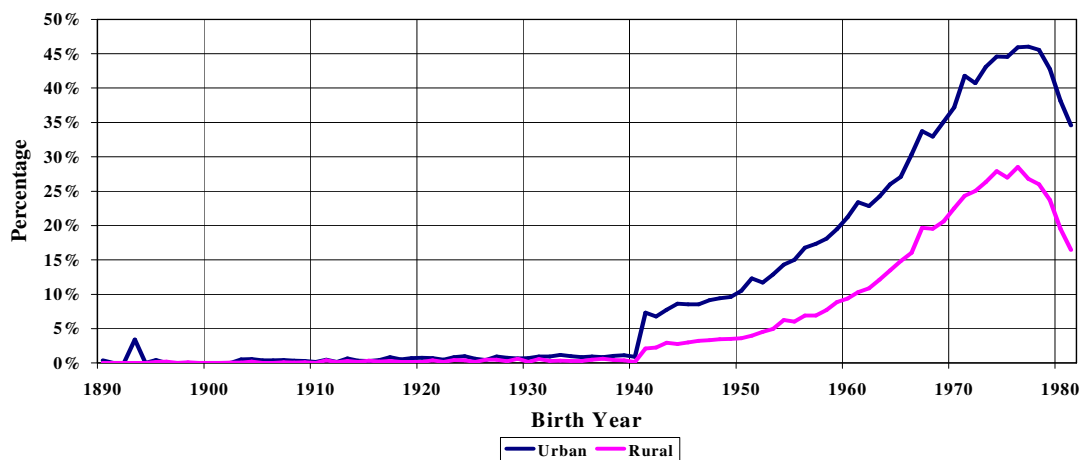


**Figure 11: Proportion of Population with Tertiary Qualifications by Birth Cohort and Race**



Source: Own calculations based on 1970 and 2001 Census data

**Figure 12: Proportion of Black Population with Matric by Birth Cohort and Location Type**



Source: Own calculations based on 1970 and 2001 Census data

