Uneducating South Africa: the failure to address the 1910 - 1993 legacy.

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Abstract

This paper presents some detailed historical time series on the South African schooling system since union in 1910. The data collected for the study covers a wide range of education indicators, from pupil enrolments, pupil teacher ratios, real expenditure (aggregate and per capita), matriculation pass rates, to some indicators of the quality of matriculation passes. We thus provide an indication of both inputs into and outputs of the educational system. In broad terms, the data indicate that from an educational perspective South Africa followed a modernisation trajectory that, although it drew ever larger numbers of pupils into the schooling system, was partial, distorted and fundamentally dysfunctional. In particular, teh data indicates that the quality of all inputs into the educational process was strongly differentiated by race, as are the output measures collected for this study.

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1. Introduction

This paper presents some detailed historical time series on the South African schooling system since union in 1910. As such it rep-

resents an exercise that to our knowledge has not been undertaken before, with the possible exception of Malherbe (1977) which covered a more limited time span. The data collected for the study covers a wide range of education indicators, from pupil enrolments, pupil teacher ratios, real expenditure (aggregate and per capita), matriculation pass rates, to some indicators of the quality of matriculation passes. We thus provide an indication of both inputs into and outputs of the educational system. Given South Africa's unique historical legacy, we continue to apply the racial classification that characterised the Apartheid era - indeed, a focus of the paper comes to rest on the form and nature of the distinctions that existed between the schooling systems accessible to the different statutorily defined racial groups in South Africa. While at least some of our conclusions have perhaps been captured for some time by more anecdotal evidence, and by less systematic studies such as those provided by the South African Institute of Race Relations, one merit of the present report is that we capture important features of the schooling system in hard data terms, in series which are consistently defined over a fairly protracted period of time.

The study has a number of justifications. First, we believe that a sound understanding of the historical background to the state the educational system currently finds itself in South Africa is vital to the sound formulation of policy. Second, many of the theoretical advances of modern theories of economics growth have turned on the centrality of human capital and its development - and empirical studies have in turn come to focus on the link between education and long run economic performance. The present paper is part of a wider project concerned with a time series modelling of the growth performance of South Africa, incorporating standard economic determinants, human capital indicators, and a range of institutional factors that have come to enter the growth debate. It thus represents one of the core data components necessary to an understanding of the impact that education in South Africa has had not just on the development of its population in broadly based human development terms, but also on the narrowly

defined per capita income of the South African population.

The interest of the present data has wider provenance, however. Coherent data on inputs and outputs of educational systems covering close on a century are to our knowledge difficult to find - all the more so in a developing country context. In this sense, the present study in collecting data on the South African schooling system over the period since Union, hopes to make a contribution to future time series studies concerned with the relationship between inputs and outputs in the education process. But South Africa is also of special interest to the educational production function literature. Given the wide divergence between pupil-teacher ratios both across time and across different racial groupings noted in the present paper, the data collected for the present study provides the basis of further time series testing of the Case and Deaton (1998) proposition that earlier Hanushek findings[1] of the unimportance of pupil teacher ratios to educational performance are driven by insufficient variation in the independent variable.

The focus on the differentials between input and output magnitudes that occurs on a racial basis also explains the failure to collect the series included in this study beyond 1993. The democratic transformation in South Africa in 1994 has led to a discontinuation of the collection of statistics in South Africa on a racial basis, making the continuation of the series presented in the present paper impossible. The point serves to emphasise the importance of the information here collected. The experience in South Africa from 1910-93 represents a unique opportunity to improve understanding of the evolution of an educational system in a developing country over a protracted time run, and with wide quality differentials within the system due to the system of racial estates practised in South Africa. It offers a natural experiment on which understanding of educational production can be improved for future policy formulation.

While the present paper opens the way for future research on educational production functions in a time series context, our purpose here is primarily descriptive - highlighting the characteristics of the

[1] See for instance Hanushek (1996) by way of example.

South African schooling system since 1910. It is perhaps useful to highlight the central, if rather unsurprising, conclusion that emerges from our findings. South Africa's schooling system has seldom if ever, and still does not represent human capital formation that can be described as healthy. Even the very best schooling sector shows strong signs of having failed to produce the sort of human capital that we might wish for - and trends in the 1990's continue to point in the wrong, rather than the right, directions.

2. Methods, Sources and Classificatory Conventions

For purposes of precision and consistency we have followed the classificatory conventions deployed by the South African authorities during both the pre-Apartheid and Apartheid periods. We consider it important to record the information under these contrived rubrics since the system of racial estates and statutory race classification had profound implications for the administration of educational matters and for the distribution of educational resources and opportunities. The post-Apartheid dispensation formally ushered in by the 1994 elections marks a significant regime-type transition and the material that we have assembled in this way should enable one to gain a better descriptive and analytical purchase on current and future educational developments.

With respect to white education, much of the data goes back to 1910, and our principal source until 1960 has been the Union Statistics for 50 Years and subsequently the Central Statistical Services Reports. For "Coloured and Asian" (a category which decomposes in 1955 into the separate categories of "Coloured" and "Asian"), we track the data back to 1934. For this data we have also used the Union Statistics for 50 years. For "Coloured" and "Asian" data we have used the Central Statistical Services' Annual Reports. Data for black education has been constructed through the derivation of information from the Union Statistics for 50 years (from 1935 to 1960) and from the Department of Bantu Education (DBE) B later Department of

Education and Training (DET) - Annual Reports from 1953 through to 1993. It should be noted that statistics for the TBVC[2] ("Independent") administrative instances disappear and then sometimes re-enter the DBE and DET data series. For purposes of coherence and continuity we have reconstructed this data to cover all those territories which originally fell under the jurisdiction of the governments of first the Union and then the Republic of South African and which have, since 1994, been reincorporated. Our data is thus comprehensive and covers during the Apartheid period the Republic of South Africa, the non-independent ("self-governing") administrative entities as well as the TBVC "states". It should be noted that the statistical records kept by these latter instances were of an uneven and often appallingly bad quality.

The latter point is a general one that applies to many of the data sources we employed. The data quality is variable at best, and state institutions did little to maintain consistency and quality of data publication over long stretches of South Africa's history since Union. In this context several general sources proved to be of considerable value to our endeavour. These included the Annual Surveys published by the Institute of Race Relations, E.G. Malherbe's Education in South Africa (Malherbe 1977) and Muriel Horrell's many studies including her Bantu Education to 1968 (Horrell 1968), her African Education: Some Origins, and Development Until 1953 (Horrell 1963), her A Decade of Bantu Education (Horrell 1964) and her The Education of the Coloured Community in South Africa 1652 to 1970 (Horrell 1970).

3. Description of the Data

The data collected for this report cover a wide range of data series. These include:

[2] We use the conventional TBVC abbreviation for "Transkei, Bophutatswana, Venda, Ciskei", the four 'independent' homelands created by the Apartheid regime from 1976 through the early 1980's.

- Pupil enrolments in primary and secondary schooling, by race and by public/private schooling.
- The number of teachers employed by public and private schools, and for different race groups.
- Matriculation and senior certificate pass rates for respective race groups.
- Teachers' qualifications by race group.
- Expenditure on education by race group, both in aggregate and in per pupil terms.
- Performance of matric pupils in mathematics for the white and black race groups.

With respect to South Africa, there are serious problems regarding the availability, reliability and consistency of data. These problems turn on the extent to which the recording of data was shaped by political considerations and considerable variation in the skill with which data for different segments of the population, different administrative regimes and different time periods was captured. Especially problematic was the extent to which the administration of education and the corresponding recording of statistical data was fragmented in consequence of the institutionalisation of Apartheid. This led to inconsistent series, the inconsistency of which flowed in part from frequent shifts from one classificatory scheme to another, with the terms of classification often not being clearly specified B and sometimes not specified at all

A further major adjustment that had to be applied to all data series was a frequent and not always consistent inclusion and exclusion of TBVC states from South African data series. All data used for the present study, unless otherwise indicated, have been corrected appropriately.

4. Specification of Inputs into Schooling

We begin with a brief description of the inputs into the schooling system both in terms of the enrolment of pupils, and in terms of the pupil-teacher ratios that prevailed in the different schooling systems in South Africa. Both serve to define at least in part the educational opportunities that participants in the alternative schooling systems faced. In a subsequent section we will turn to the question of the quality of output that emerged from South African schooling systems.

4.1. Racial Estates and the Determination of Educational Opportunity

The most striking feature of the evidence that emerges from data on white and black schooling concerns the primacy of a racial instead of a class determination of educational opportunity between white and black pupils. While a conventional wisdom, the data nevertheless allow us to note the extent of such differences in opportunity. Moreover, a close examination of the data provides an indication of significant developments in black schooling.

Figure 1 reports the pupil teacher ratios for both public and private schools for whites and blacks. The most salient point to emerge from an examination of the data is that white educational opportunity, regardless of whether the opportunity arose in public or private schools, is consistently and considerably better than black educational opportunity. White public school pupil-teacher ratios (WPubPupTch) never rise above the mid-20 level (the very highest ratio is 24.06 in 1952), while the best black pupil-teacher ratio is provided by the private schooling system (BPvtPupTch) in 1941 at a ratio of 31.61. Notably, the pupil-teacher ratios of white public and private schools (WPvtPupTch) did not differ very significantly over the entire 1917 1993 period. The widest divergence emerges through the course of the 1990's, reaching a high-point of 8.79 in 1993. Given the work of Hanushek (1996) and others, noting the statistical unimportance of pupil teacher ratios in the 10:1 to well into the 30:1 range, the implication of this evi-

dence is that the quality of schooling provided to white children is to all intents and purposes the same between the public and private sectors. The only black schooling offering pupil-teacher ratios even remotely comparable, are black private schools in the 1935 to 1956 period. Case and Deaton (1998), on the basis of cross sectional survey evidence from South Africa, note that while differences in pupil-teacher ratios in the 10:1 to 40:1 range may not significantly determine the educational performance of pupils, an increase in pupil-teacher ratios from 30:1 to 60:1 is a statistically significant determinant of educational performance. In this context it is noteworthy that the pupil-teacher ratio for black public schooling (BPubPupTch) remained in the range from 50:1 to 70:1 for a protracted period from 1957 to 1993, while black private schooling over the same period did not do significantly better.

The single most telling point to emerge from the evidence on white and black schooling in South Africa, is that regardless of class origin, blacks consistently faced poorer educational opportunities than did whites, with the possible exception of black private schooling opportunities in the period 1935 to 1956.[3]

A number of additional features of the data require explanation. The first concerns the strong discontinuity in the black private schooling pupil to teacher ratio in 1957. The 1957 discontinuity arises in consequence of the Bantu Education Act of 1953. In terms of the Act church schools were given the following options:

a) handing their control over to government or

b) becoming completely unaided by the state or

c) accepting a reduction in state aid but retaining control over their own affairs.

Those schools that chose the latter option continued to receive

[3]The improved quality of black education between 1935 to 1956 relates to the absence of institutionalized racial differentiation in the schooling system. 1957 saw the operationalization of the Bantu Education Act of 1953. In terms of the Act private (primarily church) schools were systematically marginalized, and resourcing was redirected at state controlled schooling which, while becoming more inclusive of wider sections of the population, was mostly of poorer quality.

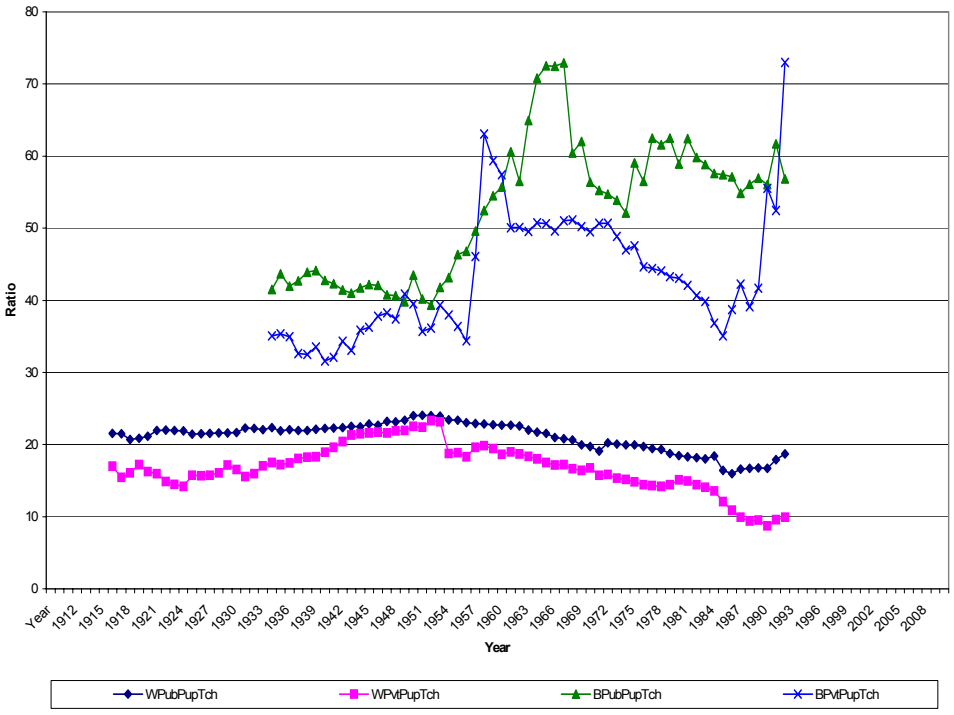

Figure 1: Pupil Teacher Ratios for Black and White Public and Private Schools

reductions in state aid until such aid was stopped completely in 1957. Those schools had then to apply to be registered as private schools, and most succeeded in being so registered. As they had previously been classified as state-aided schools, this explains the sudden jump in the number of black pupils in private schools in 1958.[4]

The 1957 discontinuity is a further reflection of the long-term decline in black private schooling in South Africa in terms of private school pupil enrolments. In particular, while there is an increase in black private schooling from 1917 through to 1937, there are two periods of marked decline from 1937 to 1957 (in which year, as explained below, a dramatic jump in consequence of a fundamental discontinuity in the series occurs)[5] and then declines precipitously from 1967 to 1987. Thereafter there is a sharp upturn in black private school enrolments[6]. The long-term decline in the enrolment of black pupils in private schools is mirrored in the sharply declining ratios of black private to black public schools in Figure 2, with the 1957 discontinuity explained above obscuring the long-term trend.

A second feature of Figure 1 that requires explanation is the sharp increase in the black public school pupil teacher ratio in the 1950's,

[4]The discontinuity is also reflected in the "white" private school series. 1957 again coincides with a sharp drop in the number of pupils, reflecting the exclusion of non-white pupils attending such schools. This explains the discontinuity in the white private school pupil to teacher ratio in 1957.

[5]It is worth noting that the decline in black private school enrolments begins in 1937, and not under the National Party governments after 1948. The decline in black private schooling under the Nationalists was thus a continuation of earlier trends. In part this decline may be a reflection of the fact that most black private schools were mission schools. With an increasing urbanization rate in the black population this may have moved some of the pupil population out of reach of private mission schools - and forced them into the public schooling system.

[6]We note, however, that the sharp increase in black private school pupils after 1987, may reflect black pupils in previously "white" private schools, rather than "black" private schools. An alternative explanation is an increase in private urban "cram colleges" for black pupils at least some of which have not been of high quality. Thus the increase in the black private school pupil-teacher ratio may be a true reflection of developments. As such the sharp increase in pupil-teacher ratios over the 1988-93 period needs to be treated with caution.

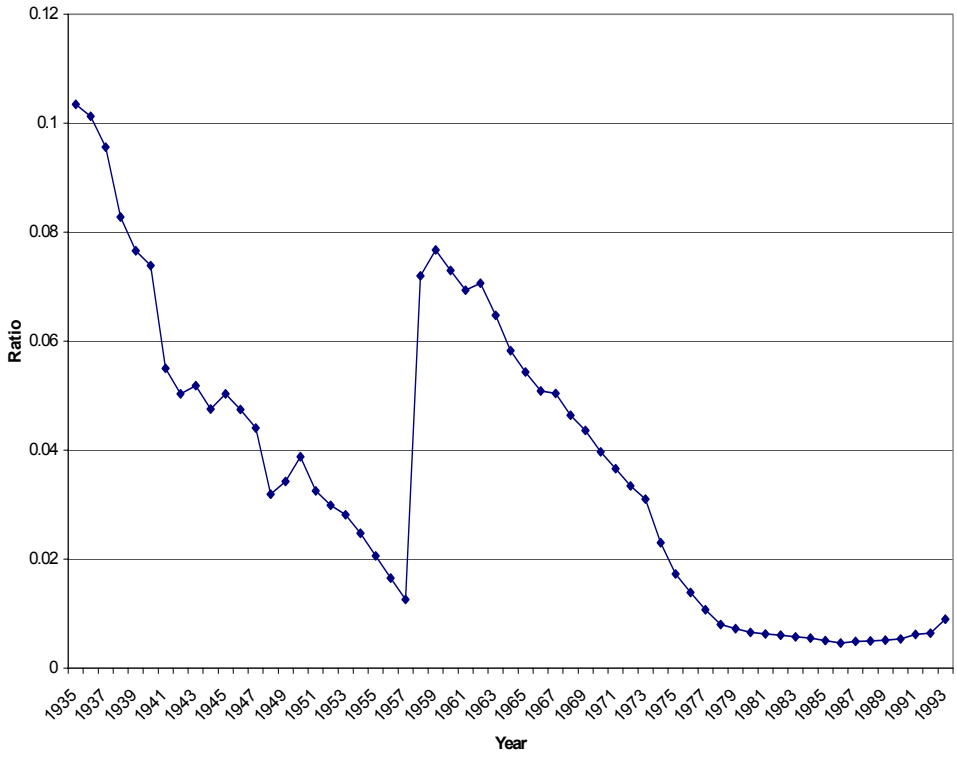

Figure 2: Ratio Black Private to Public Pupils

and the downward correction during the course of the late 1960's and early 1970's. By contrast, the 1940's were a period of improvement in the black public school pupil-teacher ratio (even if marginal). One possible explanation for this trend is that provided by Bromberger (1982), in terms of declining social expenditure in the 1950's after a period of "limited progress towards incorporation and equality" under the Smuts United Party government.[7] The data, however, do not seem to bear out this argument in this instance. Figure 3 shows black public school pupil enrolments (BPubPups) and teacher numbers (BPubTch). The pattern of development in the black public school pupil teacher ratio is explained by the fact that black public school teachers increase at the same rate under the National Party governments as they do under the Smuts government. By contrast, black public school pupil enrollment increases at a far more rapid rate as of 1952. Figure 4 illustrates by the trend lines for the growth rates of the two series.[8] The trend growth rate for pupils (BPubPup%Chg) consistently lay above that for teachers (BpubTch%Chg) from the early 1940's to the early 1970's. This coincides with the period over which the pupil-teacher ratio was rising. Only after the early 1970's did the growth rate of black teachers outperform that of pupils, and allow the pupil teacher ratio to fall. This is confirmed by the sharp increase in the slope of the line depicting the number of black public school teachers.

The implication is thus that under National Party governments, enrolment of black public school pupils began to grow at a faster rate than did the enrolment rate under earlier administrations. The growth rate of black public school teachers did not fall under the National Party government, but simply remained constant, failing to respond to the higher number of pupils entering the black schooling system. The experience of black public schooling during the 1950-70 period of Verwoerdian "grand Apartheid" was thus one of a partial modernization,

[7] See also the discussion in Luiz (1996).

[8] Trend lines of best fit were provided by a second order polynomial for black public school pupils, and a third order polynomial for black public school teachers.

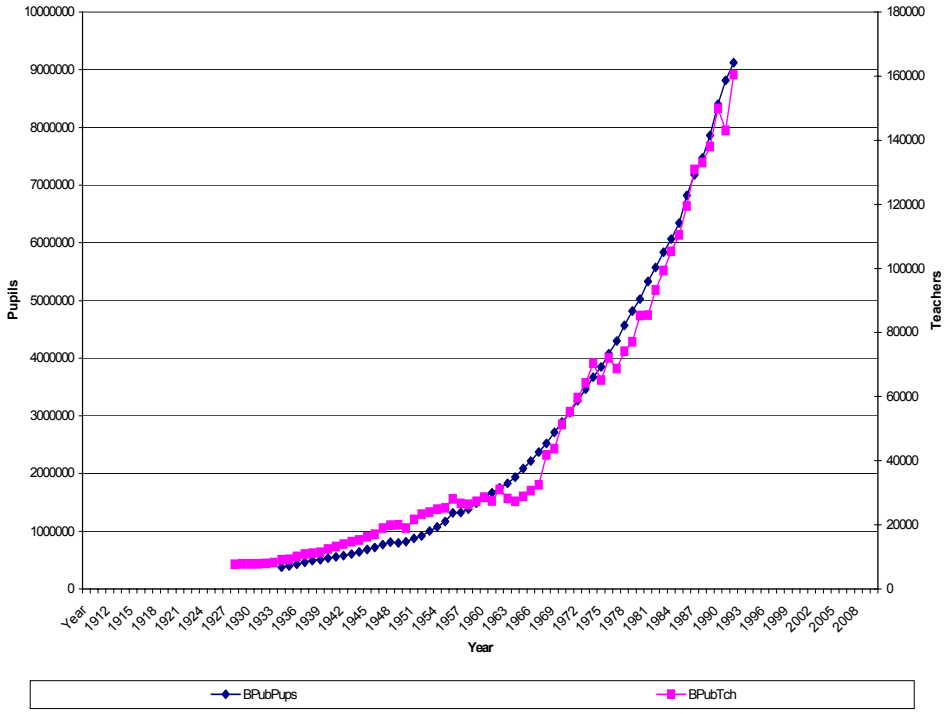

Figure 3: Black Public Schooling - Pupil and teacher Numbers

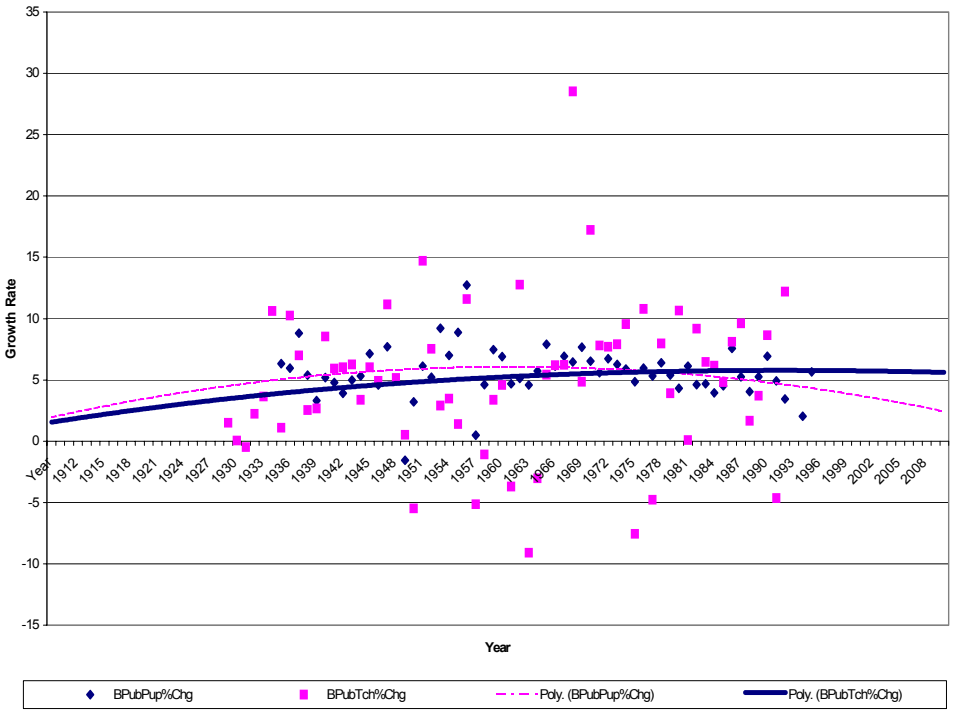

Figure 4: Black Public School Pupil & Teacher Growth Rates

generating a higher enrolment of black pupils, without providing additional teaching resources at a comparable growth rate. Only under the Vorster and Botha governments is the need for a faster growth rate in black public school teachers finally (if incompletely) addressed.[9] The only sense in which the argument for limited progress toward incorporation and equality is borne out by the present data, is that the white public school pupil-teacher ratio rose slightly during the course of the 1940's, only to be reversed under National Party governments. The increase is marginal, however, certainly did not threaten to approach the ratios maintained in black schooling, nor to leave the "safe" range of pupil-teacher rations which appear to be unimportant for schooling quality.

A last point concerns white private schooling. While white private school enrolments rise steadily from the 1920's to 1969, two shocks emerge in subsequent years. The first is the decline in white per capita income after 1970 (see Simkins (1991) and McGrath and Whiteford (1994)), which coincides with a consistent decrease in private school enrolments. This trend is reversed in the mid- to late 1980's and very sharply and sustainedly so after 1990. The evidence would suggest that with the most recent political and social transformation, some categories of whites have responded by signalling a preference for a private education for their children. Importantly, white private schools have responded by increasing teaching staff at an even faster rate than white pupil enrolments. The result has been a falling pupil teacher ratio in white private schools since the mid-1980's,[10] while during the

[9] For a further discussion of the demise of aspects of "grand Apartheid" after the accession to the premiership of J.B. Vorster, and its acceleration under the "praetorian", dirigiste but increasingly technocratic regime of the P.W. Botha Presidency, see DeKadt (1984).

[10] There is an alternative possibility here. Coloured and Asian private school enrolments show a sharp increase in the 1986-93 period, without a concurrent rise in teaching staff in Coloured and Asian private schools. This may be a consequence of the enrolment of Coloured and Asian private school pupils in formerly "white" private schools. This carries consequences for the pupil-teacher ratios in "white" private schools. Instead of declining from 12.07 to 9.90 over the 1986 to 1993

1990's white public schools experienced declining pupil enrolments, but even more dramatic decreases in teaching staff (see the increasing white public school pupil-teacher ratio).[11]

4.2. Racial Inclusion: the Case of Coloureds and Asians

Developments in Coloured and Asian schooling systems are too similar to merit separate treatment within our space constraints.[12] Where differences between the two racial categories are significant, they will be explicitly acknowledged.[13]

The most significant feature of the Coloured and Asian (C&A) pupil teacher ratios is their very significant improvement, as depicted in Figure 5. While the ratios begin at the same level as in black public schools (the worst case noted thus far), at ratios of 43.39 and 50.45 for public (C&APubPupTch) and private (C&APvtPupTch) sector schools respectively, by 1993 the C&A public school pupil teacher ratio had fallen to 21.15 (compared to the comparable ratio for whites of 18.69).

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period, the decline is limited to 13.59 to 11.86.

[11]The number of white public school teachers decreases very sharply from the almost 60000 all-time high in 1987, heading towards 50000 in 1993.

[12]We have undertaken a disaggregated analysis, and will note differences where relevant.

[13]The data reflecting Coloured and Asian school statistics is problematic on account of changes in official statistical classification categories. From 1921 to 1953 Coloured and Asian pupil enrolments are recorded as a composite figure. From 1953 the official records for Asian and Coloured schools are presented separately. For purposes of completeness and coherence we have presented the data in the following manner: first, we follow the official statistics from 1921 (where they go back this far) through to 1958; second, we combine the separately compiled figures for Coloured and Asian schools into a composite measure from 1955 to 1993. In this way we see how the picture might have looked had the earlier classification scheme remained operative; third, in order to bring precision to both the description and analysis we have collated the separate data series for Coloured and Asian schools from 1955 through to 1993. (Note: The Union Statistics For 50 Years From 1910 to 1960 records composite Coloured and Asian educational data to 1958; the Central Statistical Services compile separate data series from 1955).

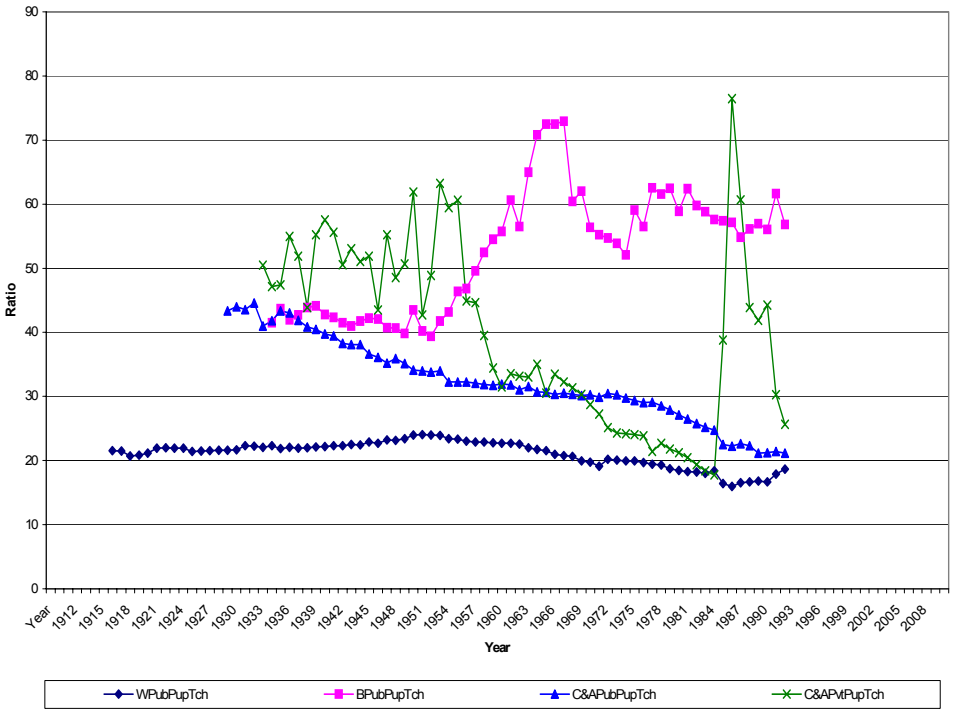

Figure 5: Pupil Teacher Ratios with special reference to Coloureds and Asians

Of further interest is the fact that this improvement has been led by the public schooling system for the entire period, except for 1971-85 period. Indeed, the C&A private school pupil teacher ratio is the highest of any ratio examined thus far for the 1935-1960 period, and is lower than the black public school sector only after the early 1960's. This view is strengthened by the fact that the total number of pupils in C&A private schooling is small throughout, never rising above 7769. Indeed, the decline of the black private schooling system already noted in the preceding section, is evident in the C&A schooling system, if anything even more dramatically. For instance, Asian private school enrolments drop precipitously from 4894 in 1955 to 64 in 1974. They remain low - rising to 111 in 1977, and then dropping again until, in 1980 they disappear completely from the statistics.[14] Only in 1986 do they re-appear in the statistics with a total of 790 pupils and rise rapidly through to 6943 in 1992.[15] The relative unimportance of the C&A private schooling system is further evident from Figure 6. While both the white (WPvtPub) and the C&A (C&APvtPub) groups show a decline in the ratio of private to public school pupils, the proportion for whites never falls below 4% of public school pupils (indeed for most of the 1917-93 period it lies between 6 and 8%), while for the C&A group it begins at a level of approximately 2%, and falls to a low of 0.2%.[16]

The implication of the evidence is that while the C&A racial grouping began with a schooling system with similar quality characteristics to black schools, over time the differential relative to the white schooling system has been steadily eroded. Thus, at least in terms of their

[14] There is some mystery concerning Asian private schooling. CSS statistics continue to report the employment of teachers in the private school sector, while recording neither private school pupils nor schools at all.

[15] As already noted, these enrolments may in fact be in formerly "white" private schools, rather than in Asian private schools. This would explain the very sharp increase in the C&A private school pupil teacher ratio: the pupils are simply not in C&A private schools, but in "white" schools. If so, this would suggest that the improvement in pupil teacher ratios for "whites" is overstated.

[16] The increase during the late 1980's has already been commented on.

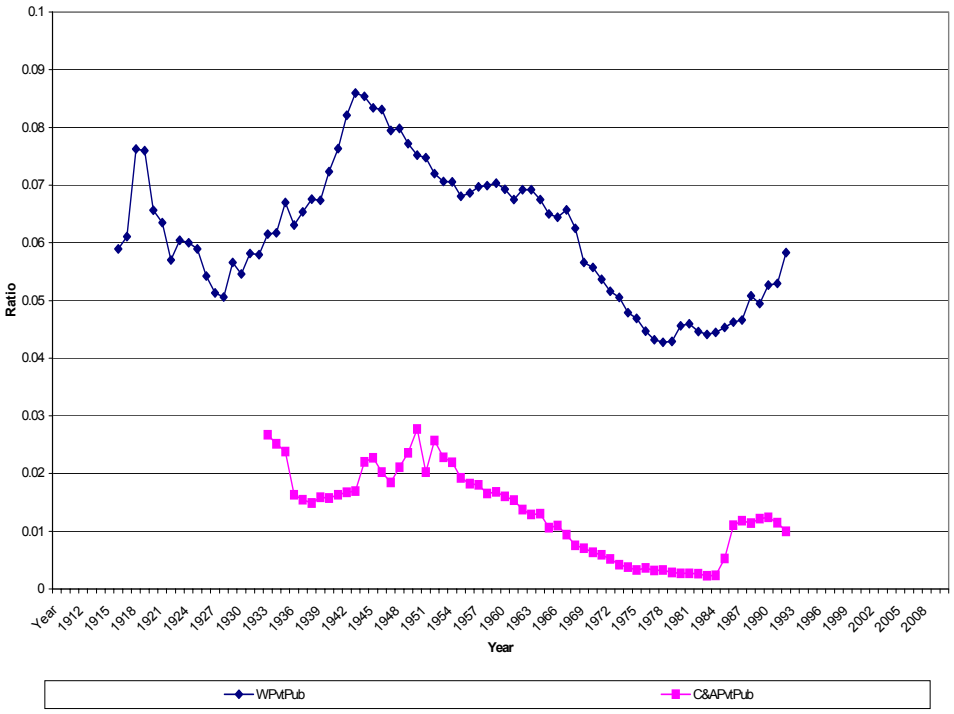

Figure 6: Ratio of White and C&A Private to Public School Pupils

access to education, the C&A racial groups have modulated racial educational quality distinctions. There has thus been a steady process of racial inclusion manifested in the characteristics of Asian and Coloured schooling systems. This trend has been present and unvarying since the 1930's, manifesting little variation over the Apartheid years. In particular, while the rate of improvement during the years in which the House of Representatives and the House of Delegates may have been marginally better than in previous years, the difference is not significant.[17] Lastly, it remains worth noting that the improvement in C&A schooling has been led by the public sector, rather than by private schools.

4.3. Expenditure on Education

Given the trend in Coloured and Asian schooling of approaching the characteristics of the white schooling system, our focus henceforth will tend to be on the distinction between white and black schooling systems. We justify this on the grounds that the two schooling systems appear to represent the two limiting cases in terms of the opportunities that they afforded.

This is confirmed by an examination of expenditure data on education by race. We again merge Coloured and Asian expenditure into a composite category. Figure 7 reports total real expenditure on schooling by the three racial categories.[18] Real expenditure on the white schooling systems outstrips the absolute level of expenditure on any other race group until the mid 1980's. While real expenditure on the black schooling system overtakes "white" expenditure as of this point, given pupil numbers in the two schooling systems, it follows that white schooling remained substantially better resourced in terms

[17] In fact, while the early 1980's manifest a faster rate of improvement, the late 1980's have a slower rate of improvement.

[18] It should be noted that the expenditure figures reported are in real rather than nominal terms. A number of earlier studies on the South African schooling system report expenditure figures, but in purely nominal terms. See Donaldson (1993) and Hofmeyr and Buckland (1992).

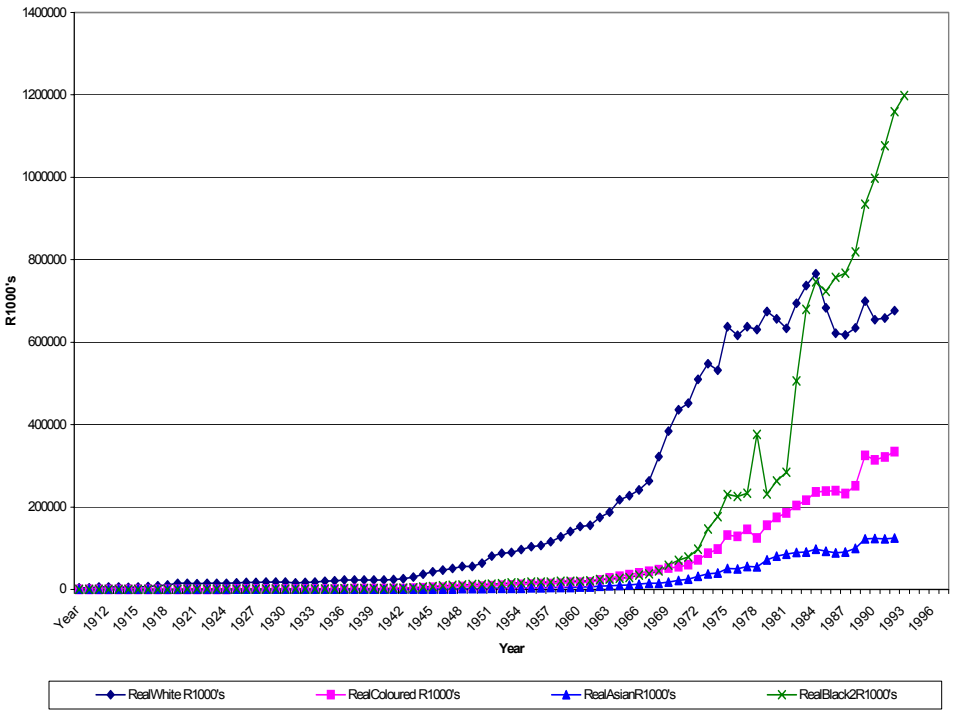

Figure 7: Real Expenditure by Race

of expenditure per pupil. This is all the more so since the period from 1975-85 saw a rapid expansion in the number of black pupil enrolments in the black schooling system - see again Figure 3.

This is borne out by an examination of per pupil expenditure by race. We report two alternative measures of per pupil expenditure. The first is that reported from Hansard in the South African Institute of Race Relations (SAIRR), over the 1972 to 1992 period, and shown in Figure 8. In terms of this per pupil expenditure on whites remains more than twice the expenditure on black pupils over the entire sam-

ple period. By contrast per pupil expenditure on both Coloureds and Asians has substantially narrowed the gap with white per pupil expenditure. A recalculation of per pupil expenditure on the basis of the total South Africa-wide expenditure on schooling (again sourced from the SAIRR, though this time relying on SAIRR-internal records), and the adjusted total pupil figures discussed above,[19] is reported in Figure 9. In terms of this calculation the disparity between white schooling (RealWPerCap) and that of other racial groups remains considerably more divergent than the SAIRR figures suggest. On these figures white per pupil expenditure remains at least at seven times the level of that for blacks (RealBPerCap), and almost twice that for Coloureds and Asians (RealC&APerCap).

Thus the rapid increase in real expenditure on black education has not allowed black schooling to eliminate the backlog with white education. Moreover, a closer examination of black per pupil expenditure suggests that over the 1983-93 period per pupil expenditure remained virtually stagnant in real terms.

The implication of the present section is thus that the divergence of quality between the white and black schooling systems is potentially considerably more dramatic than suggested by the Pupil teacher ratios examined in earlier sections. The ratio of seven to one on real per pupil expenditure is several orders of magnitude greater than the ratio of two to one we reported with respect to pupil-teacher ratios.

4.4. Teacher Qualifications

Such conclusions are further exacerbated by a consideration of teacher qualifications in the white and black schooling systems. We report the percentage of teachers in public schools who fall into one of two limiting categories.

The first, which we label iUNQLRAT, denotes the proportion of

[19] It should be recalled that these numbers are adjusted for the repeated inclusion and exclusion of the variety of political entities that could be classed under the broad rubric of "self-governing" territories.

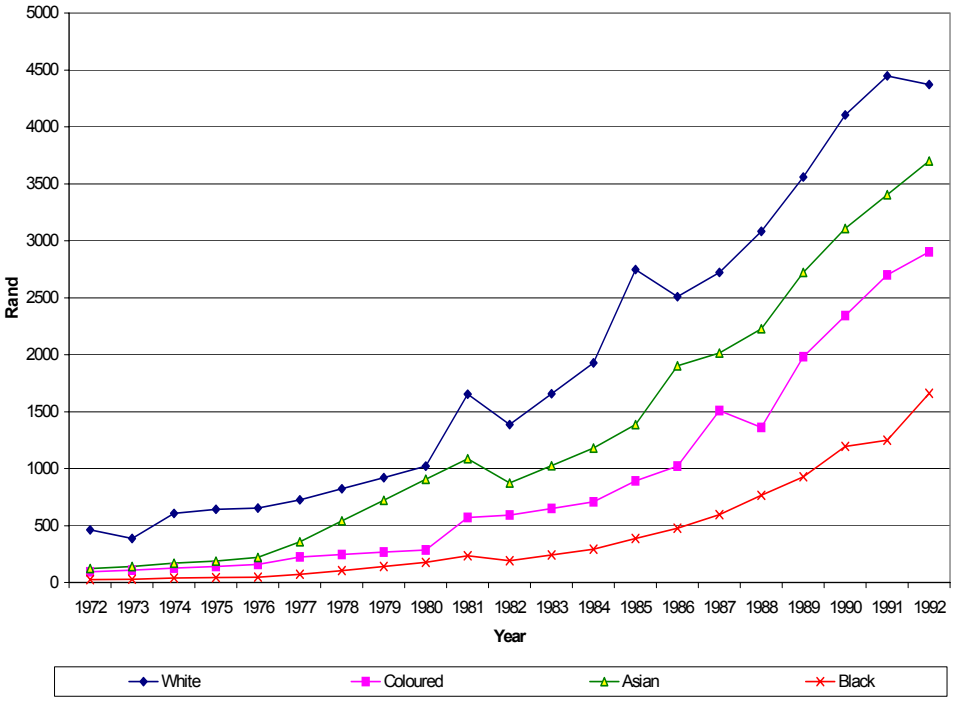

Figure 8: Per Capita Education Expenditure by Race

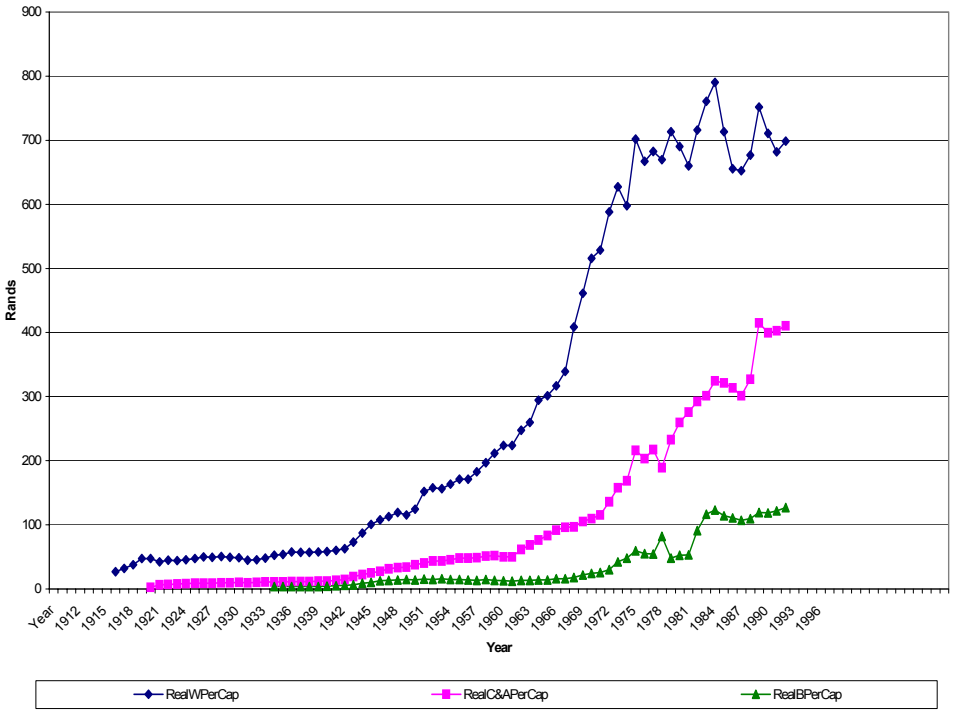

Figure 9: Real Per Pupil Expenditure by Race

the total teacher body for the racial category i which holds a Matric qualification or less. The second, which we label iSPUQLRAT, denotes the proportion of the total teacher body for the racial category i which holds a tertiary qualification.[20] They represent respectively relatively "under"-qualified and "super"-qualified teachers.

Figure 10 reports both categories of teachers for both white and black racial groups. Rather surprisingly the iUNQLRAT category of teachers is fairly similar between the white and black schooling systems, with approximately 20% of teachers proving to unqualified. The only significant difference to emerge is that the proportion falls to approximately 10% for the white schooling system almost a decade earlier than it does for the black schooling system.

However, the two schooling systems differ most markedly in terms of the proportion of teachers who are "super"-qualified. Over the 1963-83 period for the black schooling system the BSPUQLRAT category lies well below the 10% level, while the WSPUQLRAT category lies between 40 and 50% - in a ratio of approximately ten to one.

In both schooling systems teachers reacted positively to the introduction of an incentive system to acquire additional qualifications in the early 1980's. The iSPUQLRAT categories show marked increases (without a similarly dramatic decrease in the iUNQLRAT category). However, even after this response to the qualifications-incentive the dramatic difference between white and black schooling remains, with the WSPUQLRAT now stabilized in the 80-90% range, while the BSPUQLRAT category had only attained 50% by 1993. In fact, the incentive mechanism may well have been perverse. We will see in a subsequent section that black matric pass rates (as one indicator of output from the black schooling system) did not respond positively to the higher teacher qualifications - in fact they continued declining despite rising teacher qualifications in the black schooling system - see Figure 11. The pay-incentive to acquire more qualifications may well have impacted most on the most able teachers within the system, with negative consequences for classroom teaching and teacher-pupil

[20] "Tertiary" education denotes either a degree or a diploma.

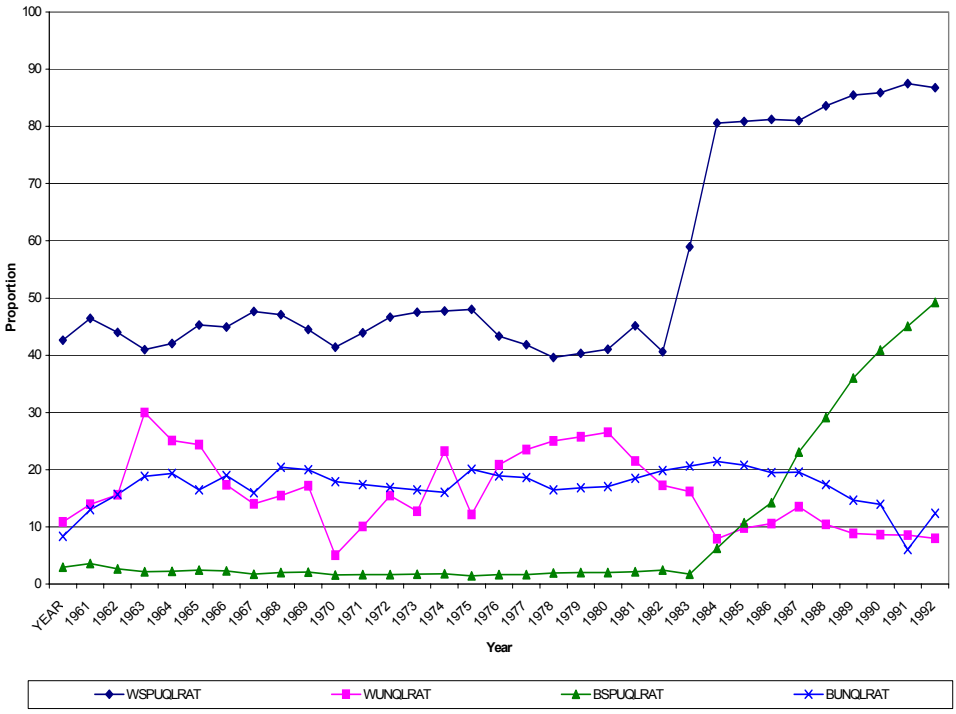

Figure 10: Teacher Qualifications

contact time.

Once again the implication that significant quality differentials between white and black schooling have deep and multi-faceted structural properties, is difficult to gainsay. In fact this situation is exacerbated by the fact that a greater proportion of white pupils are in private schools. Given that white private schools are likely to have more highly qualified teachers than white public school teachers, the implication is that white pupils have consistently been exposed to more highly trained teachers than black pupils.

5. Educational Output Measures

Our conclusions concerning the differential quality of the different schooling systems in South Africa is confirmed by a consideration of a number of alternative output measures. We have generated matriculation (school leaving and university exemption) rates for:

1. Schools which historically fell under the administrative aegis of the "old" provincial education departments and the JMB (Joint Matriculation Board). We have both disaggregated this data province by province and have generated an aggregated, comprehensive profile for pupils at white schools. We have constructed an aggregate series embracing both Matriculation Exemption and School Leaving Certificate candidates, and the proportion of those candidates passing. A white matriculation pass rate has been recoverable for the full 1910-93 period.[21]

[21] Some difficulties were encountered in providing the full data for all four provinces over the 1910-93 sample period. Since a full series was obtainable for the former Transvaal, and given the high degree of convergence between provinces on matriculation pass rates, missing data points for other provinces were imputed on the basis of the Transvaal's rates of change. While the results do not appear to be implausible (candidates and passes seem to "marry" with available observation points), and though not many data points had to be imputed, results should be treated with appropriate caution.

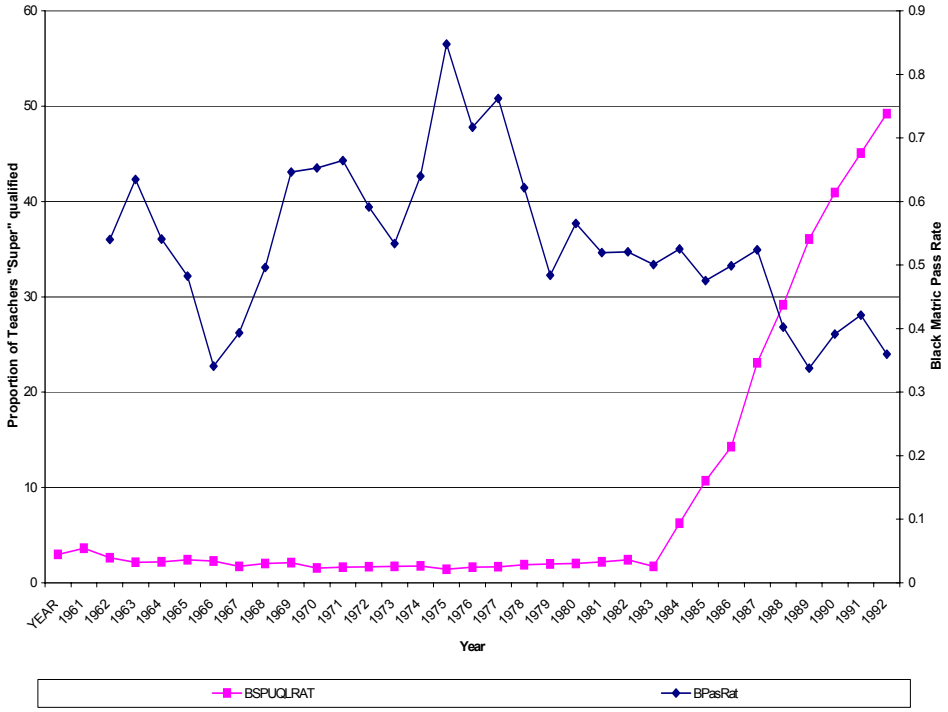

Figure 11: "Super" Qualified Teachers versus Matric Pass Rates: Black Schooling

2. Black schools that fell under the administrative aegis of the erstwhile Departments of National Education; Education, Arts and Culture; Bantu Education; and of Education and Training. In addition matriculation results from the variety of former political entities that could be classed under the broad rubric of "self-governing" territories were also incorporated into an aggregate data series for both Matriculation Exemption and School Leaving Certificate candidates, and the proportion of those candidates passing. Since black schooling was formally separated from white schooling only as of 1955, we were able to develop a black matriculation pass rate only over the 1955-93 period.

3. For both white and black matriculation candidates we have provided two data series for the proportion of total matriculation candidates reading mathematics (in either Higher or Standard Grade), and the pass rates which apply to those candidates. For white matriculants we have been able to construct a series covering the period 1910-1993.[22] For blacks the series was only available over the 1962-93 period.

Matriculation pass rates appear to confirm the findings we have already reported in our discussion thus far - see Figure 12. While the white matriculation pass rate (TotWPasRat) shows an unambiguous trend improvement over the entire 1911-93 sample period, for black matriculation the evidence is far more mixed. While black pass rates (BPasRat) increase from 1955 through to 1976, they then decline steadily through 1993. In the period for which we have separate figures for both black and white pass rates (1963 - 1993), with

[22] While all provinces reported performance in mathematics examinations intermittently, the former Transvaal provincial education department reported a consistent series over the full 1910-93 period. Given a very high degree of convergence between provinces, we use the Transvaal mathematics examination figures as an indicator for the white education system. Since we use the figures only as proportions (Math candidates as a proportion of Senior Certificate examination candidates; math pass rates, etc.), we do not believe that this seriously biases our findings.

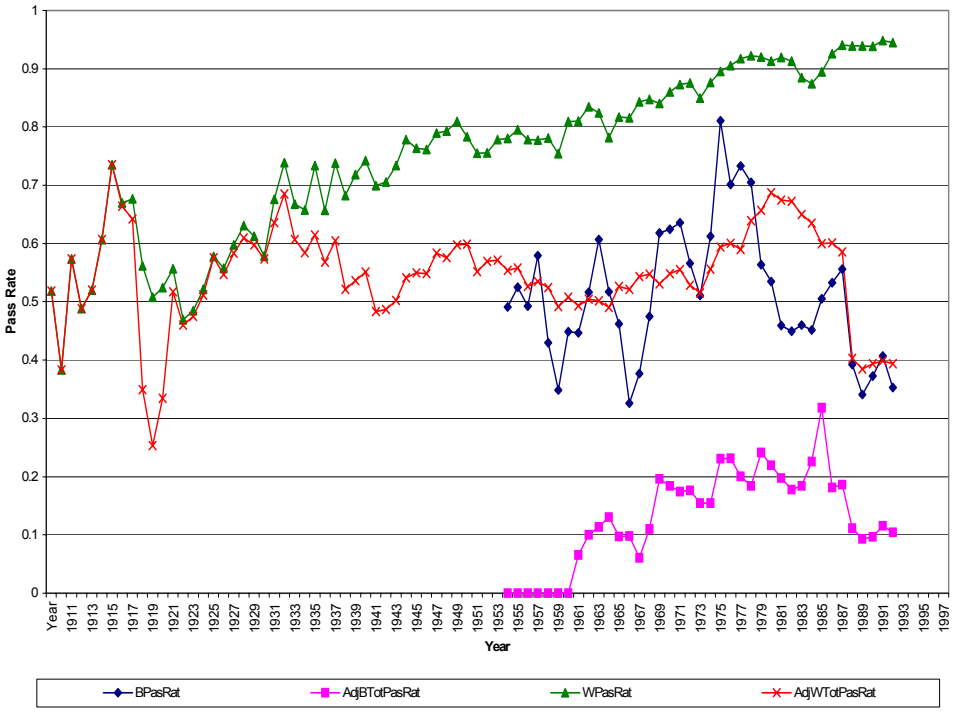

Figure 12: Matric Pass Rates

the singular exception of 1976 when the black matriculation pass rate approaches the white, the black rate consistently falls below the white rate by a very considerable degree. During this period the white rate stays within the 75% -95% range, while the black rate - with few exceptions - falls below 60%. The difference, in the worst years for black education, lies in the region of 60 percentage points.

A further distinguishing feature of the two pass rates is that the black pass rate fluctuates wildly. By contrast, the white pass rate fluctuates in an almost equivalently wild fashion only during the very early

period of political and societal consolidation after Union (1910 -1923). The distinction becomes evident from a comparison of the standard deviation which attaches to the percentage change in matriculation pass rates for whites and blacks: 8.85 and 16.57 respectively.

The black schooling systems thus not only produced pass rates which prove to lie considerably below those of the white system, but the black systems also appear to have been far more prone to either a series of shocks, or did not serve as a consistent screening mechanism - or both. Either reason for the fluctuations in pass rates is likely to have proved damaging for any positive incentive mechanisms present for black pupils - lowering the likelihood that what (poor) human capital was on offer to pupils would be absorbed.

Raw matriculation pass rates form a legitimate standard of comparison of the alternative schooling systems only if the two examination standards are comparable. Anecdotal evidence if nothing else makes this assertion questionable. We therefore weight the matriculation pass rates of white and blacks by the proportion of total matriculation candidates sitting mathematics (in either higher or standard grade).[23] In Figure 12 we report the results as AdjWTotPasRat and AdjBTotPasRat for white and black candidates respectively. The implication of weighting the pass rates is that the divergence between the measures of white and black schooling system output is further exacerbated. At no point in time does the weighted black pass rate approach the weighted white pass rates - the minimum differential is approximately 30 percentage points.[24]

[23] We choose mathematics for the following reasons: mathematics has as clearly identifiable objective performance standards as any subject available to matriculation candidates. Application of subjective standards of assessments are therefore minimized. Moreover, we consider mathematics to be foundational to a wide range of cognitive activities and vocational skills. Lastly, mathematics (and science) was used as the central indicator of the quality of the educational system in the Hanushek and Kim (1995) growth study - and proved a more significant predictor of long run economic performance than the quantity of education.

[24] Even a less stringent measure of schooling output has a similar implication. The proportion of total school pupils enrolled for the matriculation examination

The weighted pass rates for whites further suggests that the improvement in the white schooling system has been considerably less dramatic than implied by the unweighted rate. Indeed, while there is some improvement in the weighted pass rate post-1975, the 1930-75 period does not manifest any consistent trend. Moreover, weighted black pass rates also manifest somewhat different trend patterns from the unweighted series. The improvement in weighted pass rates runs through the late 1980's, declining thereafter to the end of the sample period - thus the decline sets in a decade later than implied by the unweighted pass rates.

The maths-weighted matriculation pass rates further prove to manifest considerably higher volatility for both whites and blacks. In the case of blacks the standard deviation of the percentage change of the pass rate increases from 16.57 to 30.37, while for whites the increase is from 8.85 to 13.09.

In terms of weighted pass rates even the best schooling system in South Africa is thus subject to severe quality constraints. Indeed, a consideration of the proportion of black and white pupils taking mathematics in either higher or standard grade reinforces the point. For whites the proportion of total matriculation candidates sitting mathematics has been in steady decline since the 1930's - accelerating during the course of the 1980's, to reach a low of 40% of all white matriculation candidates - see Figure 13. By contrast the proportion of black candidates writing maths rose until the late 1980's, the trend has been reversed since, and came to lie at the 30% level in 1993.

Even the very best sector of the South African schooling system thus appears to generate an output that is questionable in terms of its quality. To the extent that numeracy is a core skill essential to negotiating a global economic context defined increasingly by high

rises steadily for whites from just over 1% in 1917, to approximately 7% by 1996. By contrast, for blacks there is a discernable increase from a sub-1% level only in the late 1970's, though then rising rapidly to approximately 3% by the early 1990's. Demographic factors are likely to shape this particular measure as much as educational quality, however, and we do not pursue it further at this point.

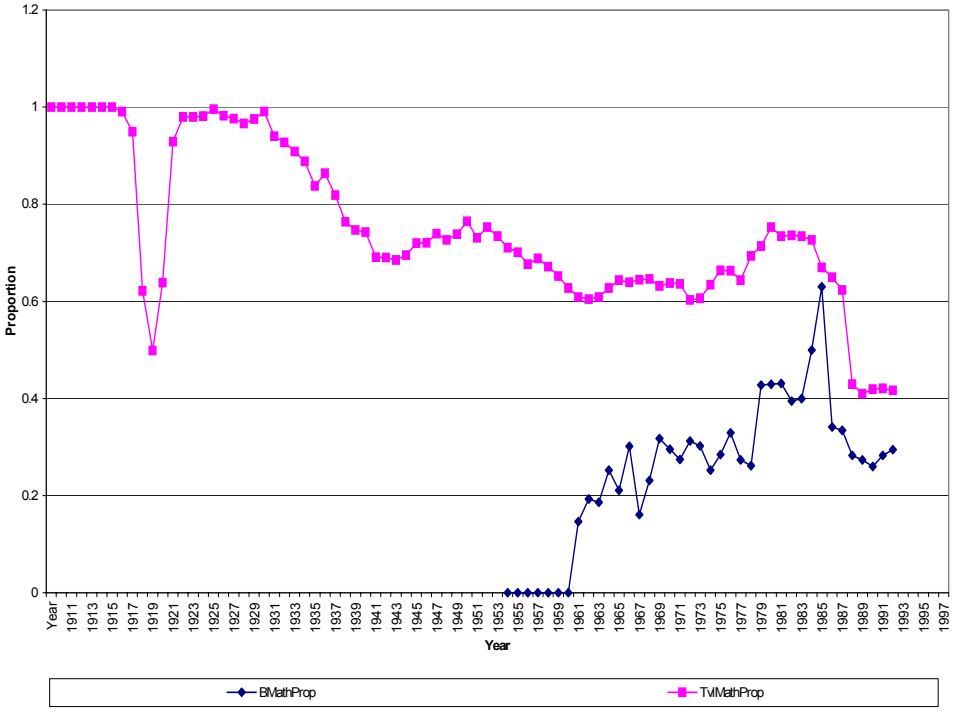

Figure 13: Proportion of Matric Candidates with Maths

levels of technological development, we can conclude only that the schooling system in South Africa signals failure, and represents an urgent case for strong remedial attention.

5.1. Conclusion

The present study presents little to leave the reader sanguine concerning the state of the South African schooling system, in any of its variants. The vast majority of South Africa's population has been, and continues to be subjected to a system with very high pupil-teacher ratios, with poorly qualified teachers, which is poorly funded, and which as a consequence fails to generate the output in terms of pass rates which one might wish for. Once we weight the output measure provided by the pass rate by the proportion of pupils sitting mathematics exams, even the very best sector of the South African schooling system (that formerly designated as "white") performs rather poorly.

In very broad terms, the data indicate that from an educational perspective South Africa followed a modernisation trajectory that, although it drew ever larger numbers of pupils into the schooling system, was partial, distorted and fundamentally dysfunctional. As such it might plausibly be said to have been inimical to the long-term prospects of sustained economic growth and prosperity. In particular, the data indicates that race - rather than class - was the principal determinant of educational opportunities and, therefore, of the structure of individuals' life chances. In this regard, the evidence supports the claim already intimated that the system of racial estates, as reflected in the educational system, constituted a substantial impediment to the realisation of a successful modern economy.

In terms of the modernising influence that the educational sector should therefore represent in any society, and in terms of its ability to act as an enabling device for its population to deal with new challenges of development, South Africa has not done well, and through the 1990's continues to manifest signs of inadequacy.

If South Africa is to address the challenges of development that

confront it, education policy will have to focus seriously on the deficiencies presented in the present study - namely the structural inequalities, the financial inefficiencies and declining educational outputs.

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