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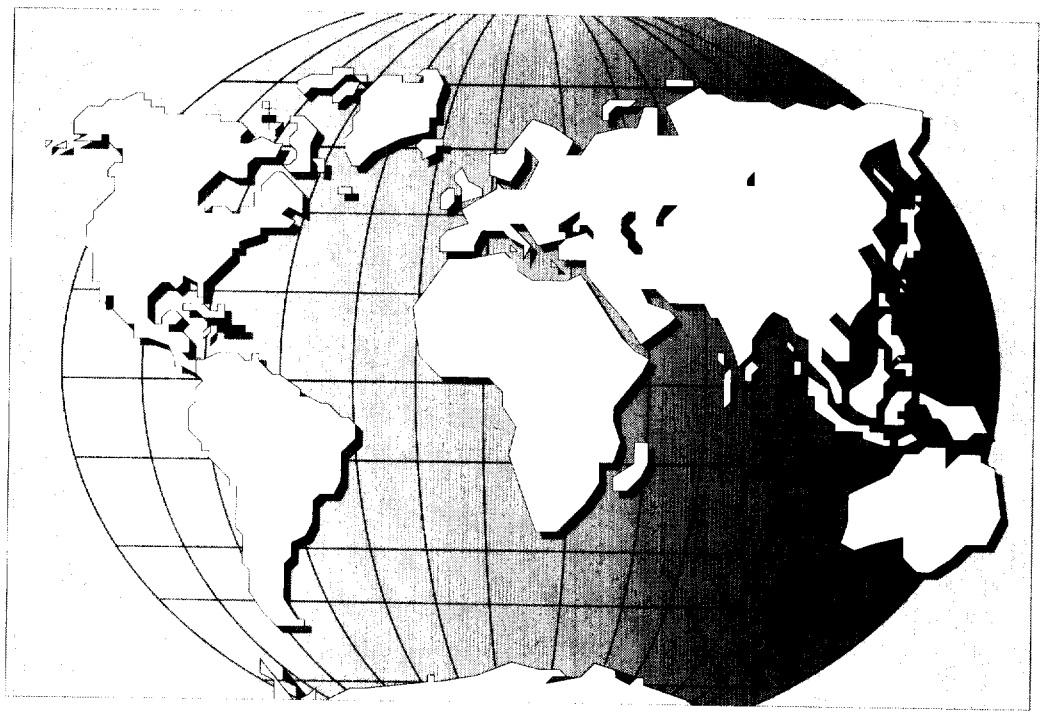
Equity and Efficiency in Public Education Expenditure in South Africa

Analysis of Recent Evidence

Luis Crouch

March 1995



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Contents

Executive summary i
Introduction 1
Current private costs and the feasibility of "free" education 2
Equity of public spending patterns 4
Efficiency of spending 8
External efficiency 9
Internal efficiency at the margin 13
Private willingness to spend and the fiscal efficiency rationale for targeting education subsidies 15
Political economy of education: towards a "Latin-Americanization" of South African education? 19

Appendix A. Notes on the Economic Landscape Survey (ELS) 26
Appendix B. Calculation of historical levels of per capita expenditure 30
Appendix C. Notes on estimation of rates of return 35
Appendix D. Raw regression results 42

Tables

Table 1. Private expenditure on education, by type of school and racial group 2
Table 2. Mean number of children in school in each family, by type of school and racial group 3
Table 3. Private expenditure per child by type of school and racial group 4
Table 4. Measures of income distribution by racial group 5
Table 5. Distribution of enrolment by income decile, type of school, and racial group 6
Table 6. Population percentages by population decile in overall income distribution 6
Table 7. Distribution of public expenditure by income decile, racial group, and type of school 7
Table 8. Income percentages by population decile of the overall income distribution 8
Table 9. Addition to monthly income from completion of school levels, by racial group . . 10
Table 10. Addition to monthly income from one additional year of schooling 10
Table 11. Various education public costs, by type of school and racial group 11
Table 12. Measured rates of return 12
Table 13. Calculation of marginal productivity of investment using survival rates 14

Figures

Figure 1. Age-earnings profiles by level of education, all groups 12
Figure 2. "Production" of schooling survival via per capita spending 15
Figure 3. Charts for analysis of targeted subsidies 17

Equity and Efficiency in Public Education Expenditure in South Africa: Analysis of Recent Evidence

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Executive Summary

In this paper we present evidence that argues that:

- Given current private costs paid largely by parents, truly free education for all, even keeping the current dismal quality which the majority has, is unachievable without a budget explosion. With a yearly budgetary growth in the neighborhood of 3% to 4%, it will simply be impossible to satisfy all the special interests, provide truly free, compulsory education for all who wish it, and improve its quality at the bottom end of the scale, without serious contribution from more parents in the form of fees.

- Current subsidies are not very equitable, even **within** traditionally disadvantaged groups. Income distribution within these groups is unequal, and education subsidies, particularly at the university level, go disproportionately to the relative elites within those groups, elites that are rather well-off, relative to their poorer brethren of the same skin color. This is opposite to the popular imagination that supposes that the traditionally disadvantaged are a teeming mass of equally poor and equally disadvantaged.

- There is evidence in South Africa, as common sense would indicate and as is the case in most countries, of strongly diminishing marginal returns to per capita educational investment. Current investment levels, by favoring certain groups (e.g., all whites, Africans at university) have pushed returns in those areas to levels much lower than those still available in other areas/groups (e.g., general secondary education of Africans). Common sense would suggest that highest overall returns can be obtained by pushing investment out in some areas and pulling it back in others so that returns at the margin are roughly the same across levels or types of schools and population groups.

- There is enough evidence to support the idea that private willingness to pay is relatively high and relatively smoothly distributed, such that the fiscal savings or quality improvements that could be made by targeting subsidies toward the poor amount to at least 15% of the expenditure implied by an education system that made education "free" to almost everyone.

We then argue that the attempt to meet all special interests, and provide "free" education for all who wish it without fees, will result in a mediocre or poor quality public system. We point out that, parallel to the public system, a private system will emerge that will attend to the children of the technocracy and political classes. This means that the public system will be managed by

persons whose children do not participate in it. We call this possible scenario a "Latin Americanization" of South African education: a two-tiered system of "free" mass education of poor quality, publicly funded and run by an uninterested bureaucracy, on the one hand, and, on the other, a private, unfettered system where even the children of the progressive elites are catered to.

We finally point out that, given the empirical evidence behind the propositions above, the process of "Latin Americanization" can be avoided via a multi-tiered system of subsidies, where effort in financing and governance is elicited from parents according to their ability to pay and organize. This would result in the development of a unified system of national education with no clear-cut division between "public" and "private" sectors, but, instead, a gradient of "publicness" and "privateness" in which everyone has a stake and therefore a sense of shared fate. It would also result in significant fiscal savings that could be used to improve the quality of education at the bottom of the income spectrum.

Equity and Efficiency in Public Education Expenditure in South Africa: Analysis of Recent Evidence

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Introduction

In a recent issue, a South African weekly news magazine leads a long article with the headline question: "Can the ANC deliver free state schooling?"[1] A rigorous answer to a question phrased in such a manner is: of course, if it is willing to sacrifice something else. Thus, since the real issue is a matter of choice and tradeoffs, a more meaningful question, from a public policy point of view, is not whether the state can fund "free" basic education for all, but whether it should.[2] Economists and other public policy analysts tend to answer the "should" question by, in turn, asking two other questions: Would it be efficient? Would it be just? A positive answer to either question, or ideally both questions, usually would imply that the state should attempt "free" state funding for all. We note that the two questions are not necessarily unrelated. Inefficiency in public spending is, after all, a form of injustice to the tax-paying citizen. And it is clear that certain forms of injustice (e.g., arbitrary, statutory labor market discrimination) can give rise to inefficiencies in the allocation of public resources (e.g., allocation to the education of certain labor market segments). In this paper we contribute to answering these and other related questions by presenting results of a recent household survey (the Economic Landscapes Survey--ELS),[3] supplemented with some data from official published sources.

In what follows, we present our general results only in tabular or graphic format. Since the background research is slightly technical but is an important part of the argument, we do present the more important technical issues, but only in footnotes or appendices.

Current private costs and the feasibility of "free" education

In this section we want to establish the fact that private expenditure by parents (who are a much more important segment of the private sector than what is usually thought of as "private sector" in South Africa, namely the **corporate** private sector) is a very large proportion of total education

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[1]**Weekly Mail and Guardian**, Vol. 10, No. 23, June 10-16, 1994, p.27.

[2]Throughout this paper we use the word "free" in quotation marks because, of course, almost nothing is free. Any activity making a claim on real, scarce resources is by definition not free to society. Someone, usually the vague "taxpayer," is paying for "free" things. Furthermore, it is also clear that even when something is nominally free to the user, in the sense applied to basic mass education in South Africa, the user still incurs heavy costs in ancillary out-of-pocket expenditures such as books and transport, as well as the opportunity cost of foregone earnings in the labor market or output in the farm.

[3]See Appendix A for some technical notes on this survey.

spending. The ELS survey results make it clear that private, household expenditure on education is a significant proportion of both total education expenditure and of household income. To make education truly "free" from the point of view of the consumer, unless subsidies are strongly targeted, would therefore be a nearly impossible task for the fisc.

Table 1 below shows levels of expenditure per family by type of schooling and by population group, first for all families in the survey and then for families who had children attending each level.

Table 1. Private expenditure on education, by type of school and racial group, 1993 Rs. per year

Type of school	All groups		African		Coloured		Indian		White	
	All fams.	Fams. w. children	All fams.	Fams. w. children	All fams.	Fams. w. children	All fams.	Fams. w. children	All fams.	Fams. w. children
Nursery	39	1283	23	940	11	275	3	423	127	2409
Pre-school	34	550	33	454	19	406	22	387	48	2198
Primary	350	1067	286	786	243	987	172	707	713	3294
Secondary	372	1592	335	1276	128	971	309	1368	669	4189
Technical Coll.	21	2281	10	1666	42	2271	142	4405	40	2761
Teach. Train.	15	2957	20	2878	-	-	-	-	-	-
Technikon	35	5857	30	4599	-	-	57	4279	74	12134
Univ.	225	13153	243	14115	-	-	63	4771	289	10985
Tert. tot.	296	8722	303	9244	-	2271	297	4882	404	9203
Other	5	6410	-		-	-	-	-	32	6410
Total	1096	2300	980	1871	443	1211	802	2023	1992	5885

Source: ELS Survey

The level of per household spending as reported in the survey is very high. For all families, that is, averaging together families with and without children, spending at Rs. 1096 per year is equivalent to about 10% of household head's income. For families with children, spending goes up to about 20% of the income of the household head. Even if these numbers turn out to be somewhat exaggerated (e.g., if we were to take into account family income as opposed to income of household head, or if the sample is biased), it is clear that education represents a significant outlay for most families. It is also clear that **poorer groups spend much more in private education outlays, as a proportion of income, than do richer groups**.

The survey makes it possible to calculate numbers of children enrolled in school, and hence to calculate levels of per child spending. Table 2 (next page), shows the numbers of children in school, both for families as a whole, and for families with children in each specific schooling category.

Table 2. Mean number of children in school in each family, by type of school and racial group

Type of school	All groups		African		Coloured		Indian		White	
	All fams.	Fams. w. children	All fams.	Fams. w. children	All fams.	Fams. w. children	All fams.	Fams. w. children	All fams.	Fams. w. children
Nursery	0.032	1.1	0.025	1.0	0.047	1.2	0.008	1.0	0.056	1.1
Pre-school	0.079	1.3	0.094	1.3	0.061	1.3	0.059	1.0	0.025	1.2
Primary	0.556	1.7	0.627	1.7	0.457	1.7	0.324	1.3	0.329	1.5
Secondary	0.343	1.5	0.394	1.5	0.184	1.4	0.300	1.3	0.211	1.3
Technical Coll.	0.014	1.5	0.013	2.1	0.018	1.0	0.032	1.0	0.015	1.0
Teach. Train.	0.005	1.0	0.007	1.0	-	-	0.006	1.0	-	-
Technikon	0.006	1.0	0.006	1.0	-	-	0.013	1.0	0.006	1.0
Univ.	0.020	1.2	0.021	1.2	-	-	0.013	1.0	0.029	1.1
Tert. tot.	0.046	1.3	0.047	1.4	0.018	1.0	0.065	1.1	0.050	1.1
Other	0.001	1.0	0.000	-	-	-	-	-	0.005	1.0

Source: ELS Survey

From this table, it is clear that different groups have different stakes in different types of schooling. The interest of the African population in teacher training and technical colleges is clear. On the whole, African families do not have more children in technical colleges than other groups, but if they do have children in technical colleges at all, they tend to have two children enrolled, whereas other groups have only one. While for families with children in school the numbers enrolled in primary and secondary are about the same across racial groups, it is clear that taking African and coloured families as a whole, the stake in primary education is much greater, since on average these two groups have 0.6 and 0.45 children in primary school, whereas Indians and whites have only 0.3 children in primary school. This naturally reflects the lower fertility rates among Indians and whites. It is interesting to note that, at least for this sample, the stake of Africans in tertiary education is about the same as for the population as a whole.

From the previous two tables it is possible to calculate per student private expenditures, as shown in Table 3 (next page).

The levels of per child spending are strikingly high in comparison with public spending. At the university level, private spending is almost as high as public spending, which means that private spending is about half of the total. At the primary and secondary levels, private spending is about half of public spending, making private spending about one third of the total. From this, it would appear that a commitment to truly "free" education (from the consumer's point of view) would increase the state's education budget by anywhere from one third to one half without even beginning to affect quality and access. This suggests that, in order to avoid explosions in the budget, enhancements in public spending so as to make

Table 3. Private expenditure per child by type of school and racial group

Type of school	Total	African	Coloured	Indian	White
Nursery	1207	904	231	423	2270
Pre-school	430	352	314	375	1896
Primary	629	456	578	529	2164
Secondary	1084	852	692	1030	3176
Technical Coll.	1497	798	2271	4405	2761
Teach. Train.	2957	2878	-	-	-
Technikon	5857	4599	-	4279	12134
Univ.	11034	11522	-	4771	9896
Tert. tot.	6494	6397	2271	4593	8080
Other	6410	-	-	-	6410
Total	1037	826	577	1063	2947

Source: ELS Survey

education more nearly "free" to the consumer should be carefully targeted by income group, so that they reach only those for whom the need for private outlays strictly limits further education. The following section makes this point not from a budgetary point of view, but from an equity point of view, in comparing the current distribution of public spending by racial group and by level of schooling.

Equity of public spending patterns

In this section we explore the incidence of public expenditure on population groups by racial group and income. We establish the fact that current spending patterns are skewed toward the higher income groups, and that university spending is particularly focused on the top 10% of the income distribution, even for Africans. But first, it is important to establish the result that, while the distribution of income between racial groups is highly skewed, it is also skewed **within** racial groups. Table 4 (next page) shows results from both the 1991 Census and the ELS survey on the distribution of income within racial groups.

In this table, the greater the "summary measure," the more equitable the income distribution. Inversely, the smaller the share in total income of the top 10% of the income distribution, the greater the equity in the distribution, all other things being equal. This last measure is not as good as the previous "summary" measure, because all other things are not always equal. But it is an easier index to understand. Two things are clear from this table. First, the within-group income distribution is not necessarily more even for the African group than for others. In fact, at least according to the data in the ELS survey, the income distribution would appear to be substantially more unequal for Africans than for any other group. The common wisdom, perhaps particularly amongst politicians, that there is a huge mass of

Table 4. Measures of income distribution

	Income dist. summary measure		Share of top 10% of income distribution	
	Census	ELS	Census	ELS
African	0.23	0.20	0.36	0.41
Coloured	0.24	0.29	0.36	0.30
Indian	0.25	0.28	0.39	0.32
White	0.24	0.27	0.38	0.31
All	0.18	0.19	0.50	0.45

Source: ELS Survey, 1991 Population Census. For the Census data, the summary measure of the income distribution is the piece-wise integration of the area under the Lorenz curve for grouped income data. Income data for the 1991 Census are from pp. 292 to 306, 1991 Population Census, Income by Development Region, Statistical Region, and District. In both cases, zero incomeearners are excluded. The within-group mid-point chosen was that which made the estimate of the overall distribution's mean converge to a steady value. For the ELS survey the piece-wise integration was from individual cases.

uniformly poor Africans on one side of the income distribution, and mostly well-off whites on the other side, clearly veers far from reality. To be sure, the average income of whites is much greater, and whites are bunched in the top 10% of the overall income distribution, but the distribution of income within the African group has a steep gradient. If the situation were as normally pictured, then a single-step targeting system, where education in the publicly subsidized system is "free" but the well-off who wish to opt out of the system via non-subsidized private education can do so, would make some sense. We will suggest below that for equity, efficiency, and political-economic reasons, South Africa needs to guard against the development of such a system.

Second, as would be expected, the distribution measures when all groups are taken together show much more inequality than for any group by itself.

With this background, we can now turn to examining the distribution of subsidies by income and racial group. Table 5 (next page) shows the distribution of attendance at three types of schools, by income decile and by racial group.

As in most countries, the distribution of primary enrollment by income decile almost exactly matches the distribution of the population by decile. That is, the poor attend primary school at almost exactly the same rate as the rich. The same is true at the secondary level. But university enrollments are overwhelmingly concentrated among the richer segments of the population: 59% of the enrollment comes from the top 20% of the income distribution. Even among Africans, 56% of the students come from the top 20% of the income distribution. This does not refer to the top 20% of the **African** income distribution, but to the top 20% of the overall income distribution. In other words, 56% of the African university students are from families that are as well off as the top 20% families in all of South Africa. Throughout the Third World, students at public universities have managed to portray themselves as the "sons and daughters of the people," with an unchallenged claim to legitimacy, and have made use of this ideological claim to defend unreasonable levels of flat subsidies. We see that the truth is far different, in South Africa as elsewhere. If we compare the distribution of students attending university by income

Table 5. Distribution of enrollment by income decile

School Type	Group	1	2	3	4	5	6	7	8	9	10
Prim.	African	10.3	10.6	11.0	12.8	9.8	12.0	10.8	9.1	10.2	3.5
	Coloured	0.0	0.0	5.4	6.1	5.0	3.0	28.9	20.4	20.9	10.3
	Indian	0.0	0.0	0.0	0.0	8.4	0.0	10.2	29.0	21.9	30.5
	White	0.0	3.0	0.8	0.0	1.5	1.5	2.3	13.8	13.9	63.2
	Total	**8.7**	**9.2**	**9.6**	**11.1**	**8.8**	**10.5**	**11.2**	**10.4**	**11.3**	**9.3**
Sec.	African	10.2	9.4	10.6	8.1	12.0	12.1	11.1	10.5	11.4	4.6
	Coloured	0.0	0.0	0.0	15.5	4.8	22.0	8.6	23.5	21.3	4.3
	Indian	0.0	0.0	0.0	0.0	18.5	0.0	2.2	19.0	21.9	38.4
	White	0.0	5.5	0.0	2.8	4.0	8.4	4.1	8.4	13.5	53.4
	Total	**8.9**	**8.6**	**9.2**	**7.7**	**11.3**	**11.9**	**10.3**	**11.0**	**12.1**	**8.9**
Univ.	African	0.0	0.0	0.0	0.0	2.4	23.0	6.0	13.1	25.6	30.0
	Coloured	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Indian	0.0	0.0	0.0	0.0	0.0	24.4	0.0	0.0	0.0	75.6
	White	0.0	12.5	0.0	0.0	0.0	0.0	0.0	12.5	11.6	63.4
	Total	**0.0**	**1.7**	**0.0**	**0.0**	**2.0**	**20.0**	**5.1**	**12.7**	**23.2**	**35.4**

Source: ELS survey. Row totals add up to 100.

decile to the distribution of the population by income decile as shown in Table 6 below, we note that there is a large disparity, particularly for Africans, between shares of university attendance and shares of the population. Whereas 63% of whites at university come from the top decile, 43% of all whites are in that income decile. Thus, some 63% of the subsidy is going to 43% of the population, which is a bit inequitable, but not unusually so. But for Africans the situation is very different: 56% (25.6%+30%) of the subsidy to African university students is going to the richest 11% (7.7+3.6) of the African population. In short, it would seem that there is strong justification for income-based targeting, and little justification for the assumption that racial group is a valuable income proxy, at least for university subsidy purposes.

Table 6. Population percentages by population decile in the overall income distribution

	1	2	3	4	5	6	7	8	9	10
African	17.7	12.0	12.4	11.8	10.1	11.2	10.6	7.4	7.7	3.6
Coloured	0.0	3.5	5.1	13.9	11.2	10.1	17.9	20.3	12.4	5.6
Indian	0.0	0.7	0.6	0.0	17.1	3.6	8.1	22.2	18.0	29.7
White	0.0	2.8	1.1	0.7	7.6	3.4	4.6	16.8	19.5	43.4
Total	**10.0**	**9.9**	**10.0**	**10.1**	**10.0**	**9.8**	**10.2**	**10.0**	**9.9**	**10.1**

Source: ELS survey. Note: in principle the last row above should have exactly 10% in each decile, since that is how the data are constructed. However, due to the size of the survey, the distribution's discontinuity is visible even with only three significant digits and therefore each decile has only approximately 10% of the population in it. Note that row totals add up to 100.

Looking back at Table 5, note that while the overall attendance distribution at primary and secondary levels matches the population distribution, if we look at the distributions by racial group the matter changes. 63% of white primary school students are from the top decile, and the equivalent percentages for whites at secondary and university levels are about the same. Since whites receive a larger per capita subsidy, this means that the distribution of the overall subsidy by income decile, even for primary, will not be as equitable as the distribution of enrollment by income decile. We applied per capita costs at primary, secondary, and university levels by racial group to the enrollment distribution, in order to create a distribution of public subsidies by racial group and by income group. This is presented in Table 7 below. Note that the distribution of public expenditure within racial group is naturally the same as the distribution of enrollment (under the not unreasonable--though not exact--assumption we have made of equal subsidies within racial groups). But because per capita subsidies differ by racial group, the distribution of the total subsidy is not the same as the distribution of total enrollment. The relative uniformity of the per capita university subsidy across racial groups explains why the distribution of the total subsidy at the university level is more nearly the same as the distribution of enrollment.

The interesting point about the table below is to see how the fact that 63% of white primary enrollment is from the top 10% of the income distribution, combined with the fact that white subsidies are so much higher, together imply that more than 21% of the total primary subsidy goes to the top 10% of the income distribution. Note that we are making the simplifying assumption that all Africans were attending schools controlled either by the DET or the various homelands. Since some Africans were attending "white" schools and universities, and since these are, in all likelihood, wealthier Africans than the average, the distribution of public subsidies within the African group is in all likelihood somewhat more skewed than these data show. In short, the differential in subsidies by racial group makes even the primary school subsidy inequitable in this strong sense, a situation which is rather unusual by international standards.

Table 7. Distribution of public expenditure by income decile, racial group, and type of school

		1	2	3	4	5	6	7	8	9	10
Primary	African	10.3	10.6	11.0	12.8	9.8	12.0	10.8	9.1	10.2	3.5
	Coloured	0.0	0.0	5.4	6.1	5.0	3.0	28.9	20.4	20.9	10.3
	Indian	0.0	0.0	0.0	0.0	8.4	0.0	10.2	29.0	21.9	30.5
	White	0.0	3.0	0.8	0.0	1.5	1.5	2.3	13.8	13.9	63.2
	Total	**6.1**	**7.2**	**7.3**	**8.2**	**6.9**	**7.9**	**10.2**	**11.9**	**12.5**	**21.8**
Second	African	10.2	9.4	10.6	8.1	12.0	12.1	11.1	10.5	11.4	4.6
	Coloured	0.0	0.0	0.0	15.5	4.8	22.0	8.6	23.5	21.3	4.3
	Indian	0.0	0.0	0.0	0.0	18.5	0.0	2.2	19.0	21.9	38.4
	White	0.0	5.5	0.0	2.8	4.0	8.4	4.1	8.4	13.5	53.4
	Total	**7.1**	**7.8**	**7.4**	**7.0**	**10.1**	**11.4**	**9.2**	**11.0**	**12.7**	**16.3**
Univ	African	0.0	0.0	0.0	0.0	2.4	23.0	6.0	13.1	25.6	30.0
	Coloured	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Indian	0.0	0.0	0.0	0.0	0.0	24.4	0.0	0.0	0.0	75.6
	White	0.0	12.5	0.0	0.0	0.0	0.0	0.0	12.5	11.6	63.4
	Total	**0.0**	**2.2**	**0.0**	**0.0**	**1.9**	**19.0**	**4.9**	**12.7**	**22.7**	**36.6**

Source: ELS survey. Row totals add up to 100.

Finally, we note that while the distribution of the public education subsidy is not strongly equity enhancing, because the better-off get a bigger share of the subsidy than their share of the population, yet for all groups except Africans in universities, the distribution of subsidies is equity enhancing at least in the sense that the better-off get a smaller share of the subsidy than their share of income. For Africans it is not equity enhancing even in that sense. This can be seen comparing Table 7 (previous page) and Table 8 below. For example, while whites in primary schools in the top 10% of the income distribution get 63% of the subsidy for whites, whites in that category have 77% of the income--they get less in subsidy than their share of the income. For Africans in universities, however, 30% of university students come from the top 10% of the income distribution, yet Africans in that category have only 21% of the income. Presumably, since taxation is at least somewhat progressive even for Africans (though probably less progressive than for whites, given that a greater proportion of the white population is in the formal sector), it is possible that the education subsidy is re-distributive even for Africans in universities in ater-tax terms. But it is important to note that by far the most equity-enhancing expenditure to make is in primary and secondary education focused toward the poor, and flat subsidies to Africans at university are not very equity-enhancing.

Table 8. Income percentages by population deciles of the overall income distribution

	1	2	3	4	5	6	7	8	9	10
African	0.1	0.8	3.2	4.8	6.7	10.7	14.3	14.5	23.9	20.6
Coloured	0.0	0.0	0.6	3.9	4.1	5.8	16.3	26.8	24.1	18.5
Indian	0.0	0.0	0.0	0.0	2.9	1.0	3.3	13.8	17.0	61.9
White	0.0	0.0	0.0	0.1	1.0	0.6	1.3	6.9	13.0	77.0
Total	0.0	0.4	1.6	2.6	4.1	5.9	8.7	12.2	19.2	45.4

Source: ELS survey.

Efficiency of spending

In this section we focus on the issue of efficiency from a social point of view. We are concerned with the overall allocation of public funding of education to broad sub-sectors, and the educational and economic results thereby obtained. We are not concerned with the administrative efficiency with which the funding is then managed within any particular education sub-sector. The latter is indeed an important question, but it is only tangentially within the scope of this paper. Due to the differential rates of subsidies by racial group, and for Africans by administrative units, and due to the fact that record-keeping was separate for all these groups and by level of the school system, it becomes possible to construct (conceptual) curves that show the relationship of marginal returns to educational investment and the level of investment per student. In essence, the disaggregation of record-keeping allows one to "fit" lines of educational "productivity" to per capita investment, and thus obtain some notion of how strongly diminishing marginal returns to education investment might be in South Africa. This process suggests where "over-investment" of public funds has taken place, and thereby continues to construct an argument for targeting of public expenditures in ways already discussed above.

We focus on this issue in two ways. First, by looking at "external" efficiency, in terms of labor market returns, and, secondly, by looking at "internal" efficiency in terms of cohort educational "survival" (or net throughput) rates.

External efficiency

One way to begin to look at the efficiency of spending is to wonder whether funding has typically been allocated to sectors where the real, labor market returns to education are greatest. In this sense, attempting to measure the impact of education on earnings by racial group and by type of school, and comparing this to the per capita spending on education of various groups, can be very enlightening. We proceeded in two steps. First, we determined the contribution of education to earnings, controlling for factors such as racial group, geographical location, and age. We therefore have a set of results that measure the gross "returns" to education by racial group. We then compare this "return" to education to historical expenditure on education by racial group. This allows us to construct a sort of "yield curve" where the return to education is measured against the volume of per capita spending on education, and it allows us to plot each racial group along the "yield curve." It is to be expected that, all other things being equal, there should be decreasing returns to per capita investment in education. The more one spends, the smaller the return of the extra, or marginal, unit of spending. In most countries, "all other things" are indeed quite equal, and with rising per capita expenditure on education (as a function of, say, the wealth of the local school district), one would expect decreasing marginal returns. But in South Africa one would expect that, because of statutory and non-statutory discrimination in the labor market, the net return to the education of, say, blacks, would not be much higher than that to whites, even though per capita expenditure on blacks has been much lower. In some crude sense, one might expect that the discrimination faced in the labor market would, logically but perversely, justify lower per capita expenditure on education of those discriminated against in the labor market. Indeed, if we understand it correctly, that was to a large extent the whole rationale of the structure of apartheid education subsidies.

Given this expectation, we found the results somewhat surprising. That is, we found that even in spite of severe labor market discrimination, the net returns to black education were relatively high, because the amount invested was so low. Below we take this discussion in two steps. First, we present evidence as to the contribution of education to monthly income, using various measures and techniques. Second, we add the cost data to determine a "yield curve."

Table 9 (next page) shows the "gross returns" of education in terms of additions to monthly income from completing certain levels or types of education. The data refer to the effect on income of having completed the cycles shown, holding age and urban vs. rural location constant, for each racial group. The last column below refers to types of post-secondary education for which completed secondary education is not an entrance requirement. In what follows, we will take technical colleges to be a proxy for such education.

Table 9. Addition to monthly income from completion of school levels

	Primary	Secondary	Post-Secondary (with comp. sec. education)	Post-Secondary (with incom. sec. education)
African	196***	481***	1395***	627***
Coloured	448***	705***	1439***	555**
Indian	82	1175*	1942***	645
White	-560	155[4]	1393*	95
All	344***	921***	2144***	853***

Source: Calculated from ELS survey. The data shown are the coefficients attached to dummy variables for each level of education shown, where other factors such as urban residence and age and its square are taken into consideration. The regressions were linear, and the raw results are shown as appendix material. Note: *** means that a confidence interval narrower than 1% does not include zero, ** for smaller than 5%, etc., as usual.

A few points are worth remarking upon. First, the raw or gross return to post-secondary education without completed secondary education is quite low: in the case of the coloured group, for example, it is actually lower than the gross return for secondary education. This is also the case for the overall population. Unless such post-secondary programs are less expensive than secondary education itself, one has to wonder about the economic value of such programs. As we will see below, this concern appears justified. Second, the gross return to going on to post-secondary education is only two to three times higher than the gross return to secondary education itself, yet the cost of post-secondary education can be five to ten times the cost of secondary education, as can be seen in Table 11 below. It would seem that improving both the coverage and the quality of secondary education for all should be a higher priority than expanding post-secondary for a few.

Essentially the same results can be seen if we view the gross return of an extra year of education, as shown in Table 10 below.

Table 10. Addition to monthly income from one additional year of schooling

	Primary	Secondary	Post-Secondary
African	10	106***	326***
Coloured	1	122***	204***
Indian	138	312***	383***
White	37	343**	399***
All	17	175***	446***

Source: Calculated from ELS survey.Values were derived as explained above, except that the schooling indeces represent years of education, rather than being dummy variables for completion of each level. Note: *** means that a confidence interval narrower than 1% does not include zero, ** for smaller than 5%, etc., as usual.

[4]In Table 9, the gross return to secondary education among whites was estimated as statistically indistinguishable from zero. This result makes it difficult to draw comparisons between the gross retrun to education by racial group and its cost by racial group. For purposes of the following analysis, we will assume that instead of 155 as we have in Table 9, the gross return to secondary education for whites is 1610. This is calculated as follows. First, we took the ratios of the return of white education to education in other groups from Table 10. (That is, 343/106, 343/122, etc.) We then applied those ratios to the secondary return of non-white groups in Table 9, which gave us three measures of the return to white secondary education. The average of those three measures is 1610.

We derive the same conclusions as above. An extra year of post-secondary education adds only about as much income as an extra year of secondary education for whites and Indians, and only about two or three times more income for Africans and coloureds. This would suggest, as we saw above, that, from a point of view of returns to public investment, the emphasis should be in redirecting budgetary allocations away from tertiary education, particularly in traditionally "white" areas, toward providing higher quality secondary education for Africans in particular. Note that there are so few persons with less than primary education that it becomes difficult to estimate any significant return to primary education at all. This does not mean that primary education has a low return in a fundamental sense. Evidently, since higher levels of education have a high return and primary education is a *sine qua non* for those levels, its return should be reasonably high.

Table 11. Various education public costs, by type of school and racial group

	Historical Secondary (1971-1985) (in 1992 Rs.)	Current (1990) Secondary (1990 Rs.)	Current Tert. (Univ+Tech.) (1990 Rs.)	Current Tech. Coll (1990s Rs.)
African	1,600	2,000	11,500	16,400
Coloured	2,100	3,600	12,900	9,300
Indian	3,300	3,200	10,000	5,300
White	7,600	7,300	13,600	5,800
Mean	2,600	2,900	13,100	8,800

Sources: These numbers are meant to give only an approximate idea of the costs. Historical data were estimated for the periods 1971, 1975, 1980, and 1985 and then brought forward using the GDP deflator as detailed in Appendix B. These years were used because they are representative of the period when the great majority of the survey respondents, whose average age is 35, was educated. Thus, their human capital today, and hence their measurable productivity, should be related to the cost of their education when they were trained. Current secondary and university costs are the total costs data divided by total enrollment in the relevant legislative and administrative groups, as reported in DNE's Education in the RSA 1990. It is clear that this is only an approximation, particularly at the University level, because many non-whites studied in universities under the control of the House of Assembly. All data are rounded to the nearest 100, to reflect their approximate nature.

Information on the "productivity" of education, in gross retursn terms such as those in Table 9, can be combined with public and private cost data (as in tables 11 and 3) to get estimates of the net returns to education by type or level and by racial group. The stream of extra earnings due to completion of a certain level, relative to the previous level, is compared to the public and private costs. This yields a "profit" or "return" percentage. The results are shown in Table 12 (next page).

The line labeled "All (AP)" in Table 12 refers to rates estimated using an age-profile of earnings. For the other cases, we were forced to make the assumption that the earnings that accrue to completion of a school level accrue immediately and stay constant through life, because the sample size was not large enough to allow estimation of education- and race-specific age-profiles. That the age profile matters can be seen in the accompanying graph, which shows the fitted profiles for the "All (AP)" category. Comparison between the "All" line and the "All (AP)" line also makes it clear that working with a true age profile makes a difference. However, the gross rank ordering of the various rates of return is likely to be essentially invariant to the use of true education- and race-specific age-profiles.

Table 12. Measured rates of return (percentages)

	Second. with historical cost data		Second. with curr. cost data		Post-Sec. (with comp. sec.) with curr. cost data		Post-Sec. (with incom. sec.) with curr. cost data	
	Public	Private	Public	Private	Public	Private	Public	Private
African	17	29	15	27	9	17	6	51
Coloured	13	25	9	22	6	14	-	-
Indian	26	42	26	42	9	18	-	-
White	10	21	11	21	9	16	10	20
All	21	36	19	35	10	20	7	28
All (AP)	13	19	13	19	9	17	11	42

Source: estimated from data in previous tables, and as described in Appendix C.

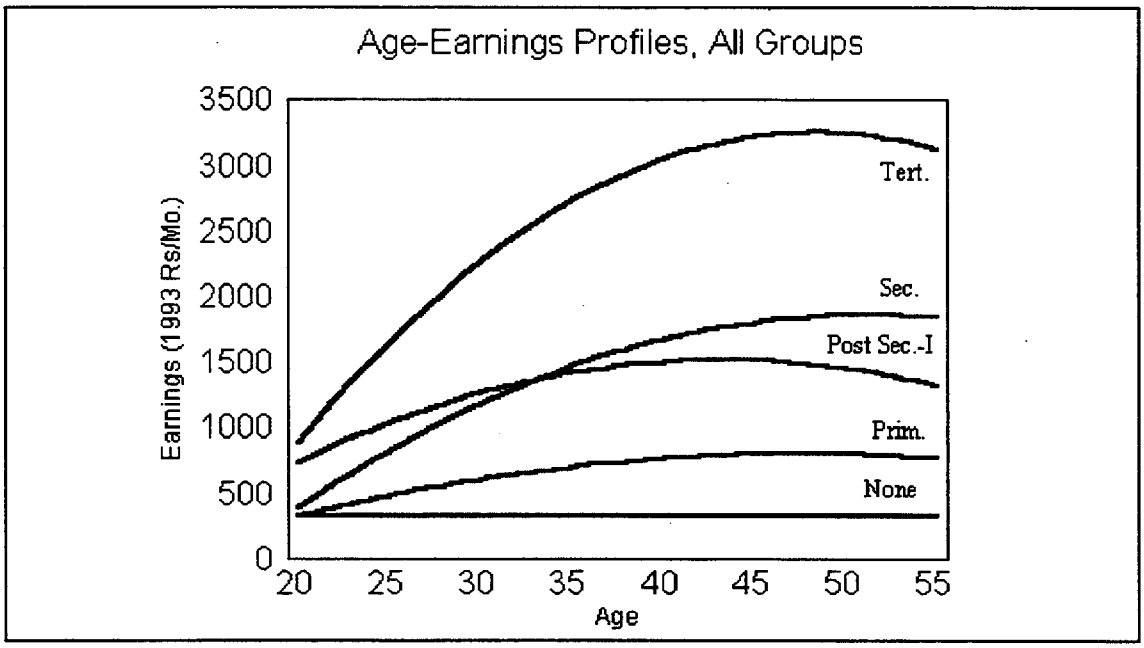

Figure 1. Age-earnings profiles, by level of education, all groups

The table makes it clear that rates of return are typically highest where investments per capita are lowest. Even though additions to monthly income due to completing secondary education are lower for Africans, say, than for whites, due to labor market discrimination, investment in Africans has been so low that the rate of return is considerably higher for them. The very large returns for Indians might reflect, we hypothesize, the fact that investment per capita was relatively low while Indians faced less labor market discrimination either in the overall labor market or in a labor market oriented to other Indians. Furthermore, the sample of Indians was small, so we must be cautious about these results, even though they are statistically rather

significant. Ignoring the Indian result (which is not replicated, say, at university level), it is clear that the highest public returns are in African secondary education.

Note that because the gross marginal returns to tertiary education for Africans is not much lower than for whites, and because the per capita costs for African tertiary education are not much lower than for whites, the net rates of return at the university level are about the same for Africans as for other groups. The uniformity of rates of return at the university level among racial groups is striking.

The divergences between public and private returns are worth noting, because they tend to signify situations where education tends to over-expand relative to its benefit/cost ratio, and are thus areas where policy-makers feel particular pressure to expand in spite of the fact that these types of education may be socially not as productive as others. Note that the **relative** (in ratio or percentage terms) divergence between public and private returns at the secondary level is least among Africans. Overall, the ratio of private to public returns is higher for university education than for secondary education, which tends to imply greatly politicized private (sometimes improperly called "social," to distinguish it from "productive" or "economic") pressure for places at university. Finally, note that the divergence between public and private costs at the technical college level is simply enormous (assuming that the earnings results on "post-secondary education with incomplete secondary" apply to technical colleges) while, simultaneously, the social returns to this type of education are very low. This means that South Africa will face pressure to expand precisely in the areas (university, technical colleges and other forms of "training") where expansion is least rational. This needs to be made subject of considerable debate and dialogue. The area requiring most attention, and with the greatest real pay-off, would be to improve access and quality of generic, basic secondary education for low-income families. Instead, severe political pressure is likely to be felt to expand university and technical college (and probably other forms of "applied" or vocational training as well) access for families in the upper half or even the upper fourth of the income distribution. This will be done, and is already being done, in the name of access to tertiary education by the masses. We have shown that the majority of public subsidies, even to Africans at university, go to top 20% of the income distribution. On the other hand, private expenditures at the university level are already extremely high. Thus, a wise combination of fees and targeted subsidies is called for. The typical Third World temptation of flat university and technical education or "training" subsidies for large proportions of each cohort should be resisted.

To summarize this section on external efficiency: it appears that there are indeed decreasing marginal returns to per capita investment, both by level in the system and in terms of per capita investment by racial group. In levels of the system and for racial groups where per capita investment has been pushed the hardest, such as in university education for most groups and secondary education for whites, returns are down to the range of 8% to 10%, whereas in other areas where per capita investment is very low, such as in general secondary education for Africans, rather high returns still seem to be available.

Internal efficiency at the margin

Per capita investment should be expected to increase internal efficiency by reducing dropout and

repeater rates, but internal efficiency should be expected to increase at a decreasing rate in response to per capita spending. That is, internal efficiency should be subject to diminishing returns at the margin. Some idea of this can be derived by comparing a simple index of internal efficiency, the ratio of Standard 5 enrollment to SSA enrollment, to per capita investment per child across racial groups and, within the African group, by administrative department. Table 13 shows these results.

Table 13. Calculations for marginal productivity of investment using survival rates

Group	Enr. SSA	Enr. Std 5	Per stud. cost	Ratio 5/SSA
White	80626	68076	5041	0.84
Indian	22049	19344	3329	0.88
Coloured	106989	70420	2421	0.66
DET	342274	162711	1223	0.48
Gazankulu	47749	18957	1038	0.40
Kangwane	36328	14760	946	0.41
Kwazulu	266192	112473	707	0.42
Lebowa	103273	73328	1012	0.71
Qwa-qwa	11148	8129	2413	0.73
Kwandebele	16530	11415	978	0.69
Transkei	254187	70887	701	0.28
Bop.	68366	47933	904	0.70
Venda	25863	17726	1077	0.69
Ciskei	40827	22191	1048	0.54

Source: DNE Education in the RSA 1990, various pages.

If one fits a line through the points defined by per capita expenditure and the SSA to Std. 5 survival rate, the results are as shown in the accompanying graph.

Two points are readily apparent via this graphical analysis.[5] First, while survival rates increase with per capita expenditure, these increases diminish rapidly at the margin. Increases in survival rates are fast up until about Rs. 2,500 (note that these are 1990 data in 1990 Rs.), but slow down quickly thereafter. Second, it is also clear that per capita expenditure is by no means the sole predictor of survival rates. Points below the curve could be labeled "under-achievers" while points above it might be spoken of as "over-achievers." In particular, for example, Lebowa, Kwandebele, Bophutatswana, and Venda seemed to achieve more than would be expected given their levels of per capita expenditure, while the DET, for example, achieved less. Clearly, other factors are at work. In combination with the notion of diminishing returns at the margin, this suggests focusing expenditure where returns can be higher, while at the same time attempting to

[5]The equation for the line is: survival = -1.96 + 0.218 ln(cost per capita). The intercept is significant at the 5% level and the coefficient at the 1% level, and the correlation is 73%.

extend to these sectors administrative and other characteristics (to the degree they are not cultural characteristics and therefore difficult to copy) that boost returns without calling on increased resources.

Private willingness to spend and the fiscal efficiency rationale for targeting education subsidies

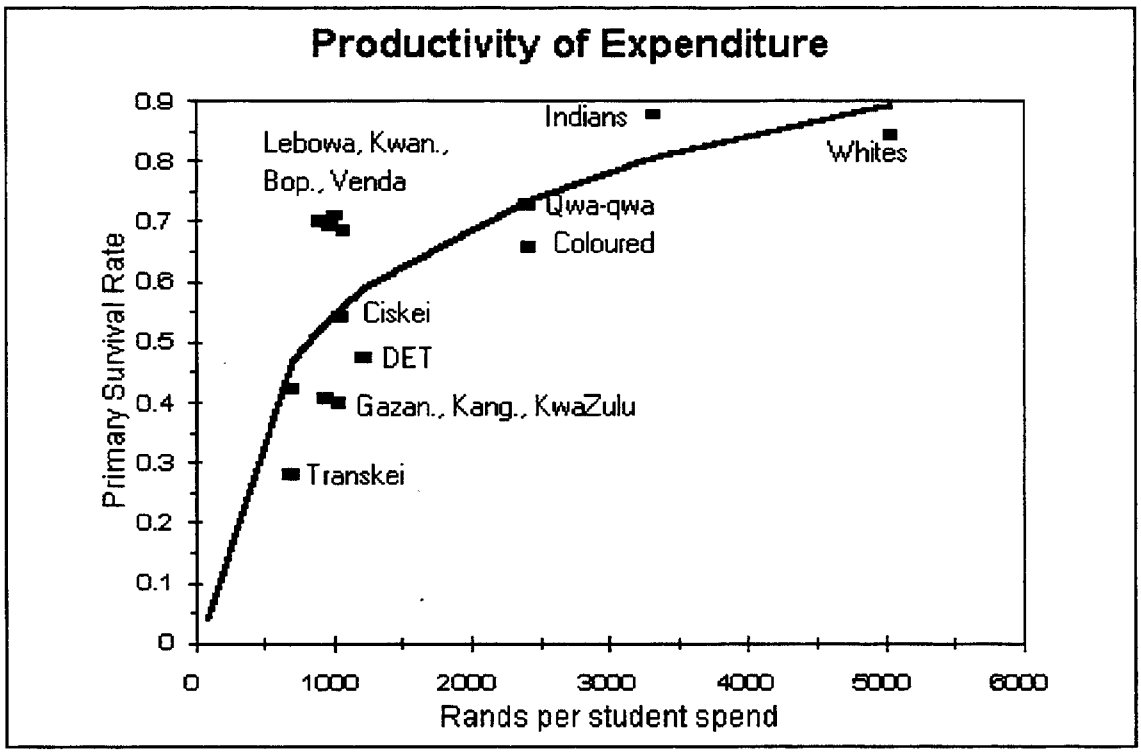

Figure 2. "Production" of schooling survival rates via per capita spending

It seems clear that, to the extent that the better-off are willing to finance their own education from their post-tax income, whereas the poor are unable to do so, the attempt to subsidize education equally for all, and hence make it "free" to all, is fiscally inefficient. It is therefore important to try to understand private willingness to pay as a function of income. Unfortunately, this is very hard to measure when education is so heavily subsidized. Clearly, when a good is very highly subsidized, the relationship between private purchases of that good and income tends to get blurred. If the government were to give away a Toyota Corolla (or Corollas to some and Trabants to others!) to everyone, the observable relationship between income and private spending on automobile transport would weaken considerably, regardless of the strength of the underlying relationship between income and the willingness or ability to pay. Presumably, the rich would buy more expensive tires, more stereo equipment, and higher grades of gasoline. Some would even entirely forego the Corollas and use their own funds to purchase Jaguars. Nevertheless, it is clear that the link between spending on automobile transportation and income would be severely weakened, both in terms of the strength of the effect of income on expenditure

and the statistical reliability of any such observed effect. Something like this happens to education in most countries with public education systems of at least decent quality for significant segments of the population, and therefore it is difficult to directly observe a relationship between income and private expenditure on education. Nevertheless, we have made an attempt to measure this relationship. Clearly, the private expenditures observed include only "extra" items for most families, as well as the totality of private fees for the few who choose and can afford to send their children to essentially privately-funded schools.

Using our estimated relationship, we have constructed the accompanying set of analytical graphs to explain the nature, and calculate the approximate amount, of fiscal savings accruing from targeting of public education expenditure.[6] The graphs are based on our estimates of the relationship between current willingness to pay for primary school and income. Since the actual calculations refer to "extras" paid by parents whose children attend public schools, combined with fees paid at private schools, the numbers are lower than they would be in the total absence of a public subsidy. As pointed out in the technical note, we presume the real curve would be displaced up by an unknown amount, but that the slope would be roughly the same, perhaps a little steeper. In all of these graphs we have not shown the 10th income decile, because the bar is so high that it obscures the details of what is going on in the rest of the graph.

The first graph simply shows the willingness to pay by income group. This shows that the poorest group would be willing to pay the amount A. Now, suppose that in order to receive an education of minimum acceptable quality it is necessary to spend the amount B per child. This means that each child needs to receive the amount B-A as a subsidy from the government, since A is paid by the parents. The graph, and the points A and B, are constructed so as to roughly reflect current reality, since parents, on average, are paying about one-third of the cost of primary education. Note that for the highest income groups (9 and 10, the latter not shown) no subsidy at all would be needed. Presumably, income groups 9 and 10 would meet their education needs entirely privately.

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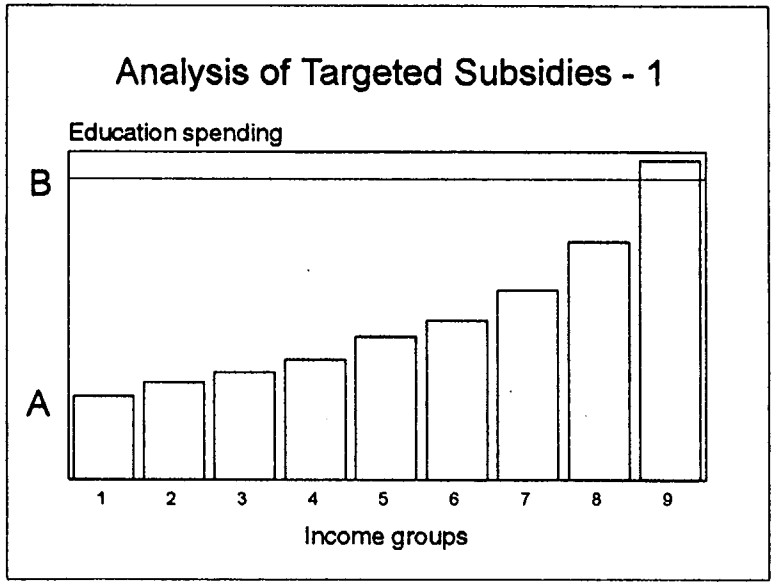
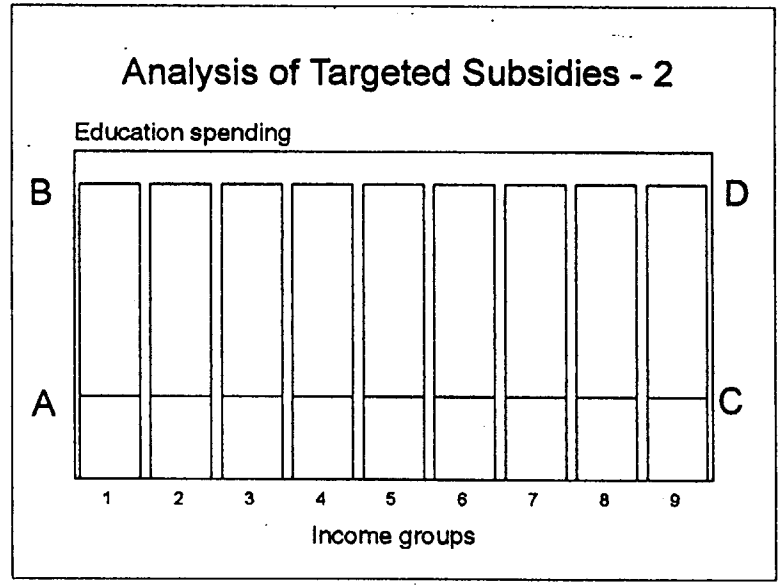
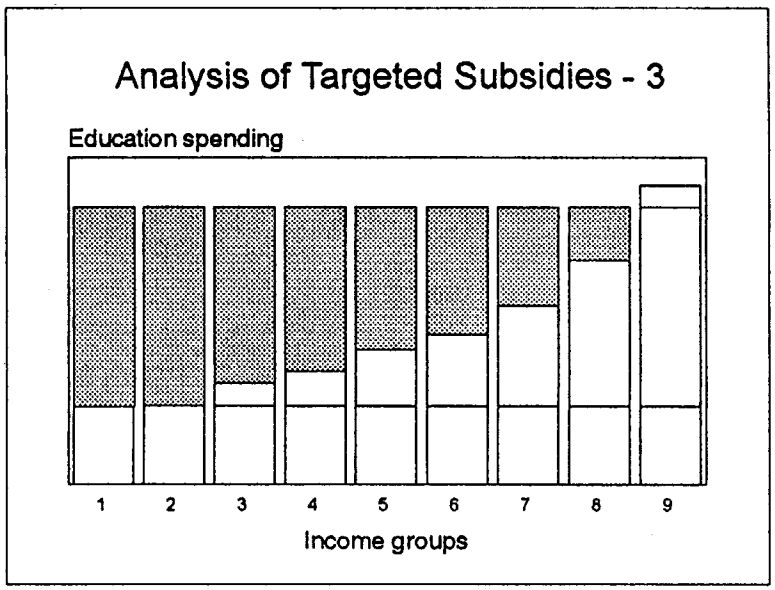
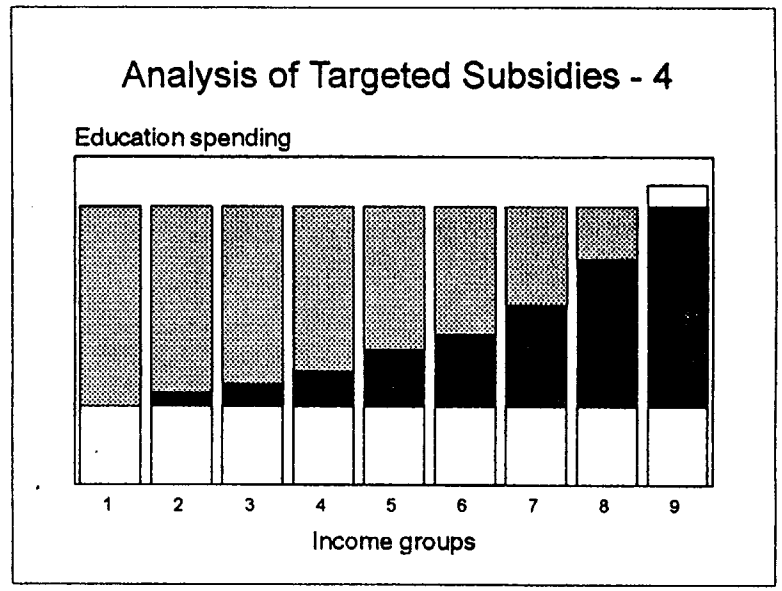
[6]The relationship was estimated as follows. A relationship between per child expenditure on primary education and income yielded the following: expenditure = 441 - 0.2 * income, with t-values of 8.4 and 9.3 respectively, but with an R^2 of only 0.15. Evidently, the explanatory power of income is low, given that so much of education is subsidized. Concerned that these coefficient estimates might be very unstable, given the possibility of so so many outliers--as hinted by the low R^2 --and that some of them could be exerting a great deal of influence, we successively removed the 5% worst outliers and re-estimated the equation. The estimated intercepts and coefficients converged as 440, 307, 259, 222, 191, etc., and 0.20, 0.17, 0.16, 0.15, 0.15, with naturally ever-increasing significance. We took the last equation's intercept and an intermediate slope estimate (based on the assumption that the intercept must be quite low in reality, since it is hard to see how anyone could spend, say, 190 Rs. per year if they report earning only some 300 Rs.), applied them to the income at the top end of each decile, and graphed the results. This, naturally, is a graph of most people's private willingness to spend on "extras," and willingness to spend on private tuition for some, all mixed together. How valid this is as a measure of the slope of willingness to pay in the absence of subsidies, is difficult to say. In the best of all worlds, real, private willingness to pay would simply be the same slope, but with the intercept displaced upwards. It is likely that in reality the slope would be a little steeper. It is logical to suppose that the sensitivity of private expenditure to income would be greater if there were not a subsidized floor to total expenditure.

Figure 3. Charts for the analysis of targeted subsidies









The second graph shows what would happen if education were to be "free" for all, that is, if no one had to pay private fees and all had to pay ancillary expenses or other informal fees. This would imply a need to extend the same level of subsidy (length B-A) to everyone. Thus, B-A would have to extend over the length B to D. Hence, the subsidy would have to cover the whole area ABDC (or, technically, the area corresponding to the 9th decile could be left out, since this could presumably be private). This would result in a two-tier system. In effect, the subsidy would be targeted in a very simple manner: 80% of the population gets a flat, income-unrelated subsidy, and 20% of the population gets nothing and meets their education needs privately. The result is a subsidy equal, in its monetary implications, to the area ABDC.

The third graph shows the actual needed subsidy, given private willingness to pay, as the lightly shaded area. Since the income distribution is in fact relatively smooth, there is a gradient of different levels of willingness to pay. This means that a comprehensive flat subsidy would incur in an amount of fiscal "waste" as depicted in the fourth graph in black. Note an important point. If the income distribution were as is perceived in the popular and perhaps in politicians' imaginations, namely totally flat and equal for the 80% "poor," and then kinked at a 90-degree angle for the 20% "rich," then a two-tier, all-or-nothing targeting would incur no waste. But we have seen that the income distribution is actually relatively smooth.

To calculate the amount of "waste" (black-shaded area) incurred by an untargeted system relative to a targeted one, we analyze the data behind the graphs. We calculate the area in black divided by the area ABDC. After performing these calculations we conclude that the "waste" incurred by a non-targeted system would be about 25% to 35% depending on whether the 9th income decile is included or excluded from a non-targeted subsidy.

A few caveats and comments are in order. First, as we pointed out above, the more "kinked" the curve (that is, the curve described by the top of the bars) on the "rich" side (right-hand side) of the graph, the less point there is in targeting the subsidy beyond the simple "all-or-nothing" or two-tier system. We suspect that perhaps the popular image of a highly kinked (essentially 90-degree angle) distribution has influenced policy discussion in South Africa to the point where the notion of targeting subsidies by income is not even considered in this discussion.

Second, targeting need not be based on personal income. The data for this do not exist. Community income, or community wealth, is a reasonable proxy, though since there are some poor people in wealthy areas, and vice-versa, some "leakage" takes place if targeting is based on community indicators rather than individual ones. But targeting according to community indicators is much more practical. Furthermore, if community wealth data are not available, a not unreasonable proxy is simply the current condition of schools at some baseline point, say 1992 or 1993. However, note that to some extent this might target resources not necessarily only to the poor, but possibly to those who have shown low preference for education, or a low ability to locally organize in favor of education. If targeting is based on actual ability to provide oneself with education through private or community means, then this targeting system can tend to either reward those who are least interested in education or least able to organize for it, <u>or</u> can act as a perverse incentive to continue to under-invest locally. If rewards are removed based on actual improvements in conditions to schools, then the incentive is to reduce local or private efforts. Thus, if the targeting is by proxy, the proxy should be based as closely as possible on capacity to

pay, rather than on actual payment.

Third, targeting into 8 separate income groups might be impractical because of information and administrative costs. If targeting into 8 groups produces a savings of, say, 30%, then targeting by 4 or 5 groups should still produce a savings of 15%, and might be more practical.

Fourth, a little reflection will show that the greater the gap B-A relative to the gap in height between the highest relevant bar (say, the 9th or 8th decile) and the lowest bar (the first decile), the less the gain from targeting. In other words, if private willingness to pay is too small, even at the high income levels, to produce an acceptable quality of education from a social or public point of view, then the gains from targeting would be much smaller. That is, if even the rich are unwilling to pay a reasonable proportion of the minimum education spending deemed convenient from a public viewpoint, out of private funds, then there is little point in targeting. Unfortunately, this is empirically difficult to establish, given that real willingness to pay in the absence of subsidies is unobservable. A more rigorous methodology would have to be used to approximate this better than we have been able to do here, and we recommend that this would be a fruitful area for further study. However, based on observed willingness to pay for "extras" and for private fees (as seen in the ELS survey), and based on the idea that if the education subsidy were eliminated and, say, 7% of GDP were thereby to be given back from the fisc to individuals, we believe that the relative (though not the absolute) heights we have used in our diagrammatic treatment are about right. This means that a conservative estimate of some 10% savings with, say, a four- or five-tier targeting mechanism, relative to a "free education for all" two-tier system, is probably not far off the mark.

Finally, note that the height B need not be fixed. If 10% of the budget can be saved via targeting, this 10% can be returned to the fisc or to the citizens, which would leave B fixed. Alternatively, a 10% savings can be used to increase B and thus raise the floor on education spending, and hence presumably raise the floor on education quality. (Though, as we saw above, the correlation between per capita spending and quality indices is only about 73%.) Thus, there are two alternative ways to view the analysis we have carried out. If we consider B fixed, then the "waste" in a non-targeted system is fiscally relevant. If we consider B variable and suppose that nothing will be returned to the fisc, then the measured "waste" in a non-targeted system is a rough indication of how much the minimum quality of the system could be improved if a targeted system were instituted.

Political economy and education: towards a "Latin-Americanization" of South African education?

Above we have argued and presented evidence to support the following four propositions:

- Given current private costs paid largely by parents, truly "free" education for all, even keeping the current dismal quality which the majority has, is unachievable without a budget explosion of some 30%.

- Current subsidies are not very equitable, even **within** traditionally disadvantaged groups.

Income distribution within these groups is unequal, and education subsidies, particularly at the university level, go disproportionately to the relative elites within those groups, elites that are rather well-off, relative to their poorer brethren of the same skin color. Though the between-group income distribution is more unequal than the within-group distribution for any group, the within-group distribution shows the same level of inequality for all groups, or even more inequality for the traditionally disadvantaged. This is opposite to the popular imagination that supposes that the traditionally disadvantaged are a teeming mass of equally poor and equally disadvantaged persons.

- There is evidence in South Africa, as common sense would indicate and as is the case in most countries, of strongly diminishing marginal returns to per capita educational investment. Current investment levels, by favoring certain groups (e.g., all whites, Africans at university) have pushed returns in those areas to levels much lower than those still available in other areas/groups (e.g., general secondary education of Africans). Common sense would suggest that highest overall returns can be obtained by pushing investment out in some areas and pulling it back in others so that returns at the margin are roughly the same across levels or types of schools and population groups.

- There is enough evidence to support the idea that private willingness to pay is relatively high and relatively smoothly distributed, such that the fiscal savings or quality improvements that could be made by targeting subsidies toward the poor amount to at least 10% or 15% of the expenditure implied by an education system that made education "free" to almost everyone.

The implication of these empirically (we believe) strong propositions are that spending should be targeted and re-allocated, in general towards the poor (predominantly African, but the targeting should not be on the basis of racial group or historical racial institutions), and towards the early and generic levels of the system. We have argued that if everyone who wants it can get a "free" education, this will make it difficult or impossible to improve educational quality for the bottom 20% of the income distribution, barring budgetary windfalls on the order of 30% to 50%. This means that really only the poor should have "free" education. There should be a gradient of support to schooling, whereby only the poorest have the maximum possible level of public support. Public support would gradually become smaller and smaller as the wealth of the parents increases along the income distribution gradient. Since this apparently flies in the face of political commitments to provide "free" education for **all**, we need to explore the political economy of the situation, and to look for ways out. We will see below that it is very important to provide a way out, and that it is possible to develop a system that provides for the appearance of free education without losing the targeting features we have argued for above.

We would assert that the attempt to provide nearly everyone with a "free" public education will result in a system with the following characteristics, which are typical of what one observes in Latin America and some other medium-income regions, and which are likely to lead to a mediocrity of "Latin American" style and magnitude.

- Since high-quality education provided on a "free" basis to everyone will simply not be budgetarily feasible, "free" education for the masses will tend to become of at best mediocre quality, and at worst will be (or continue to be) very poor. Many extant proposals and

lobbies will argue for special interests (e.g., the handicapped, EduCare, etc.). To meet the financial needs of a system which is expanding to provide compulsory education for ten years, on a truly or even partially "free" basis, and to cater to special interests and needs, and to improve quality, will require much more budget than is available or will be available in the next ten or twenty years. This means that with a budget limited to even 3% to 4% growth, public education will tend to be mediocre if it attempts to be "free" for all.

- Since private education is not forbidden (clearly it would be a terrible mistake to try to do this, as many countries have discovered), everyone who can will opt out of the public system and its developing mediocrity. A two-tier system would tend to emerge. One tier would be "free," publicly-controlled and almost entirely publicly-funded, and often under the sway of bureaucratic unions. The other, private, tier would be free to set its policies and fees, as long as no overt racial discrimination is practiced. It would have little or no public support. The public school system would tend to become a contested ground between two bureaucracies: the state and the unions. Creativity and flexibility will tend to be stifled by salary pressure from below, budgetary pressure from above, inflexible work rules, etc. The private system would develop creatively and non-bureaucratically in a demand-driven fashion.

- Anyone with any political voice will opt out of the public system, and will send his or her children and grandchildren to private schools. The publicly-funded system will be left without powerful stakeholders. Since it will be perceived as a system that caters only to the powerless, it will find it harder and harder to make claims on the national budget. The profile of such a system is already clearly visible in South Africa, even among "progressive" circles, as should be obvious. It is not surprising that the traditionally wealthy and powerful should send their children to private schools. But when even "progressive" elements begin to do so in societies having undergone de-colonization or "liberation" of one sort or another, it is time to re-assess the political economy of the situation.

- A vicious cycle will be created that will make the situation worse and worse over time: the less powerful real stakeholders (i.e., individuals with a personal interest in the system) the public system has, the more it will starve for funds, and the worse it will become, and the worse it becomes, the more the politicians and technocrats will abandon it. Lack of political representation implies lack of budget, lack of budget implies mediocrity, and mediocrity implies further exit and further lack of political representation in a worsening spiral. Along with lack of political representation comes lack of accountability pressure from the powerful and creative in society, with the result that the education system becomes a playground for the mediocre. Within a decade, technocrats and politicians three or four levels down from the top in the Ministries will have their children in private schools, and then it will take something like a revolution to rescue the public system, if it can be done at all. Because of competitive pressure and the demand for private schools to cater not only to the rich but to the middle classes in the technocracy, mid-range private schools will develop. Once private schools for the middle class are fully entrenched, the technocracy will tend never to go back to the public system, with the result that the personal interest in the correct functioning of the public system will perhaps be gone forever. The private schools for the middle classes will become a more and more powerful lobby, and it may be that at that point the targeted system that we have outlined here will be seen as the natural solution, but by then a decade or two

will have been wasted.

- After some time, particularly if labor unions happen to lose clout in the "real" private sector, the public sector becomes a refuge for labor unions, and the schools become ever more bureaucratized. The attitude of Finance and other powerful Ministries will be to tolerate this as an escape valve for unionism or as a sop to the labor constituency of certain governments, but to give it less and less money to waste. In the public sector, the norm will become "we pretend to work and they pretend to pay us." The (now multi-racial) elite will not care personally, since their children are catered to by private education. From an economic development and quality-of-labor-force point of view, the assumption or justification will be that mining and other such industries do not require much trained labor, and that the modern and services sector where the elite works will be supplied by labor trained in the private education sector. This will retard overall economic and social development and will leave South Africa unprepared to compete in a world increasingly dominated by free trade and where extractive, low-skill industries are less and less important. Unfortunately, that lesson will take years--maybe one or two decades--to sink in, and by then it will be too late.

To avoid this scenario, we would argue, will require a strong will to develop a system that is multi-tiered or targeted, rather than the two-tier system that threatens to emerge now, a system that would almost inevitably evolve into the elite/high-quality and mass/low-quality system that plagues so much of the Third World. A multi-tier system, with, say, somewhere between five and eight different levels of per capita state support, will elicit from parents a private contribution in accordance with their ability to pay and with governance input in accordance with their ability to organize. Ideally no school should be entirely "free" or "public" and no school should be entirely "private" or "unsupported." Thus, everyone would have a stake in the system. There would be a national education system of multiple expressions, in which even the powerful and important technocrats have a **personal** stake rather than an abstract or ideological stake. The history of education throughout the Third World in the last fifty years makes it amply clear that ideological and abstract commitments are not enough, except perhaps in racially homogenous and very disciplined societies. If the powerful do not have a real, personal stake in the systems they oversee, the systems are not likely to work very well. In short, the advantages of a targeted, multi-tiered system that is preferentially supportive of the poor and of the lower levels in the system are plenty:

- it is fiscally more efficient and can therefore result in savings to the fisc or improvements in the floor quality of the system,

- it can focus investment where returns are highest, and therefore maximize global returns to public education investment,

- it is more equitable and therefore more likely to generate socio-political stability,

- a system of multi-tiered targeting would allow for maximum application of the principle of subsidiarity: maximum decision-making and financing capacity would be delegated down to the appropriate level,

- a funding mechanism such as that proposed would perhaps be the best tradeoff between allowing for independence and protection, and

- it generates a favorable political-economic dynamic that prevents powerful stakeholders from opting out of the system, which would make the system deteriorate.

In spite of these clear advantages, there are several possible objections to this kind of system, some of which are more valid than others. To finish up this paper, we list some of these objections, and either suggest that they are not as valid as is commonly though, or suggest some possible ways around them.

First, there is the political issue. A targeted system is by definition "free" only for the very bottom of the income distribution, say the poorest 10% or 20%, if for anyone at all. Thus, education is by definition not "free" for all or even for those who choose to participate in it. There are ways around this. First, public, central (either national or provincial) support according to a targeted formula can supplement either private **or** local community resources. Schooling can still be nominally "free" if communities are enjoined (and given technical assistance) to improve their tax collection and supplement national or provincial funding with local funding through the local tax base. This makes education "free" only in a very nominal sense, but it would make it possible to honor a political commitment to "free" education. Since education is never "free" in any case, whether the cost is met privately or by local tax-like contributions seems somewhat immaterial, at least from the point of view of the central (national or provincial) fisc. We would argue, however, that it does make a difference managerially, since actual private funding is likely to act as a better incentive to efficiency and economy, and empowers parents more. Furthermore, local communities may not have the tax base and tax systems needed to fund their schools, and therefore waiting until communities gear up to manage their taxes in this manner might retard implementation. Thus, direct fees to supplement national or provincial targeted support may be a more practical and efficient alternative than local taxes. Note that only income groups above the 10% or 20% poorest would have to pay anything other than a very nominal fee, and the fees would rise with income. Thus, those who would have to pay fees would also generally be in a better condition to pay local taxes. Finally, another possibility is simply not to call them fees, and yet have private, individual payments under some other name. In short, there are alternatives around this political issue that are partly semantic and partly real.

Second, there is the issue of practicality. Is there enough knowledge to target? Based on what we have seen of information systems in South Africa, we would argue that is is certainly feasible to target on a community or local district basis. It is even possible to use proxies based on school-system data, subject to the dangers discussed above. A related issue is whether targeting would be administratively expensive (which is an issue separate from technical feasibility). Certainly, a flat subsidy is easier, administratively less costly, and less subject to corruption. But the administrative expense has to be compared to the potential savings. A savings of 10% to 20% (or conceivably as high as 30%) of the budget can pay for a good deal of management and still leave ample funds for quality improvements.

Third, what are poorer communities to do with the influx of funds? If teacher hiring and

salaries, and hiring decisions (and hence pupil/teacher ratios) are centrally determined (say, at the province level), what good is extra funding for a school district? Does not a multi-tiered system require doing away with a national or provincial system of teacher labor relations and teacher appointments? Only if the labor relations systems is extremely rigid. For example, a national salary system could have floors, but communities could be enabled to "top off" salaries as needed to attract the teachers they want, thus going toward something more like a real labor market for teachers. Furthermore, funds could be allocated to reconstruction tasks. Or communities simply could hire more teachers rather than more expensive ones, as long as service ratios were not mandated. In short, a little creativity will show that communities can easily find worthwhile destinies for extra funding, with a little guidance to ensure that the extra funding has an impact on education. Some care is needed here since, as we have seen, funding is not the only (though a major) determinant of schooling success.

Fourth, it must be noted that the targeting needs to be based on ability to pay for education out of private or community funds, and must **not** be based on actual private or community contributions. In the latter case, the withdrawal of central (national or provincial) support in step with increases in local support would be like a 100% tax on local spending, and would hence constitute a perfect disincentive for local support. If support were to be withdrawn at all in proportion to actual expenditure, rather than simply withdrawn based on **ability** to spend as measured by wealth or income, the proportion of withdrawal should be no more that about 60% or 70% withdrawal of national funding for every extra Rand increase in local support. This naturally reduces the effectiveness of targeting. In practice, since willingness and actual expenditure are correlated, it means that the targeting cannot be perfect, and some efficiency will necessarily be lost. In other words, if the bars in our graphs analyzing subsidies represent actual outlays rather than potential, then the support curve (the line between points B and D in the graphs) should not be completely flat.

Finally, the temptation to both be innovative in terms of finance and governance **and** solve dire poverty problems at the same time, in the same places, and with the same government programs should be resisted. Innovative arrangements that put an organizational and financial burden on communities require communities that are organized and know how to make collective decisions smoothly. Romantic wishes aside, the evidence for knowlege of the mechanics of collective decision-making about non-traditional issues at the local level in the rural Third World, and the evidence that there would be sufficient budgetary attention to education in a block-grant system, is not very solid. A system such as that envisioned here proposes a gradient of public support and public governance, where better-off communities would be required to come up with more of their own funding and governance. This would free up the limited funding and bureaucratic talent of the state to attend to the poor, and to promote change-agency in rural and poor urban areas. The highly "innovative" non-bureaucratic solutions can be tried with and by the literate, urban upper, middle, and lower middle class parents, while state funding, bureaucratic, and change-agency talent, which is in shortage, can be dedicated to where it is most badly needed: the deep rural areas and the urban poor.

We feel that if something along the lines of what we have discussed in this paper is actually implemented, South Africa's chances of avoiding the most egregious post-colonial mistakes already made in the Third World, and particularly in Latin America and Sub-Saharan Africa, will

be greatly enhanced. South Africa's options for a system that is highly equitable but efficient will depend on devising creative solutions that make use of private and public sector contributions in a targeted and transparent manner, and that create systems in which everyone has a stake and therefore a sense of shared fate.

Appendix A

Notes on the Economic Landscape Survey (ELS)

Appendix A. Notes on the Economic Landscape Survey (ELS)

The survey used in this study is the Economic Landscape Survey. This was a stratified random sample survey, to which an education section was appended for and funded by the Education Foundation. It is the only data set we know of that contains recent education data on two generations of South Africans, including current data on out-of-pocket expenditures on education. The assistance of Terry Langerschmidt and Tony Sham in obtaining the data set has been an invaluable help for this paper, for which we are grateful. In addition to the variables derived from the section funded by the Education Foundation, they were generous in providing a sub-set of related variables from this rich and interesting source of data.

The variables in our data set included the following. The names and codes correspond to each other in a self-explanatory manner in most cases. Where they do not, we have added the code.

Identification
Weighing Factor
Age

Years of Total Education
Years of Basic Education (Primary and Secondary)
Years of Post Secondary Education

Dummy indicator for Primary Completion (E1)
Dummy Indicator for Secondary Completion (E2)
Dummy for post-secondary education after completion of secondary (E3)
Dummy for post-secondary education without completed secondary (E4)

Total out-of-pocket expenditure on:
Nursery School
Pre-School or EduCare
Primary
Secondary
Technical College
Teacher Training College
Technikon
University
Other
Tertiary Total (Technikon plus University)
Total Spend

Numbers of children attending:
Nursery
Pre-School
Primary
Second
Technical College

Teacher Training College
Technikon
University
Other
Tertiary Total
Total

White Dummy (R4)
African Dummy (R1)
Coloured Dummy (R2)
Asian Dummy (R3)
Non-white Dummy
Coloured or African Dummy

Urban
Rural

Alternative Income Measure
Declared Income

All of these variables should be self-explanatory, except for the Alternative Income Measure, which deserves a little explanation. Because of the classic problem of people under-stating or refusing to state monetary income, and because of the classic problem of monetary income, even if correctly measured, being an underestimate of purchasing power, we thought it wise to take advantage of the ELS data on consumer durables to create a "wealth"-based income proxy. This variable was defined as:Due to the notorious unreliability of declared income data, we decided to complement the income data with a proxy for income consisting of a synthetic measure of an aggregate consumer durable constructed as follows:

$$\text{Altinc} = 30\ \text{Cars} + \text{Radio} + 10\ \text{TV} + 4\ \text{Refrigerator} + 7\ \text{VCR} + 5\ \text{WashingMachine} + 3\ \text{Telephone} + 10\ \text{MNET} + 10\ \text{SoundSystem}$$

The weights were more or less arbitrary, but are expected to reflect the relative contribution of each item to a sense of wealth, particularly among black urban families. It is unlikely that altering any of these weights, within reasonable bounds, would alter the results presented in this paper in any statistically significant manner.

In order to check the comparability of the ELS data with other sources, at least along some of the key dimensions that matter to us, we decided to make some comparisons between the ELS results and the 1991 Census. For example, we compared the ELS and the Census with regard to a key variable of interest to us, income and its size- and race-distribution, noting that we discarded all observations with zero declared income and those that refused to declare income. We calculated the size-distribution within each racial group and for all racial groups, and we also calculated the mean for all racial groups and the overall mean, in both the ELS and the Census. As a summary measure of the equity in the income distribution, we took a piece-wise integration of the Lorenz

curve. As we can see in the table below, the actual numerical results are somewhat different between the Census and the ELS.

	Income Distribution Summary Measure		Income (as prop. of mean)		Income (as prop. of African)	
	Census	ELS	Census	ELS	Census	ELS
African	0.23	0.20	0.5	0.6	1.0	1.0
Coloured	0.24	0.29	0.6	0.8	1.3	1.2
Indian	0.25	0.28	1.1	1.9	2.3	2.9
White	0.24	0..27	2.3	2.8	4.9	4.4
Mean	0.24	0.26	1.0	1.0	2.1	1.6
Total	0.18	0.19	NA	NA	NA	NA

However, the key characteristics are common to the ELS and the Census:

- The rank order of income inequality is about the same: the Indian population is the least unequal, followed by the whites and coloured, and finally by the African.

- The common-sensical conclusion that the measure of inequality, taking all groups together, is much worse than the mean across groups is confirmed in both cases, and by about the same margin. In other words, in both cases the integral of the Lorenz curve for all groups together is about 6 points lower than the mean of the integrals across the groups.

- The rank order and relative income gaps as identified in both sources is about the same. The only "serious" difference appears to be for the Indian population, but this is understandable given that this population is such a small sub-sample in the ELS survey. In any cases, none of our conclusions will hinge on this.

Appendix B

Calculation of Historical Levels of Per Capita Expenditure

Appendix B. Calculation of historical levels of per capita expenditure

The key problem here was finding data that distinguished primary from secondary levels. This was possible only for a few years and not for all racial groups. Thus, we had to make some approximations, as follows.

1971 expenditure by level

	Primary	Secondary	Gen.
African	21	113	25
Coloured	91	120	94
Indian	112	156	124
White	366	624	461

Source: SAIRR, Survey of Race Relations 1973, p. 293

1975 expenditure by level

	Primary	Secondary	Gen.
African	34	135	42
Coloured	127	213	139
Indian	157	281	189
White	511	872	644

Source: SAIRR, Survey of Race Relations 1976, p. 461

White breakdown by primary and secondary was unknown in 1975. We used the same breakdown as in 1971, which is shown below as ratios of primary and secondary spending to general spending. These were applied to the general spending to get the primary and secondary spending.

1971 ratio of primary and secondary to general

	Primary	Secondary
African	0.84	4.52
Coloured	0.97	1.28
Indian	0.90	1.26
White	0.79	1.35

The data for 1975 then allowed as to calculate similar ratios for 1975, which are used together with the 1971 ratios to calculate the 1980 primary and secondary data for the coloured, Indian, and white groups, as the breakdown into primary and secondary was not reported for any groups.

1975 ratio of primary and secondary to general

	Primary	Secondary
African	0.81	3.21
Coloured	0.91	1.53
Indian	0.83	1.49
White	0.79	1.35

The ratios for 1971 and 1975 were studied, and the following stylized values were then chosen for 1980 and 1985 for all groups except African, whose treatment was as explained below, due to the availability of additional information.

1980 and 1985 presumed ratios of primary and secondary to general

	Primary	Secondary
Coloured	0.85	1.50
Indian	0.80	1.45
White	0.80	1.35

1980 expenditure by level

	Primary	Secondary	Gen.
African	139	459	176
Coloured	228	402	268
Indian	459	832	574
White	817	1378	1021

Source: SAIRR, Survey of Race Relations 1982, p. 465 for general column

The figure for Indian general was not available in 1980. The value of this number excluding capital investments was known. (For all the other groups the value includes capital investment.) We used the values excluding cap. exp. as a proportion, based on this proportion for the other groups.

1985 expenditure by level

	Primary	Secondary	Gen.
African	224	585	293
Coloured	602	1062	708
Indian	946	1714	1182
White	1541	2600	1926

Source: SAIRR, Survey of Race Relations 1985, p. 366 for general, ratios applied for primary and secondary for all groups except African.

For Africans in 1985, we had the additional information:

	Percent of students	
	Primary	Secondary
African	0.81	0.19

and:

	Percent of budget	
	Primary	Secondary
African	0.62	0.38

Which suggests the following as ratios of primary and secondary spending to general spending:

	Primary	Secondary
African	0.77	2.00

These ratios were then applied to the general column to derive the primary and secondary spending levels for Africans in 1985.

To bring these data forward, we needed a deflator, as shown below:

1970	11.5
1971	12.2
1972	13.5
1973	16.0
1974	18.6
1975	20.6
1976	22.6
1977	25.1
1978	28.1
1979	32.3
1980	40.0
1981	44.8
1982	50.9
1983	58.9
1984	65.7
1985	76.4
1986	88.2
1987	100.0
1988	115.7
1989	133.0
1990	151.6
1991	168.8
1992	187.8

Source: World Bank World Tables data on diskette

Which are then used to create the following ratios for bringing various years to 1992:

1971	15.46
1975	9.13
1980	4.70
1985	2.46

Using all of the above information, we can finally calculate the following set of tables:

Expenditure in 1993 Rands

1971

	Primary	Secondary	Gen.
African	325	1747	386
Coloured	1407	1855	1453
Indian	1731	2411	1917
White	5657	9645	7126

1975

	Primary	Secondary	Gen.
African	310	1232	383
Coloured	1159	1944	1268
Indian	1433	2564	1725
White	4666	7955	5877

1980

	Primary	Secondary	Gen.
African	651	2154	826
Coloured	1070	1888	1258
Indian	2155	3906	2694
White	3835	6472	4794

1985

	Primary	Secondary	Gen.
African	552	1439	720
Coloured	1480	2611	1741
Indian	2325	4214	2906
White	3788	6393	4735

Avg. 1971-1985

	Primary	Secondary	Gen.
African	459	1643	579
Coloured	1279	2074	1430
Indian	1911	3274	2310
White	4487	7616	5633

Appendix C

Notes on Estimation of Rates of Return

Appendix C. Notes on estimation of rates of return

The rates of return were estimated by fitting to the ELS data linear earnings functions of the form

$$\text{Earnings} = a + b\,E1 + c\,E2 + d\,E3 + e\,E4 + f\,\text{urban} + g\,\text{age} + h\,\text{age}^2$$

for each racial group, where E1 is completed primary, E2 is completed secondary, E3 is post-secondary with completed secondary, and E4 is post-secondary with incomplete secondary.

It was not possible to produce education-specific age-profiles by racial group. That is, the equation

$$\text{Earnings} = a + b\,E1 + c\,E2 + d\,E3 + e\,E4 + f\,\text{urban} + g\,\text{age} + h\,\text{age}^2 \\ i\,E1\,\text{age} + j\,E1\,\text{age}^2 + k\,E2\,\text{age} + l\,E2\,\text{age}^2 + \text{etc.}$$

did not produce statistically significant results by racial group. We were able to get significant results only for all racial groups together and for Africans, and only by removing the pure age effect--that is, only be leaving the education-age interaction terms. We believe the inability to estimate separate education-specific age-profiles for the racial groups was essentially a sample size problem, and we remain convinced that a sufficiently large sample combined with good quality data would be able to uncover such relationships. The actual statistical results are presented in Appendix D. Below we show the typical calculations for the rates of return, laying bare all the assumptions.

The results on rates of return shown beow and in table 12 should be taken with some caution. In particular, note that the returns in the last line, labeled "All (AP)" are considerably lower in some categories. "AP" refers to "age-profile." All the estimates other than the ones in this line essentially take the average increase in monthly earnings due to completion of a certain level of education as constant over a life-time. That is, there is no age-profile, or the shape of the age-profile is not dependent on the level of education. This is important, because the normal tendency is for successively higher levels of education to imply a greater upward mobility through life, or a more convex age-profile of earnings. This means that since the large increases in earnings are later in life, their discounted value is relatively small compared to the alternative assumption of an immediate increase after completing school, with salaries then remaining constant through life, at the average level implied if a true age-profile were available. Unfortunately, we could estimate proper education-dependent age-profiles only for the population as a whole. That the age-profile matters in South Africa can be seen from Figure 1 in the main text, which shows the age profiles estimated for the sample as a whole. We do not know whether that is because the age profile is in fact flat for some of the groups, or because the sample size is small for the groups. Since we were able to derive a proper age profile for the whole sample, we suspect that the age profile for the specific groups is not flat, but that we simply did not have a large or good enough sample. In fact, for the African group, which is the largest sub-sample, we were able to estimate some curvature (but not worth reporting in the main text) in the age profile. This inability to estimate the age profile for the groups is why only the line for

"All" has an alternative with a proper age-profile shown. As expected, the rate of return when the age profile is properly accounted for is lower, except for post-secondary with incomplete secondary, for which we've taken technical colleges to be a proxy. That is because the age-profile for this type of education is lower and flatter than for complete secondary itself. Thus, when one discounts for the wages in the previous level (an average of secondary itself and primary) according to an age-profile, the effect is to make the rate of return to this level appear lower.

The actual calculations are shown starting in the next page. Due to page-width limitations, we were forced not to show most of the years of earning needed to calculate the internal rates of return by equate the discounted stream of earnings to the discounted initial costs. However, these data are essentially repetitive and tedious. The gist of what we did can easily be seen with the data that are in fact presented.

Regression equations for income: non-education-specific age-profiles

	Intcpt.	E1	E2	E3	E4	Urban	Age	Age^2
African	-1244	196	481	1395	627	82	71.6	-0.756
Coloured	-1828	448	705	1439	556	471	101	-1.22
Indian	-5344	82	1175	1942	646	--	336	-3.93
White	-3791	-559	155	1393	94	-1200	367	-4.145
All	-2190	344	921	2145	853	346	110	-1.152
Without Schooling								
	1	0	0	0	0	1	35	35
African	418							
Coloured	684							
Indian	1602							
White	2776							
All	595							
Primary								
	1	1	0	0	0	1	35	35
African	614							
Coloured	1132							
Indian	1684							
White	2217							
All	939							
Secondary								
	1	0	1	0	0	1	35	35
African	899							
Coloured	1389							
Indian	2777							
White	2931							
All	1516							
Secondary								
	1	0	1	0	0	1	35	35
African	899							
Coloured	1389							
Indian	2777							
White	2931							
All	1516							
Post Complete Sec.								
	1	0	0	1	0	1	35	35
African	1813							

Coloured	2123
Indian	3544
White	4169
All	2740

Post Incomplete Sec.

1	0	0	0	1	1	35	35

African	1045
Coloured	1240
Indian	2248
White	2870
All	1448

For cost, enter below if you wish to consider only private cost or total cost:

Private	1
Public	1

Enrollment numbers for weighted avg. of per capita expenditure:

African	2003904
Coloured	228172
Indian	91355
White	387483

PRIVATE PUBLICCOST

	Secondary Cost Hist.	Secondary Cost Hist.		RoR	Cost+ Opp. Cost					19	20	21	22	23	24	25	26	27	28	29
African	713	1643	2356	0.17	-2970	-2970	-2970	-2970	-2970	3420	3420	3420	3420	3420	3420	3420	3420	3420	3420	3420
Coloured	395	2074	2469	0.13	-3601	-3601	-3601	-3601	-3601	3084	3084	3084	3084	3084	3084	3084	3084	3084	3084	3084
Indian	1042	3274	4316	0.26	-6000	-6000	-6000	-6000	-6000	13116	13116	13116	13116	13116	13116	13116	13116	13116	13116	13116
White	3309	7616	10925	0.10	-13143	-13143	-13143	-13143	-13143	8568	8568	8568	8568	8568	8568	8568	8568	8568	8568	8568
All	964	2588	3552	0.21	-4491	-4491	-4491	-4491	-4491	6924	6924	6924	6924	6924	6924	6924	6924	6924	6924	6924
All (AP)	964	2588	3552	0.13	-4491	-4491	-4491	-4491	-4491	0	0	746	1458	2148	2817	3464	4090	4694	5276	5837

	Secondary Cost Curr	Secondary Cost Curr		RoR	Cost+ Opp. Cost					19	20	21	22	23	24	25	26	27	28	29
African	852	1962	2814	0.15	-3428	-3428	-3428	-3428	-3428	3420	3420	3420	3420	3420	3420	3420	3420	3420	3420	3420
Coloured	692	3632	4324	0.09	-5456	-5456	-5456	-5456	-5456	3084	3084	3084	3084	3084	3084	3084	3084	3084	3084	3084
Indian	1030	3235	4265	0.26	-5949	-5949	-5949	-5949	-5949	13116	13116	13116	13116	13116	13116	13116	13116	13116	13116	13116
White	3176	7309	10485	0.11	-12702	-12702	-12702	-12702	-12702	8568	8568	8568	8568	8568	8568	8568	8568	8568	8568	8568
All	1084	2910	3994	0.19	-4933	-4933	-4933	-4933	-4933	6924	6924	6924	6924	6924	6924	6924	6924	6924	6924	6924
All (AP)	1084	2910	3994	0.13	-4933	-4933	-4933	-4933	-4933	0	0	746	1458	2148	2817	3464	4090	4694	5276	5837

	Post Compl Cost Curr	Post Complete Sec. Cost Curr		RoR	Cost+ Opp. Cost					24	25	26	27	28	29	30	31	32	33	34
African	8411	11400	19811	0.09	-20710	-20710	-20710	-20710	-20710	10968	10968	10968	10968	10968	10968	10968	10968	10968	10968	10968
Coloured	8411	12900	21311	0.06	-22700	-22700	-22700	-22700	-22700	8808	8808	8808	8808	8808	8808	8808	8808	8808	8808	8808
Indian	4525	10000	14525	0.09	-17302	-17302	-17302	-17302	-17302	9204	9204	9204	9204	9204	9204	9204	9204	9204	9204	9204
White	10957	13600	24557	0.09	-27488	-27488	-27488	-27488	-27488	14856	14856	14856	14856	14856	14856	14856	14856	14856	14856	14856
All	8672	13130	21802	0.10	-23318	-23318	-23318	-23318	-23318	14688	14688	14688	14688	14688	14688	14688	14688	14688	14688	14688

All (AP)	8672	13130	21802	0.09	-23318	-23318	-23318	-23318	-23318	8448	9194	9905	10582	11226	11835	12410	12951	13458	13931	14370

(Assumes private cost per capita for coloured same as for African, due to unvail. of private cost data for coloured.)

	Post Incom Cost Curr	Post Incomplete Sec. Cost Curr		RoR	Cost+ Opp. Cost			21	22	23	24	25	26	27	28	29	30	31	32	33
African	798	15000	15798	0.06	-16412	-16412	-16412	3462	3462	3462	3462	3462	3462	3462	3462	3462	3462	3462	3462	3462
Coloured	2271	9300	11571	0.00	-12703	-12703	-12703	-246	-246	-246	-246	-246	-246	-246	-246	-246	-246	-246	-246	-246
Indian	4405	5300	9705	0.00	-11389	-11389	-11389	210	210	210	210	210	210	210	210	210	210	210	210	210
White	2761	5800	8561	0.10	-10778	-10778	-10778	3552	3552	3552	3552	3552	3552	3552	3552	3552	3552	3552	3552	3552
All	1497	8795	10292	0.07	-11231	-11231	-11231	2646	2646	2646	2646	2646	2646	2646	2646	2646	2646	2646	2646	2646
All (AP)	1497	8795	10292	0.11	-11231	-11231	-11231	4562	4583	4596	4599	4593	4578	4555	4522	4480	4429	4369	4300	4222

Regressions for education-specific age-profiles

	Intcpt.	E1	E2	E3	E4	U	E1*A	E1*A^2	E2*A	E2*A^2	E3*A	E3*A^2	E4*A	E4*A^2
African	296.5	-1197	-1994	-1906	-1170	34.1	68.044	-0.793	117.99	-1.22	132.9	-1.12	81.74	-0.84
All	197.2	-1067	-2570	-4078	-1649	243.4	59.96	-0.628	156.24	-1.53	285.1	-2.95	126	-1.45

Note: Age and Age^2 were never statistically significant on their own, which suggests that the earnings profile for the No Education category is

No ed.	1	0	0	0	0	1	0	0	0	0	0	0	0	0
Primary	1	1	0	0	0	1	1	1	0	0	0	0	0	0
Secondary	1	0	1	0	0	1	0	0	1	1	0	0	0	0
Tert. Com	1	0	0	1	0	1	0	0	0	0	1	1	0	0
Tert. Inc	1	0	0	0	1	1	0	0	0	0	0	0	1	1

Education Specific Age-Earnings Profiles

	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
No ed.																				
African	331	331	331	331	331	331	331	331	331	331	331	331	331	331	331	331	331	331	331	331
All	441	441	441	441	441	441	441	441	441	441	441	441	441	441	441	441	441	441	441	441
Primary																				
African	101	140	177	213	247	279	310	339	367	393	417	440	461	481	499	515	530	544	555	566
All	249	286	322	356	389	420	451	480	508	535	560	584	607	629	649	668	686	703	718	732
Secondary																				
African	66	138	209	277	342	406	466	525	580	634	685	733	779	823	864	903	939	973	1005	1034
All	187	287	384	477	568	655	740	821	899	974	1047	1116	1182	1245	1305	1361	1415	1466	1514	1558
Tert. Com.																				
African	454	545	634	721	806	888	969	1047	1123	1196	1267	1336	1403	1468	1530	1590	1648	1704	1757	1809
All	538	714	884	1049	1207	1359	1506	1646	1781	1910	2033	2150	2261	2366	2465	2559	2646	2728	2804	2874
Tert. Inc.																				
African	359	410	459	506	551	595	637	678	717	754	789	823	855	885	914	941	966	990	1012	1032
All	589	661	730	797	860	921	979	1033	1085	1134	1180	1223	1264	1301	1335	1367	1395	1421	1444	1464

Appendix D

Raw Regression Results

Appendix D. Raw regression results

CYCLE COMPLETION EARNINGS FUNCTIONS

ALL GROUPS, UNWEIGHTED[7]

DEP VAR: MEANINC N: 1475 MULTIPLE R: .551 SQUARED MULTIPLE R: .303
ADJUSTED SQUARED MULTIPLE R: .300 STANDARD ERROR OF ESTIMATE: 1585.665

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-3129.804	390.292	0.000	.	-8.019	0.000
E1	489.263	122.005	0.126	0.4779752	4.010	0.000
E2	1240.821	156.527	0.222	0.6064442	7.927	0.000
E3	2510.492	138.500	0.563	0.4919859	18.126	0.000
E4	973.209	170.795	0.143	0.7533956	5.698	0.000
URBAN	423.297	92.988	0.102	0.9369505	4.552	0.000
AGE	148.302	19.504	1.072	0.0238952	7.604	0.000
AGE* AGE	-1.525	0.232	-0.926	0.0238963	-6.567	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.160628E+10	7	.229469E+09	91.264	0.000
RESIDUAL	.368853E+10	1467	2514333.446		

ALL GROUPS, WEIGHTED

DEP VAR: MEANINC N: 15917 MULTIPLE R: .548 SQUARED MULTIPLE R: .300
ADJUSTED SQUARED MULTIPLE R: .300 STANDARD ERROR OF ESTIMATE: 1294.278

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-2189.634	92.242	0.000	.	-23.738	0.005
E1	344.239	28.381	0.110	0.5347297	12.129	0.008
E2	921.094	38.494	0.196	0.6543340	23.928	0.004
E3	2144.548	34.525	0.538	0.5867893	62.117	0.000
E4	852.904	42.025	0.151	0.8001347	20.295	0.004
URBAN	345.935	21.383	0.109	0.9612665	16.178	0.005
AGE	109.537	4.743	1.016	0.0227392	23.097	0.002
AGE* AGE	-1.152	0.057	-0.884	0.0227429	-20.106	0.005

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.114153E+11	7	.163076E+10	973.497	0.000
RESIDUAL	.266501E+11	15909	1675155.799		

[7]The ELS used a stratified sample with different weights for different observations. The regression package used gives unbiased estimates of coefficients for this type of situation, but the estimate of the standard error is incorrect due to the weighting algorithm used. For the estimates of standard errors, and therefore of the prob. values, we have relied on the equivalent equation formulation in each case, but without the weights. For the estimate of the coefficients we relied on the weighted estimation. That is why for every equation both the weighted and unweighted versions are shown.

CYCLE COMPLETION EARNINGS FUNCTIONS

AFRICAN, UNWEIGHTED

DEP VAR: MEANINC N: 857 MULTIPLE R: .547 SQUARED MULTIPLE R: .299
ADJUSTED SQUARED MULTIPLE R: .293 STANDARD ERROR OF ESTIMATE: 756.586

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-1326.026	242.256	0.000	.	-5.474	0.000
E1	227.018	69.325	0.126	0.5622689	3.275	0.001
E2	506.070	95.803	0.185	0.6769128	5.282	0.000
E3	1376.580	91.246	0.533	0.6616192	15.087	0.000
E4	643.197	105.586	0.195	0.8092938	6.092	0.000
URBAN	94.636	52.411	0.053	0.9727945	1.806	0.071
AGE	74.375	12.730	1.044	0.0258638	5.842	0.000
AGE* AGE	-0.776	0.158	-0.878	0.0258132	-4.908	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.207011E+09	7	.295730E+08	51.663	0.000
RESIDUAL	.485986E+09	849	572421.734		

AFRICAN, WEIGHTED

DEP VAR: MEANINC N: 12229 MULTIPLE R: .561 SQUARED MULTIPLE R: .314
ADJUSTED SQUARED MULTIPLE R: .314 STANDARD ERROR OF ESTIMATE: 726.771

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-1244.167	58.691	0.000	.	-21.199	0.002
E1	195.989	17.294	0.111	0.5832788	11.333	0.000
E2	480.786	24.861	0.175	0.6867945	19.339	0.000
E3	1394.789	23.389	0.538	0.6880874	59.634	0.001
E4	627.331	26.945	0.192	0.8270976	23.282	0.000
URBAN	82.268	13.296	0.047	0.9773678	6.187	0.000
AGE	71.638	3.096	1.156	0.0224860	23.140	0.000
AGE* AGE	-0.756	0.038	-0.994	0.0224204	-19.874	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.296045E+10	7	.422921E+09	800.689	0.000
RESIDUAL	.645509E+10	12221	528196.248		

CYCLE COMPLETION EARNINGS FUNCTIONS

COLOURED, UNWEIGHTED

DEP VAR: MEANINC N: 148 MULTIPLE R: .597 SQUARED MULTIPLE R: .357
ADJUSTED SQUARED MULTIPLE R: .325 STANDARD ERROR OF ESTIMATE: 646.603

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-1594.458	661.408	0.000	.	-2.411	0.017
E1	429.602	139.947	0.272	0.5837819	3.070	0.003
E2	717.948	247.614	0.230	0.7313172	2.899	0.004
E3	1396.283	220.991	0.504	0.7219569	6.318	0.000
E4	539.796	271.879	0.146	0.8481408	1.985	0.049
URBAN	474.058	339.738	0.098	0.9307345	1.395	0.165
AGE	88.524	27.717	1.596	0.0183947	3.194	0.002
AGE* AGE	-1.072	0.316	-1.701	0.0182503	-3.391	0.001

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.324919E+08	7	4641705.055	11.102	0.000
RESIDUAL	.585333E+08	140	418094.826		

COLOURED, WEIGHTED

DEP VAR: MEANINC N: 1084 MULTIPLE R: .607 SQUARED MULTIPLE R: .368
ADJUSTED SQUARED MULTIPLE R: .364 STANDARD ERROR OF ESTIMATE: 623.074

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-1827.724	207.781	0.000	.	-8.796	0.000
E1	448.173	53.719	0.283	0.5118277	8.343	0.000
E2	705.144	84.206	0.249	0.6634198	8.374	0.000
E3	1439.104	83.677	0.501	0.6929224	17.198	0.000
E4	555.788	99.384	0.151	0.8087372	5.592	0.000
URBAN	470.796	108.578	0.111	0.8980638	4.336	0.000
AGE	101.030	9.002	1.805	0.0226963	11.223	0.000
AGE* AGE	-1.220	0.106	-1.857	0.0225383	-11.505	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.243724E+09	7	.348177E+08	89.685	0.000
RESIDUAL	.417726E+09	1076	388220.991		

CYCLE COMPLETION EARNINGS FUNCTIONS

INDIAN, UNWEIGHTED

DEP VAR: MEANINC N: 128 MULTIPLE R: .547 SQUARED MULTIPLE R: .299
ADJUSTED SQUARED MULTIPLE R: .264 STANDARD ERROR OF ESTIMATE: 1598.525

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-5392.828	1379.342	0.000	.	-3.910	0.000
E1	-6.157	629.344	-0.002	0.2346008	-0.010	0.992
E2	1172.997	682.281	0.229	0.3252882	1.719	0.088
E3	1846.933	646.732	0.485	0.2005098	2.856	0.005
E4	386.347	794.407	0.050	0.5398723	0.486	0.628
AGE	338.138	69.422	2.322	0.0254837	4.871	0.000
AGE* AGE	-3.902	0.852	-2.213	0.0247900	-4.579	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.132035E+09	6	.220059E+08	8.612	0.000
RESIDUAL	.309189E+09	121	2555281.698		

INDIAN, WEIGHTED

DEP VAR: MEANINC N: 288 MULTIPLE R: .572 SQUARED MULTIPLE R: .327
ADJUSTED SQUARED MULTIPLE R: .313 STANDARD ERROR OF ESTIMATE: 1516.651

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-5344.125	871.065	0.000	.	-6.135	0.000
E1	82.313	332.961	0.021	0.3313847	0.247	0.805
E2	1174.927	363.237	0.240	0.4358439	3.235	0.001
E3	1942.075	354.187	0.496	0.2928569	5.483	0.000
E4	645.825	425.089	0.092	0.6538439	1.519	0.130
AGE	336.256	42.211	2.636	0.0218616	7.966	0.000
AGE* AGE	-3.930	0.499	-2.630	0.0214918	-7.881	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.314564E+09	6	.524273E+08	22.792	0.000
RESIDUAL	.646365E+09	281	2300231.520		

CYCLE COMPLETION EARNINGS FUNCTIONS

WHITE, UNWEIGHTED

DEP VAR: MEANINC N: 342 MULTIPLE R: .434 SQUARED MULTIPLE R: .188
ADJUSTED SQUARED MULTIPLE R: .171 STANDARD ERROR OF ESTIMATE: 2541.900

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-3324.339	1706.083	0.000	.	-1.949	0.052
E1	-355.563	985.203	-0.054	0.1067835	-0.361	0.718
E2	434.675	1079.646	0.059	0.1120417	0.403	0.687
E3	1762.010	1048.256	0.316	0.0688575	1.681	0.094
E4	216.873	950.755	0.025	0.1980870	0.228	0.820
URBAN	-1529.293	633.725	-0.119	0.9958854	-2.413	0.016
AGE	339.736	67.430	1.752	0.0201044	5.038	0.000
AGE* AGE	-3.753	0.764	-1.717	0.0199097	-4.914	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.501161E+09	7	.715945E+08	11.081	0.000
RESIDUAL	.215806E+10	334	6461256.340		

WHITE, WEIGHTED

DEP VAR: MEANINC N: 2316 MULTIPLE R: .436 SQUARED MULTIPLE R: .190
ADJUSTED SQUARED MULTIPLE R: .188 STANDARD ERROR OF ESTIMATE: 2452.551

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-3790.690	626.529	0.000	.	-6.050	0.000
E1	-559.647	396.914	-0.086	0.0949430	-1.410	0.159
E2	155.301	429.324	0.022	0.0935317	0.362	0.718
E3	1393.173	419.572	0.256	0.0590253	3.320	0.001
E4	94.502	384.840	0.011	0.1736331	0.246	0.806
URBAN	-1200.737	233.579	-0.097	0.9924242	-5.141	0.000
AGE	367.404	24.133	2.010	0.0201292	15.224	0.000
AGE* AGE	-4.145	0.278	-1.980	0.0199567	-14.930	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.326015E+10	7	.465736E+09	77.429	0.000
RESIDUAL	.138826E+11	2308	6015006.187		

EXTRA YEAR EARNING FUNCTIONS

ALL GROUPS, UNWEIGHTED

DEP VAR: MEANINC N: 1475 MULTIPLE R: .611 SQUARED MULTIPLE R: .373
ADJUSTED SQUARED MULTIPLE R: .371 STANDARD ERROR OF ESTIMATE: 1503.349

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-3006.718	372.407	0.000	.	-8.074	0.000
YRSPRIED	30.095	25.023	0.031	0.6577880	1.203	0.229
YRSSECED	242.546	28.429	0.252	0.4875260	8.532	0.000
YRSPSTED	459.924	28.236	0.392	0.7364813	16.289	0.000
URBAN	393.096	87.964	0.095	0.9411441	4.469	0.000
AGE	138.681	18.545	1.002	0.0237575	7.478	0.000
AGE* AGE	-1.435	0.220	-0.871	0.0238860	-6.517	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.197704E+10	6	.329507E+09	145.796	0.000
RESIDUAL	.331777E+10	1468	2260058.081		

ALL GROUPS, WEIGHTED

DEP VAR: MEANINC N: 15917 MULTIPLE R: .609 SQUARED MULTIPLE R: .371
ADJUSTED SQUARED MULTIPLE R: .371 STANDARD ERROR OF ESTIMATE: 1226.696

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-2173.198	87.692	0.000	.	-24.782	0.000
YRSPRIED	17.271	5.815	0.023	0.6742506	2.970	0.000
YRSSECED	175.439	7.008	0.227	0.4819856	25.034	0.000
YRSPSTED	446.238	7.967	0.412	0.7302915	56.011	0.000
URBAN	335.310	20.223	0.106	0.9653888	16.581	0.002
AGE	105.623	4.492	0.980	0.0227639	23.511	0.004
AGE* AGE	-1.112	0.054	-0.854	0.0228552	-20.531	0.002

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.141243E+11	6	.235404E+10	1564.373	0.000
RESIDUAL	.239411E+11	15910	1504783.679		

EXTRA YEAR EARNING FUNCTIONS

AFRICAN, WEIGHTED

DEP VAR: MEANINC N: 857 MULTIPLE R: .602 SQUARED MULTIPLE R: .362
ADJUSTED SQUARED MULTIPLE R: .357 STANDARD ERROR OF ESTIMATE: 721.289

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-1412.429	230.078	0.000	.	-6.139	0.000
YRSPRIED	12.316	14.419	0.029	0.6559854	0.854	0.393
YRSSECED	108.838	17.884	0.240	0.4818041	6.086	0.000
YRSPSTED	321.448	24.793	0.408	0.7596275	12.965	0.000
URBAN	105.282	49.760	0.059	0.9808730	2.116	0.035
AGE	76.051	12.097	1.068	0.0260298	6.287	0.000
AGE* AGE	-0.788	0.150	-0.892	0.0259906	-5.246	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.250778E+09	6	.417963E+08	80.338	0.000
RESIDUAL	.442219E+09	850	520257.596		

AFRICAN, WEIGHTED

DEP VAR: MEANINC N: 12229 MULTIPLE R: .618 SQUARED MULTIPLE R: .382
ADJUSTED SQUARED MULTIPLE R: .382 STANDARD ERROR OF ESTIMATE: 689.894

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-1352.043	55.633	0.000	.	-24.303	0.003
YRSPRIED	9.965	3.551	0.024	0.6777919	2.806	0.000
YRSSECED	105.629	4.562	0.239	0.4734142	23.152	0.000
YRSPSTED	326.123	6.328	0.424	0.7468495	51.540	0.001
URBAN	100.649	12.564	0.057	0.9862542	8.011	0.000
AGE	73.513	2.925	1.186	0.0226906	25.128	0.001
AGE* AGE	-0.768	0.036	-1.010	0.0226440	-21.369	0.002

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.359843E+10	6	.599738E+09	1260.078	0.001
RESIDUAL	.581710E+10	12222	475953.361		

EXTRA YEAR EARNING FUNCTIONS

COLOURED, UNWEIGHTED

DEP VAR: MEANINC N: 148 MULTIPLE R: .624 SQUARED MULTIPLE R: .389
ADJUSTED SQUARED MULTIPLE R: .363 STANDARD ERROR OF ESTIMATE: 627.821

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-1567.809	638.828	0.000	.	-2.454	0.015
YRSPRIED	11.581	25.151	0.037	0.6636630	0.460	0.646
YRSSECED	138.965	43.529	0.320	0.4304351	3.192	0.002
YRSPSTED	186.454	50.221	0.284	0.7382829	3.713	0.000
URBAN	482.004	334.900	0.100	0.9029881	1.439	0.152
AGE	90.050	26.756	1.623	0.0186098	3.366	0.001
AGE* AGE	-1.079	0.305	-1.713	0.0184714	-3.537	0.001

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.354487E+08	6	5908120.128	14.989	0.000
RESIDUAL	.555765E+08	141	394159.505		

COLOURED, WEIGHTED

DEP VAR: MEANINC N: 1084 MULTIPLE R: .636 SQUARED MULTIPLE R: .404
ADJUSTED SQUARED MULTIPLE R: .401 STANDARD ERROR OF ESTIMATE: 604.798

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-1761.136	200.156	0.000	.	-8.799	0.000
YRSPRIED	1.438	9.404	0.005	0.6264175	0.153	0.878
YRSSECED	121.561	15.518	0.280	0.4314631	7.834	0.000
YRSPSTED	204.007	17.967	0.304	0.7722076	11.355	0.000
URBAN	533.552	106.933	0.126	0.8723895	4.990	0.000
AGE	101.401	8.664	1.811	0.0230844	11.704	0.000
AGE* AGE	-1.222	0.102	-1.859	0.0229520	-11.979	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.267504E+09	6	.445839E+08	121.887	0.000
RESIDUAL	.393946E+09	1077	365780.931		

EXTRA YEAR EARNING FUNCTIONS

INDIAN, UNWEIGHTED

DEP VAR: MEANINC N: 128 MULTIPLE R: .618 SQUARED MULTIPLE R: .382
ADJUSTED SQUARED MULTIPLE R: .357 STANDARD ERROR OF ESTIMATE: 1494.407

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-5169.330	1374.677	0.000	.	-3.760	0.000
YRSPRIED	122.930	111.442	0.107	0.5416760	1.103	0.272
YRSSECED	318.006	123.040	0.294	0.3918229	2.585	0.011
YRSPSTED	405.439	85.031	0.383	0.7829698	4.768	0.000
AGE	281.747	63.770	1.935	0.0263954	4.418	0.000
AGE* AGE	-3.231	0.773	-1.832	0.0263442	-4.181	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.168768E+09	5	.337535E+08	15.114	0.000
RESIDUAL	.272457E+09	122	2233252.563		

INDIAN, UNWEIGHTED

DEP VAR: MEANINC N: 288 MULTIPLE R: .634 SQUARED MULTIPLE R: .403
ADJUSTED SQUARED MULTIPLE R: .392 STANDARD ERROR OF ESTIMATE: 1426.790

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-5272.124	860.929	0.000	.	-6.124	0.000
YRSPRIED	137.511	61.872	0.137	0.5573203	2.222	0.027
YRSSECED	311.696	71.017	0.318	0.4039969	4.389	0.000
YRSPSTED	382.677	54.464	0.362	0.7989521	7.026	0.000
AGE	296.656	39.104	2.326	0.0225453	7.586	0.000
AGE* AGE	-3.482	0.456	-2.330	0.0227893	-7.643	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.386853E+09	5	.773707E+08	38.006	0.000
RESIDUAL	.574076E+09	282	2035728.903		

EXTRA YEAR EARNING FUNCTIONS

WHITE, UNWEIGHTED

DEP VAR: MEANINC N: 342 MULTIPLE R: .490 SQUARED MULTIPLE R: .240
ADJUSTED SQUARED MULTIPLE R: .226 STANDARD ERROR OF ESTIMATE: 2456.741

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-4059.373	1559.451	0.000	.	-2.603	0.010
YRSPRIED	29.706	210.319	0.007	0.8681318	0.141	0.888
YRSSECED	402.917	122.904	0.184	0.7186117	3.278	0.001
YRSPSTED	393.513	66.983	0.299	0.8735503	5.875	0.000
URBAN	-1312.863	613.510	-0.102	0.9925873	-2.140	0.033
AGE	288.532	65.215	1.488	0.0200772	4.424	0.000
AGE* AGE	-3.204	0.736	-1.466	0.0200146	-4.352	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.637303E+09	6	.106217E+09	17.599	0.000
RESIDUAL	.202192E+10	335	6035575.253		

WHITE, WEIGHTED

DEP VAR: MEANINC N: 2316 MULTIPLE R: .493 SQUARED MULTIPLE R: .243
ADJUSTED SQUARED MULTIPLE R: .241 STANDARD ERROR OF ESTIMATE: 2370.878

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-4426.404	557.019	0.000	.	-7.947	0.000
YRSPRIED	36.937	81.073	0.009	0.8718581	0.456	0.649
YRSSECED	342.888	47.271	0.155	0.7160323	7.254	0.000
YRSPSTED	399.211	25.509	0.304	0.8685183	15.650	0.000
URBAN	-1006.754	226.130	-0.081	0.9895295	-4.452	0.000
AGE	309.727	23.455	1.694	0.0199144	13.205	0.000
AGE* AGE	-3.520	0.269	-1.681	0.0198786	-13.092	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.416375E+10	6	.693959E+09	123.457	0.000
RESIDUAL	.129790E+11	2309	5621061.043		

RACE-SPECIFIC EARNINGS FUNCTIONS WITH EDUCATION-SPECIFIC AGE PROFILES

ALL GROUPS, UNWEIGHTED

DEP VAR: MEANINC N: 1475 MULTIPLE R: .575 SQUARED MULTIPLE R: .331
ADJUSTED SQUARED MULTIPLE R: .324 STANDARD ERROR OF ESTIMATE: 1558.020

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-399.452	1104.737	0.000	.	-0.362	0.718
E1	-366.986	1219.758	-0.095	0.0046168	-0.301	0.764
E2	-2866.367	1487.499	-0.512	0.0064831	-1.927	0.054
E3	-4382.383	1376.326	-0.983	0.0048099	-3.184	0.001
E4	-1362.889	1858.468	-0.200	0.0061431	-0.733	0.463
URBAN	435.554	91.827	0.105	0.9275822	4.743	0.000
AGE	22.098	53.733	0.160	0.0030395	0.411	0.681
AGE* AGE	-0.209	0.605	-0.127	0.0033989	-0.346	0.730
AGE* E1	31.530	60.438	0.336	0.0011027	0.522	0.602
AGE* AGE* E1	-0.279	0.691	-0.157	0.0030508	-0.404	0.686
AGE* E2	189.258	77.284	1.238	0.0017927	2.449	0.014
AGE* AGE* E2	-1.911	0.928	-0.575	0.0058903	-2.060	0.040
AGE* E3	322.350	68.670	2.856	0.0012386	4.694	0.000
AGE* AGE* E3	-3.362	0.795	-1.437	0.0039744	-4.230	0.000
AGE* E4	126.501	89.857	0.804	0.0014059	1.408	0.159
AGE* AGE* E4	-1.539	1.016	-0.497	0.0042542	-1.515	0.130

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.175319E+10	15	.116880E+09	48.150	0.000
RESIDUAL	.354161E+10	1459	2427425.769		

ALL GROUPS, WEIGHTED

DEP VAR: MEANINC N: 15917 MULTIPLE R: .571 SQUARED MULTIPLE R: .326
ADJUSTED SQUARED MULTIPLE R: .325 STANDARD ERROR OF ESTIMATE: 1270.245

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-189.047	239.743	0.000	.	-0.789	0.472
E1	-593.025	268.689	-0.190	0.0057467	-2.207	0.000
E2	-2299.145	341.431	-0.490	0.0080113	-6.734	0.000
E3	-3541.285	333.097	-0.888	0.0060718	-10.631	0.000
E4	-1272.372	430.416	-0.225	0.0073471	-2.956	0.000
URBAN	346.946	21.081	0.110	0.9525773	16.458	0.003
AGE	12.169	11.744	0.113	0.0035719	1.036	0.337
AGE* AGE	-0.087	0.133	-0.067	0.0040768	-0.656	0.553

AGE* E1	45.742	13.530	0.602	0.0013376	3.381	0.004
AGE* AGE* E1	-0.533	0.157	-0.371	0.0035594	-3.403	0.005
AGE* E2	152.930	18.313	1.129	0.0023187	8.351	0.010
AGE* AGE* E2	-1.545	0.226	-0.508	0.0076868	-6.841	0.000
AGE* E3	272.719	16.954	2.700	0.0015047	16.086	0.006
AGE* AGE* E3	-2.906	0.200	-1.379	0.0047125	-14.541	0.000
AGE* E4	115.600	21.221	0.882	0.0016185	5.448	0.000
AGE* AGE* E4	-1.401	0.245	-0.539	0.0047827	-5.723	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.124087E+11	15	.827249E+09	512.697	0.000
RESIDUAL	.256566E+11	15901	1613523.107		

RACE-SPECIFIC EARNINGS FUNCTIONS WITH EDUCATION-SPECIFIC AGE PROFILES

AFRICAN, UNWEIGHTED

DEP VAR: MEANINC N: 857 MULTIPLE R: .574 SQUARED MULTIPLE R: .330
ADJUSTED SQUARED MULTIPLE R: .318 STANDARD ERROR OF ESTIMATE: 743.303

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	78.036	576.439	0.000	.	0.135	0.892
E1	-1004.300	659.812	-0.555	0.0059909	-1.522	0.128
E2	-1758.908	892.286	-0.641	0.0075318	-1.971	0.049
E3	-1742.978	1020.666	-0.675	0.0051037	-1.708	0.088
E4	-1074.347	1121.894	-0.325	0.0069188	-0.958	0.339
URBAN	99.366	51.759	0.055	0.9627330	1.920	0.055
AGE	4.298	28.576	0.060	0.0049542	0.150	0.880
AGE* AGE	0.009	0.327	0.010	0.0058225	0.026	0.979
AGE* E1	67.220	33.857	1.390	0.0016274	1.985	0.047
AGE* AGE* E1	-0.847	0.401	-0.849	0.0049278	-2.110	0.035
AGE* E2	112.001	49.705	1.299	0.0023984	2.253	0.024
AGE* AGE* E2	-1.187	0.651	-0.540	0.0090810	-1.823	0.069
AGE* E3	136.201	54.342	1.895	0.0013940	2.506	0.012
AGE* AGE* E3	-1.224	0.682	-0.716	0.0049935	-1.793	0.073
AGE* E4	85.584	57.744	1.022	0.0016780	1.482	0.139
AGE* AGE* E4	-0.960	0.702	-0.524	0.0054395	-1.368	0.172

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.228345E+09	15	.152230E+08	27.553	0.000
RESIDUAL	.464652E+09	841	552499.081		

AFRICAN, WEIGHTED

DEP VAR: MEANINC N: 12229 MULTIPLE R: .589 SQUARED MULTIPLE R: .347
ADJUSTED SQUARED MULTIPLE R: .346 STANDARD ERROR OF ESTIMATE: 709.461

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	26.704	139.194	0.000	.	0.192	0.858
E1	-935.012	159.237	-0.530	0.0065559	-5.872	0.000
E2	-1673.547	218.408	-0.608	0.0084797	-7.662	0.003
E3	-1619.942	242.407	-0.625	0.0061045	-6.683	0.007
E4	-873.258	273.097	-0.267	0.0076727	-3.198	0.009
URBAN	90.069	13.063	0.051	0.9648738	6.895	0.009
AGE	7.150	6.865	0.115	0.0043575	1.041	0.315
AGE* AGE	-0.028	0.078	-0.037	0.0050812	-0.363	0.733
AGE*						

E1	63.747	8.149	1.442	0.0015739	7.822	0.001
AGE*						
AGE*						
E1	-0.810	0.096	-0.949	0.0042602	-8.470	0.000
AGE*						
E2	108.870	12.282	1.257	0.0026566	8.864	0.000
AGE*						
AGE*						
E2	-1.172	0.161	-0.544	0.0095913	-7.282	0.008
AGE*						
E3	132.901	12.791	1.957	0.0015073	10.390	0.006
AGE*						
AGE*						
E3	-1.238	0.157	-0.827	0.0048461	-7.872	0.000
AGE*						
E4	73.638	13.982	0.939	0.0016807	5.267	0.000
AGE*						
AGE*						
E4	-0.805	0.168	-0.495	0.0050042	-4.793	0.000

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.326829E+10	15	.217886E+09	432.885	0.000
RESIDUAL	.614724E+10	12213	503335.587		

RACE-SPECIFIC EARNINGS FUNCTIONS WITH EDUCATION-SPECIFIC AGE PROFILES

COLOURED, UNWEIGHTED

DEP VAR: MEANINC N: 148 MULTIPLE R: .641 SQUARED MULTIPLE R: .410
ADJUSTED SQUARED MULTIPLE R: .343 STANDARD ERROR OF ESTIMATE: 637.678

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-490.295	1491.979	0.000	.	-0.329	0.743
E1	-484.558	1668.102	-0.307	0.0039963	-0.290	0.772
E2	-1142.182	4296.259	-0.366	0.0023627	-0.266	0.791
E3	1663.321	3678.634	0.600	0.0025340	0.452	0.652
E4	-2727.812	4013.810	-0.738	0.0037847	-0.680	0.498
URBAN	405.032	349.572	0.084	0.8550073	1.159	0.249
AGE	29.496	68.124	0.532	0.0029615	0.433	0.666
AGE* AGE	-0.360	0.723	-0.572	0.0033902	-0.498	0.619
AGE* E1	55.323	76.555	1.592	0.0009202	0.723	0.471
AGE* AGE* E1	-0.697	0.828	-1.136	0.0024501	-0.841	0.402
AGE* E2	39.773	266.218	0.414	0.0005823	0.149	0.881
AGE* AGE* E2	0.649	4.009	0.243	0.0019821	0.162	0.872
AGE* E3	23.662	178.658	0.348	0.0006483	0.132	0.895
AGE* AGE* E3	-0.654	2.082	-0.436	0.0023186	-0.314	0.754
AGE* E4	167.322	181.105	2.065	0.0008939	0.924	0.357
AGE* AGE* E4	-1.926	1.928	-1.242	0.0028925	-0.999	0.319

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.373496E+08	15	2489970.172	6.123	0.000
RESIDUAL	.536757E+08	132	406633.776		

COLOURED, WEIGHTED

DEP VAR: MEANINC N: 1084 MULTIPLE R: .658 SQUARED MULTIPLE R: .433
ADJUSTED SQUARED MULTIPLE R: .425 STANDARD ERROR OF ESTIMATE: 592.616

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-561.506	484.381	0.000	.	-1.159	0.247
E1	-636.950	536.657	-0.402	0.0046392	-1.187	0.236
E2	-357.771	1258.126	-0.126	0.0026884	-0.284	0.776
E3	1722.246	1338.543	0.599	0.0024496	1.287	0.198
E4	-2641.934	1380.635	-0.716	0.0037909	-1.914	0.056
URBAN	415.710	108.457	0.098	0.8142312	3.833	0.000
AGE	33.486	22.734	0.598	0.0032190	1.473	0.141
AGE*						

AGE	-0.410	0.245	-0.625	0.0038224	-1.676	0.094
AGE* E1	64.339	25.175	1.722	0.0011700	2.556	0.011
AGE* AGE* E1	-0.816	0.277	-1.208	0.0031572	-2.947	0.003
AGE* E2	-14.326	79.451	-0.159	0.0006808	-0.180	0.857
AGE* AGE* E2	1.566	1.214	0.617	0.0023180	1.290	0.197
AGE* E3	19.754	66.937	0.266	0.0006548	0.295	0.768
AGE* AGE* E3	-0.605	0.805	-0.349	0.0024553	-0.752	0.452
AGE* E4	162.031	63.475	1.908	0.0009507	2.553	0.011
AGE* AGE* E4	-1.860	0.693	-1.082	0.0032713	-2.685	0.007

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.286375E+09	15	.190916E+08	54.362	0.000
RESIDUAL	.375075E+09	1068	351193.822		

RACE-SPECIFIC EARNINGS FUNCTIONS WITH EDUCATION-SPECIFIC AGE PROFILES

INDIAN, UNWEIGHTED

DEP VAR: MEANINC N: 128 MULTIPLE R: .585 SQUARED MULTIPLE R: .342

ADJUSTED SQUARED MULTIPLE R: .261 STANDARD ERROR OF ESTIMATE: 1602.707

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-6150.045	9901.684	0.000	.	-0.621	0.536
E1	4290.920	10189.658	1.071	0.0008996	0.421	0.674
E2	137.997	10408.370	0.027	0.0014051	0.013	0.989
E3	-764.755	10131.289	-0.201	0.0008213	-0.075	0.940
E4	10369.668	13320.990	1.352	0.0019301	0.778	0.438
AGE	330.821	430.384	2.272	0.0006665	0.769	0.444
AGE* AGE	-3.535	4.454	-2.005	0.0009122	-0.794	0.429
AGE* E1	-171.366	448.158	-1.752	0.0002774	-0.382	0.703
AGE* AGE* E1	1.706	4.717	0.834	0.0010947	0.362	0.718
AGE* E2	123.095	463.916	0.908	0.0004972	0.265	0.791
AGE* AGE* E2	-1.994	4.933	-0.702	0.0019282	-0.404	0.687
AGE* E3	195.059	447.271	1.745	0.0003636	0.436	0.664
AGE* AGE* E3	-2.710	4.740	-1.032	0.0017873	-0.572	0.569
AGE* E4	-454.677	604.427	-2.530	0.0005146	-0.752	0.453
AGE* AGE* E4	4.871	6.424	1.392	0.0017280	0.758	0.450

INDIAN, WEIGHTED

DEP VAR: MEANINC N: 288 MULTIPLE R: .614 SQUARED MULTIPLE R: .377

ADJUSTED SQUARED MULTIPLE R: .345 STANDARD ERROR OF ESTIMATE: 1480.665

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	-4287.212	6845.474	0.000	.	-0.626	0.532
E1	2530.719	7008.820	0.646	0.0007128	0.361	0.718
E2	-1819.002	7096.027	-0.371	0.0010885	-0.256	0.798
E3	-2627.343	6972.237	-0.671	0.0007203	-0.377	0.707
E4	4801.842	8695.375	0.683	0.0014894	0.552	0.581
AGE	241.257	272.771	1.891	0.0004990	0.884	0.377
AGE* AGE	-2.616	2.687	-1.751	0.0007053	-0.974	0.331
AGE* E1	-86.369	283.151	-0.963	0.0002291	-0.305	0.761
AGE* AGE* E1	0.840	2.838	0.472	0.0008976	0.296	0.767
AGE* E2	219.300	289.419	1.918	0.0003561	0.758	0.449
AGE* AGE*						

E2	-2.972	2.911	-1.395	0.0012217	-1.021	0.308
AGE*						
E3	297.750	282.646	2.705	0.0003459	1.053	0.293
AGE*						
AGE*						
E3	-3.929	2.854	-1.603	0.0016832	-1.377	0.170
AGE*						
E4	-187.419	369.006	-1.338	0.0003286	-0.508	0.612
AGE*						
AGE*						
E4	1.985	3.752	0.822	0.0009451	0.529	0.597

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.362412E+09	14	.258866E+08	11.808	0.000
RESIDUAL	.598517E+09	273	2192368.236		

RACE-SPECIFIC EARNINGS FUNCTIONS WITH EDUCATION-SPECIFIC AGE PROFILES

WHITE, UNWEIGHTED

DEP VAR: MEANINC N: 342 MULTIPLE R: .467 SQUARED MULTIPLE R: .218

ADJUSTED SQUARED MULTIPLE R: .182 STANDARD ERROR OF ESTIMATE: 2525.710

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	16697.801	54908.693	0.000	.	0.304	0.761
E1	-12544.169	54906.334	-1.921	0.0000339	-0.228	0.819
E2	-19130.634	54993.980	-2.609	0.0000426	-0.348	0.728
E3	-21366.591	54927.080	-3.829	0.0000248	-0.389	0.698
E4	-15781.519	54952.019	-1.838	0.0000585	-0.287	0.774
URBAN	-1451.817	635.795	-0.113	0.9768458	-2.283	0.023
AGE	-465.639	2182.669	-2.401	0.0000189	-0.213	0.831
AGE* AGE	3.748	21.002	1.714	0.0000260	0.178	0.858
AGE* E1	423.092	2184.076	3.415	0.0000077	0.194	0.847
AGE* AGE* E1	-3.355	21.033	-1.588	0.0000242	-0.159	0.873
AGE* E2	782.213	2189.174	4.688	0.0000139	0.357	0.721
AGE* AGE* E2	-7.276	21.098	-2.255	0.0000561	-0.345	0.730
AGE* E3	950.386	2184.624	7.568	0.0000079	0.435	0.664
AGE* AGE* E3	-9.056	21.030	-3.929	0.0000288	-0.431	0.667
AGE* E4	670.170	2186.492	3.800	0.0000156	0.307	0.759
AGE* AGE* E4	-6.576	21.079	-2.081	0.0000539	-0.312	0.755

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.579598E+09	15	.386399E+08	6.057	0.000
RESIDUAL	.207962E+10	326	6379211.292		

WHITE, WEIGHTED

DEP VAR: MEANINC N: 2316 MULTIPLE R: .474 SQUARED MULTIPLE R: .225

ADJUSTED SQUARED MULTIPLE R: .220 STANDARD ERROR OF ESTIMATE: 2403.658

VARIABLE	COEFFICIENT	STD ERROR	STD COEF	TOLERANCE	T	P(2 TAIL)
CONSTANT	19176.694	23159.242	0.000	.	0.828	0.408
E1	-15230.277	23161.280	-2.333	0.0000268	-0.658	0.511
E2	-21873.981	23181.761	-3.121	0.0000308	-0.944	0.345
E3	-24793.322	23164.330	-4.556	0.0000186	-1.070	0.285
E4	-18987.043	23165.070	-2.218	0.0000460	-0.820	0.413
URBAN	-1126.563	231.043	-0.091	0.9742905	-4.876	0.000
AGE	-571.756	921.938	-3.128	0.0000132	-0.620	0.535
AGE*						

AGE	4.717	8.880	2.253	0.0000187	0.531	0.595
AGE* E1	526.287	922.474	4.204	0.0000062	0.571	0.568
AGE* AGE* E1	-4.340	8.890	-2.033	0.0000194	-0.488	0.625
AGE* E2	891.828	923.789	5.408	0.0000107	0.965	0.334
AGE* AGE* E2	-8.373	8.907	-2.617	0.0000435	-0.940	0.347
AGE* E3	1095.364	922.521	8.682	0.0000063	1.187	0.235
AGE* AGE* E3	-10.574	8.888	-4.548	0.0000231	-1.190	0.234
AGE* E4	800.770	922.628	4.457	0.0000128	0.868	0.386
AGE* AGE* E4	-7.849	8.898	-2.431	0.0000444	-0.882	0.378

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	.385437E+10	15	.256958E+09	44.475	0.000
RESIDUAL	.132884E+11	2300	5777572.233		

Advancing Basic Education and Literacy

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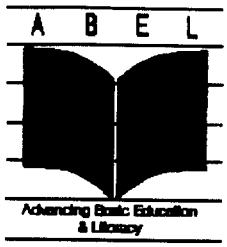

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