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Discussion Paper



**Estimating the private rate  
of return to education for  
indigenous Australians**

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## **ABSTRACT**

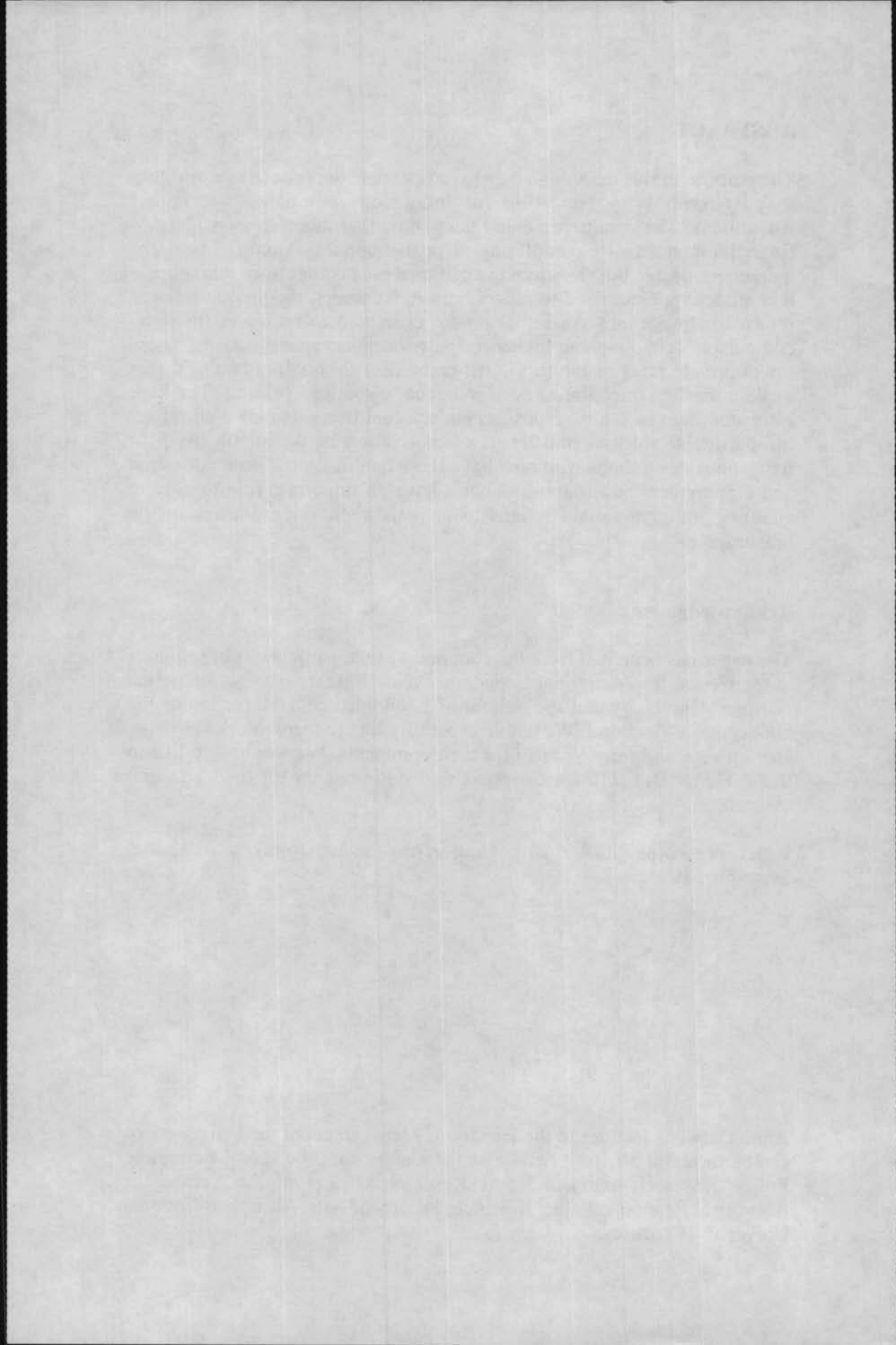
The purpose of this discussion paper is to estimate the private rate of return to post-compulsory education for indigenous compared with other Australians. The results presented here show that there are considerable financial benefits to completing a post-secondary qualification for indigenous people but the return to additional post-compulsory schooling is less attractive. Compared to others born in Australia, the private rates of return for indigenous Australians were estimated to be lower for post-compulsory schooling and higher for post-secondary qualifications. These lower private rates of return to post-compulsory schooling could in part explain the low retention rates of indigenous youth to year 12. The high estimated rates of return to post-secondary qualifications may well reflect the particular abilities and levels of motivation of the small group of indigenous Australians who now have these qualifications. Both education and employment and training policies have an important role to play in enabling indigenous Australians to increase their opportunities in the labour force.

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An important assumption of government policy in the area of indigenous education is that increasing educational attainment will increase the employment rate and incomes of indigenous Australians.<sup>1</sup> This assumption is supported by empirical evidence which shows that more educated indigenous Australians are more likely to be in employment than others (this is especially true for females), and that higher levels of education are associated with higher incomes (Daly 1995; Jones 1991; Ross 1991).

In many government reports, for example the Hughes Report (1988) and the Aboriginal Education Policy (AEP) Review (1994), there has been an emphasis on the need for indigenous Australians to catch up with other Australians in terms of educational achievement. The AEP Review recommended large expenditures to improve the delivery and relevance of indigenous education. Its major recommendations included increasing indigenous involvement and decision-making in education; improved access to education, for example by the adoption of new technologies to reach remote communities; greater incentives for indigenous people to complete secondary school and enter higher education; and a recognition of the fact that what might be considered appropriate and relevant education for other Australians may not be the preferred model for indigenous people. It was recognised that these goals would require inputs at both the Federal and State government levels (see Schwab 1995 for a detailed survey of indigenous education policy). In response to the AEP Review, Commonwealth and State governments have agreed to spend \$215 million over the next four years to improve indigenous education.

The educational shortfall amongst indigenous Australians which has been the focus of these official reports is a longstanding problem. Table 1 summarises data from the Censuses between 1976 and 1991 which reveal lower levels of educational attainment of indigenous Australians compared with other Australians. Indigenous adults were less likely to have stayed on at school past the age of 16 years and were more likely to have received no schooling at all. Not surprisingly, indigenous Australians were also less likely to hold post-secondary qualifications than were other Australians; only nine per cent of indigenous adults held a post-secondary qualification compared with 31 per cent of other Australian adults. Although there is some evidence of improvement in access to education for indigenous people, a big gap still remains as retention rates in education for other Australians have increased substantially over the last decade.

School retention rates remain lower for the current generation of indigenous youth than for other Australians. Data presented in Table 2, derived from the AEP Review, for the 1992 year 12 cohort, show that retention rates, for indigenous males in particular, fell off dramatically in years 11 and 12. While 76 per cent of this cohort of other Australian students reached year 12, only 29 per cent of indigenous females and 22.5 per cent of indigenous males reached year 12. The general nature of these

results are confirmed by Groome and Hamilton's (1995) study using ABSTUDY data.

**Table 1. Age on leaving school for indigenous and other Australians aged 15 years and over, 1976-91.<sup>a</sup>**

	1976 Per cent	1981 Per cent	1986 Per cent	1991 Per cent	Change in share 1976-91 Per cent
<b>Indigenous persons</b>					
Less than 15 years	28.4	25.9	22.6	19.7	-30.6
15-16 years	48.8	51.0	55.7	54.3	11.3
17+ years	8.6	10.7	13.7	20.6	139.5
did not attend school	14.3	12.5	7.9	5.4	-62.2
Total	100.0	100.0	100.0	100.0	
<b>Other Australians</b>					
Less than 15 years	31.0	26.9	22.8	17.2	-44.5
15-16 years	47.5	48.1	47.8	45.8	-3.6
17+ years	20.4	24.2	28.6	36.0	76.5
did not attend school	1.0	0.8	0.8	1.0	0.0
Total	100.0	100.0	100.0	100.0	
<b>Ratio of Indigenous/ Other Australians</b>					
Less than 15 years	0.9	1.0	1.0	1.2	
15-16 years	1.0	1.1	1.2	1.2	
17+ years	0.4	0.4	0.5	0.6	
did not attend school	14.3	15.6	9.9	5.4	

a. Information on the school leaving age of the Aboriginal adult population was not presented in 1971. Data are available, however, for the highest level of schooling for the whole Aboriginal population, including both adults and children. Among those not currently attending school at the time of the 1971 Census, 26.3 per cent had never attended school. The figures presented in Table 1 for later years do not include those still attending school.

Source: 1976, 1981, 1986 and 1991 Censuses.

There are many reasons for wishing to increase the educational attainment of indigenous Australian youth. These include social, cultural, economic and political advantages which may flow from raising educational standards in the indigenous community. The aim of this paper is to narrow the focus to economic benefit. It asks the question, if an indigenous teenager were making an economic decision about continuing in education, how worthwhile is the investment of time and money in an extra year of schooling, given the likely addition to income in later life associated with higher schooling levels? In other words, what would be the private rate of

**Table 2. School retention rates for indigenous and other Australians, 1992 year 12 cohort.<sup>a</sup>**

	Year 8 Per cent	Year 9 Per cent	Year 10 Per cent	Year 11 Per cent	Year 12 Per cent
Other Australian students	100.0	100.0	98.3	85.8	76.2
Indigenous females	100.0	97.1	78.1	46.2	29.0
Indigenous males	100.0	82.7	64.7	38.2	22.5

a Data exclude students in Queensland schools.

Source: AEP Report (1994).

return to this investment in an additional year of schooling? The internal rate of return which equates the benefits and costs has been calculated here as:

$$C = \sum_{i=n}^{64} \frac{I_i}{(1+r)^{i-n}}$$

where I is income, C is costs, r is the internal rate of return and n is the age on completing education (Appendix B contains a further description of the calculation of the internal rate of return).

The human capital framework, with its assumption of rational optimising behaviour, suggests that the low retention rates described above may reflect the fact that education is not as worthwhile an investment for indigenous Australians as for other Australian youth. This may be because they plan to spend a smaller proportion of their adult lives in paid employment or because, even in employment, they receive lower incomes for a given level of education.

In addition to calculating rates of return to additional schooling, we shall calculate some rates of return to post-secondary education for indigenous compared with other Australians.

### The data

The data used for this study come from the 1991 Census and relate to indigenous and other native-born Australians. Other studies (for example Chiswick and Miller 1985), show that the returns to education for overseas-born Australians differ from those for native-born Australians, so the former group has been excluded to avoid this complication in the comparisons.



Regression equations have been estimated and used to calculate the internal rate of return to an additional year of schooling and to the completion of a post-schooling qualification for males and females aged 15-64 years in full-time and part-time employment (these results are presented in Appendix A). The results for other Australians have been derived from the 1 per cent public-use sample of the Census and those for indigenous Australians from the full Aboriginal sub-file of the 1991 Census.<sup>2</sup> The coefficients on the schooling variables in these regressions could be interpreted as the returns to schooling if there were no other costs involved apart from the earnings foregone while undertaking education (Mincer 1974). In the Australian context, however, there are additional costs involved such as the direct cost of tuition fees and books and Higher Education Contribution Scheme (HECS) charges for those at university. There are also offsetting benefits while studying in the form of income support through AUSTUDY and ABSTUDY which need to be taken into account (AUSTUDY and ABSTUDY rates for 1991 are given in Table A3).

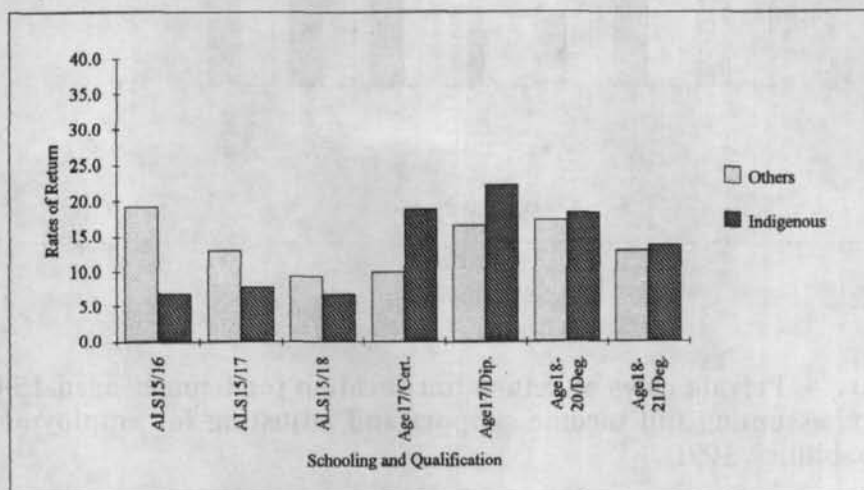
The results reported in the section below estimate the internal private rate of return to education based on the predicted income from these regression equations with the appropriate adjustments for additional costs and benefits. Results are reported for both males and females, indigenous and other Australians and also for those living in different parts of Australia. Numerous studies of the socioeconomic status of indigenous Australians conducted over many years have highlighted major differences between those living in major urban, other urban and rural areas (see for example Altman and Nieuwenhuysen 1979; Fisk 1985; Taylor 1993 and Daly 1995). The rate of return to education in these different situations is therefore a question of interest. It is however, only possible to calculate these under certain restrictive assumptions about migration patterns as discussed below.

## Results

Figures 1-4 present comparisons of the private rates of return to education for indigenous and other Australian males and females. The calculations used to derive Figures 1 and 3 assume that no income support is received through either AUSTUDY or ABSTUDY and compare the costs and benefits of education for those in employment; that is, the estimated rate of return for someone making the choice between leaving school at the age of 15 years and entering employment, and leaving school at the age of 17 years and entering employment. Figures 2 and 4 assume the full income entitlement under these schemes (the data are also presented in Tables 3, 4, 5 and 6). These figures also take into account the probability of being in employment for each age category and education level; that is, the estimated rate of return for someone choosing between leaving school at

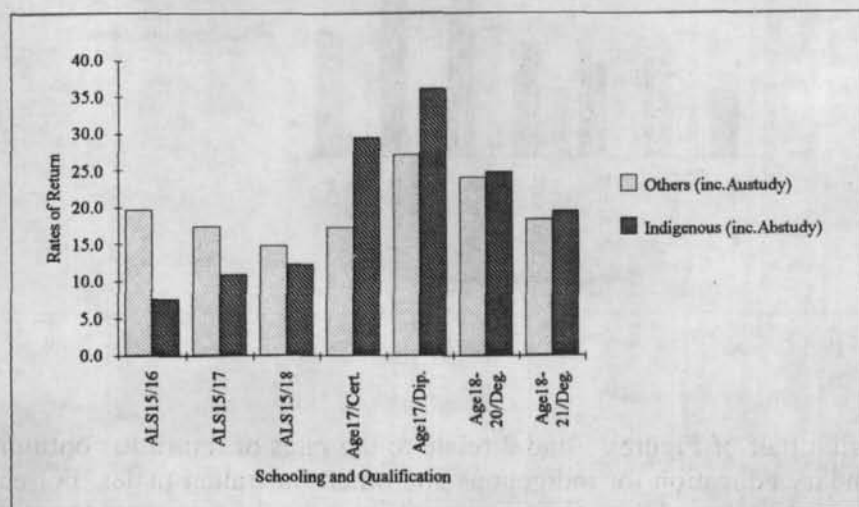
the age of 15 years with a given probability of gaining employment, and leaving school at the age of 17 years with its associated probability of gaining employment. Education not only increases income on average, but it also increases the probability of being in employment (Daly 1995). In these calculations, it has also been assumed that there is no alternative source of income, for example from part-time employment whilst in education. The results for males and females will be discussed in turn.

**Figure 1. Private rates of return to education for males aged 15-64 years, 1991.**



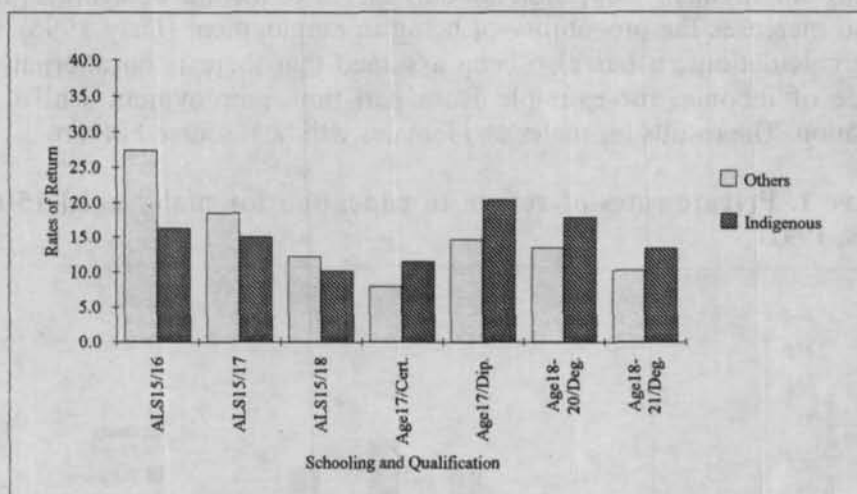
Source: 1991 Census.

**Figure 2. Private rates of return to education for males aged 15-64 years, assuming full income support and adjusting for employment probabilities, 1991.**



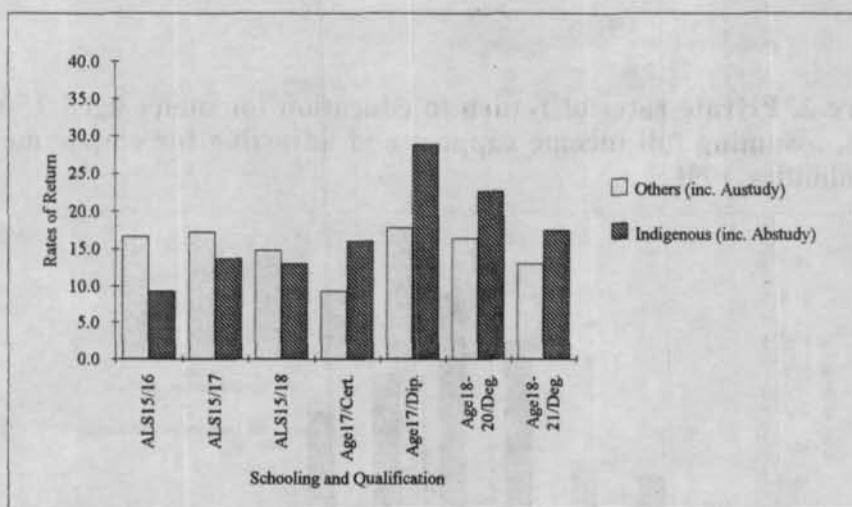
Source: 1991 Census.

**Figure 3. Private rates of return to education for females aged 15-64 years, 1991.**



Source: 1991 Census.

**Figure 4. Private rates of return to education for females aged 15-64 years, assuming full income support and adjusting for employment probabilities, 1991.**



Source: 1991 Census.

The first half of Figures 1 and 2 relate to the rates of return to continuing secondary education for indigenous and other Australian males. For each of the options for additional post-compulsory schooling presented here, the private rate of return was higher for non-indigenous males than for

indigenous males, whether AUSTUDY and ABSTUDY were included or not. These results are consistent with the observed low retention rates for indigenous males in the post-compulsory schooling years. For those not intending to continue on to a post-secondary qualification, there is a relatively low rate of return to investment in further secondary education, before any non-pecuniary benefits and costs are taken into account.

The second part of these figures relate to post-secondary qualifications. In each of the cases considered, the estimated rates of return were higher for indigenous than for other Australian males. The results suggest that investment in post-secondary qualifications is worthwhile for indigenous males. The first post-secondary qualification group to be considered is 'certificate' which covers a wide range of vocational qualifications. The estimated rate of return was 18.8 per cent and grew to 29.4 per cent with full ABSTUDY allowance and adjustment for the probability of being in employment. An average duration of two years full-time study after leaving school at the age of 17 years has been assumed, but for those undertaking an apprenticeship the duration of the training is longer, albeit part-time.

The highest private rate of return (over 20 per cent) estimated for indigenous males for a post-secondary qualification was for a diploma which was assumed to take two years of full-time study to complete. Two estimates of the rate of return to a university degree are presented; the first assumes three years of full-time study (18.4 and 24.8 per cent, excluding and including a full ABSTUDY allowance and adjustment for employment probabilities) and the second lower estimate assumes four years of study (13.8 and 19.6 per cent).

Figures 3 and 4 relate to females. The calculations reported here show that education, especially post-secondary qualifications, is a worthwhile undertaking for indigenous females. There were some similar patterns to the male results. Indigenous females were estimated to have a lower rate of return to post compulsory secondary schooling than other Australian females. They did, however, exceed the private rates of return estimated for indigenous males. As with indigenous males, indigenous females had higher rates of return to post-secondary qualifications than their other Australian counterparts. The highest private rate of return was estimated for the diploma.

Tables 3, 4, 5 and 6 present the estimated private rate of return to education for indigenous and other Australians including a breakdown by geographical area of residence.<sup>3</sup> These have been estimated under the restrictive assumption that people do not migrate between major urban, other urban and rural sections-of-State. This assumption makes it possible to compare the income streams of individuals with different levels of education and living in the same section-of-State but is unrealistic given

the evidence of considerable internal migration in Australia (Bell 1992; Taylor and Bell 1994). The figures should therefore only be thought of as rough indications of the private rates of return, as individuals can and do migrate fairly easily to take advantage of any income opportunities in different parts of the country.

**Table 3. Private rates of return to education for indigenous Australians aged 15-64 years, 1991.**

Section-of-State by gender	ALS <sup>a</sup> 15/16 <sup>b</sup>	ALS 15/17 <sup>c</sup>	ALS 15/18 <sup>d</sup>	Age 17 Cert. <sup>e</sup>	Age 17 Dip. <sup>f</sup>	Age 18-20 Deg. <sup>g</sup>	Age 18-21 Deg. <sup>h</sup>
<b>Males</b>							
Australian total	6.9	7.9	6.8	18.8	22.3	18.4	13.8
Inc. ABSTUDY	6.9	9.8	9.4	28.0	33.1	26.2	19.3
Gap	0.0	1.9	2.6	9.2	10.8	7.8	5.5
Major urban	9.5	6.1	6.6	8.9	13.8	11.8	8.5
Inc. ABSTUDY	9.5	7.4	8.7	12.8	19.4	15.9	11.6
Gap	0.0	1.3	2.1	3.9	5.6	4.1	3.1
Other urban	7.9	10.5	4.5	12.7	14.6	15.1	11.2
Inc. ABSTUDY	7.9	12.6	6.5	18.2	20.8	21.3	15.7
Gap	0.0	2.1	2.0	5.5	6.2	6.2	4.5
Rural areas	+	+	+	26.2	30.4	22.4	16.8
Inc. ABSTUDY	+	2.5	3.7	44.8	51.8	35.3	26.0
Gap	+	2.5	3.7	18.6	21.4	12.9	9.2
<b>Females</b>							
Australian total	16.3	15.0	10.2	11.5	20.4	17.8	13.4
Inc. ABSTUDY	16.3	18.6	14.3	18.0	31.3	26.2	19.6
Gap	0.0	3.6	4.1	6.5	10.9	8.4	6.2
Major urban	22.5	17.3	11.6	8.9	14.3	14.0	10.4
Inc. ABSTUDY	22.5	21.2	15.8	13.7	21.2	20.2	15.1
Gap	0.0	3.9	4.2	4.8	6.9	6.2	4.7
Other urban	18.0	15.6	10.9	9.3	18.7	16.2	12.2
Inc. ABSTUDY	18.0	19.1	15.1	14.5	28.3	23.5	17.9
Gap	0.0	3.5	4.2	5.2	9.6	7.3	5.7
Rural areas	8.9	10.5	6.8	9.1	28.6	21.3	16.0
Inc. ABSTUDY	8.9	13.5	10.3	17.2	47.4	33.5	24.7
Gap	0.0	3.0	3.5	8.1	18.8	12.2	8.7

a. Age left school.

b. + indicates rate of return could not be determined.

c. ABSTUDY payments begin at age 16 years.

d. The private rates of return to stay in school until the second rather than first age.

e. Assuming a certificate involves two years of full time study.

f. Assuming a diploma involves two years of full time study.

g. Assuming a degree involves three years of full time study.

h. Assuming a degree involves four years of full time study.

Source: 1991 Census.

**Table 4. Private rates of return to education for indigenous Australians aged 15-64 years, 1991 (including adjustment for employment probabilities).**

Section-of-State by gender	ALS <sup>a</sup> 15/16 <sup>b</sup>	ALS 15/17 <sup>c</sup>	ALS 15/18 <sup>d</sup>	Age 17 Cert. <sup>e</sup>	Age 17 Dip. <sup>f</sup>	Age 18-20 Deg. <sup>g</sup>	Age 18-21 Deg. <sup>h</sup>
<b>Males</b>							
Australian total	7.6	8.0	7.7	18.5	23.3	17.8	14.1
Inc. ABSTUDY	7.6	11.0	12.3	29.4	36.1	24.8	19.6
Gap	0.0	3.0	4.6	10.9	12.8	7.0	5.5
Major urban	17.0	11.6	12.3	16.2	21.3	15.0	11.8
Inc. ABSTUDY	17.0	14.9	17.6	25.3	32.5	20.0	15.8
Gap	0.0	3.3	5.3	9.1	11.2	5.0	4.0
Other urban	9.5	21.7	5.7	16.2	20.7	15.7	12.7
Inc. ABSTUDY	9.5	26.3	10.3	25.3	30.8	21.4	17.4
Gap	0.0	4.6	4.6	9.1	10.1	5.7	4.7
Rural areas	+	+	+	20.4	23.7	18.3	14.1
Inc. ABSTUDY	+	2.4	1.5	35.3	40.0	27.7	21.4
Gap	+	2.4	1.5	14.9	16.3	9.4	7.3
<b>Females</b>							
Australian total	9.4	10.1	7.7	10.3	18.2	15.4	11.8
Inc. ABSTUDY	9.4	13.7	13.1	16.1	28.9	22.7	17.5
Gap	0.0	3.6	5.4	5.8	10.7	7.3	5.7
Major urban	15.4	14.6	11.4	9.8	16.1	14.0	10.7
Inc. ABSTUDY	15.4	18.8	17.7	15.6	25.1	20.4	15.7
Gap	0.0	4.2	6.3	5.8	9.0	6.4	5.0
Other urban	10.3	10.1	8.7	9.6	17.5	14.2	11.4
Inc. ABSTUDY	10.3	13.9	14.4	15.1	27.2	20.0	16.3
Gap	0.0	3.8	5.7	5.5	9.7	5.8	4.9
Rural areas	3.0	5.4	2.7	5.2	20.5	15.1	11.7
Inc. ABSTUDY	3.0	8.0	6.8	10.5	34.5	22.8	17.6
Gap	0.0	2.6	4.1	5.3	14.0	7.7	5.9

a. Age left school.

b. + indicates rate of return could not be determined.

c. ABSTUDY payments begin at age 16 years.

d. The private rates of return to stay in school until the second rather than first age.

e. Assuming a certificate involves two years of full time study.

f. Assuming a diploma involves two years of full time study.

g. Assuming a degree involves three years of full time study.

h. Assuming a degree involves four years of full time study.

Source: 1991 Census.

The results show higher rates of return to post-secondary qualifications for indigenous Australian males in rural compared with major urban areas but much lower rates of return to additional years of post-compulsory schooling. For indigenous females, the private rate of return was estimated to be considerably higher in major urban than rural areas for both

additional post-compulsory schooling and post-secondary qualifications. The higher rates of return on post-secondary qualifications in rural areas for males may reflect the pay loadings which are often given to those working in remote areas. In addition, generally lower levels of educational attainment in these areas may mean that any qualification commands a premium. However, the very low rates of return to additional years of post-compulsory schooling in rural areas is an interesting result which probably reflects the limited employment opportunities in these areas. The results for other Australian males and females also show that the private rate of return to post-compulsory years of education was lower outside the major urban areas.

**Table 5. Private rates of return to education for other Australians aged 15-64 years, 1991.**

Section-of-State by gender	ALS <sup>a</sup> 15/16 <sup>b</sup>	ALS 15/17 <sup>c</sup>	ALS 15/18 <sup>d</sup>	Age 17 Cert. <sup>e</sup>	Age 17 Dip. <sup>f</sup>	Age 18-20 Deg. <sup>g</sup>	Age 18-21 Deg. <sup>h</sup>
<b>Males</b>							
Australian total	19.3	13.1	9.4	9.9	16.6	17.4	13.0
Inc. AUSTUDY	19.3	15.9	12.8	15.0	24.5	24.5	18.2
Gap	0.0	2.8	3.4	5.1	7.9	7.1	5.2
Major urban	24.6	16.1	11.1	8.3	14.7	15.3	11.5
Inc. AUSTUDY	24.6	19.5	15.0	12.6	21.5	21.5	16.1
Gap	0.0	3.4	3.9	4.3	6.8	6.2	4.6
Other areas	13.1	8.2	5.5	11.1	17.9	19.1	14.3
Inc. AUSTUDY	13.1	10.2	8.0	17.0	27.1	27.5	20.3
Gap	0.0	2.0	2.5	5.9	9.2	8.4	6.0
<b>Females</b>							
Australian total	27.4	18.5	12.2	7.9	14.6	13.5	10.3
Inc. AUSTUDY	27.4	24.9	19.5	15.3	26.7	22.9	17.3
Gap	0.0	6.4	7.3	7.4	12.1	9.4	7.0
Major urban	31.9	19.3	12.8	7.5	12.6	12.2	9.3
Inc. AUSTUDY	31.9	26.0	20.4	14.6	23.1	20.8	15.8
Gap	0.0	6.7	7.6	7.1	10.5	8.6	6.5
Other areas	21.7	16.7	10.7	7.9	17.7	15.2	11.6
Inc. AUSTUDY	21.7	22.5	17.2	15.4	32.3	25.7	19.4
Gap	0.0	5.8	6.5	7.5	14.6	10.5	7.8

a. Age left school.

b. + indicates rate of return could not be determined.

c. AUSTUDY payments begin at age 16 years.

d. The private rates of return to stay in school until the second rather than first age.

e. Assuming a certificate involves two years of full time study.

f. Assuming a diploma involves two years of full time study.

g. Assuming a degree involves three years of full time study.

h. Assuming a degree involves four years of full time study.

Source: 1991 Census.

**Table 6. Private rates of return to education for other Australians aged 15-64 years, 1991 (including adjustment for employment probabilities).**

Section-of-State by gender	ALS <sup>a</sup> 15/16 <sup>b</sup>	ALS 15/17 <sup>c</sup>	ALS 15/18 <sup>d</sup>	Age 17 Cert. <sup>e</sup>	Age 17 Dip. <sup>f</sup>	Age 18-20 Deg. <sup>g</sup>	Age 18-21 Deg. <sup>h</sup>
<b>Males</b>							
Australian total	19.7	14.1	10.7	11.0	17.8	17.1	13.2
Inc. AUSTUDY	19.7	17.4	14.9	17.3	27.2	24.1	18.4
Gap	0.0	3.3	4.2	6.3	9.4	7.0	5.2
Major urban	24.5	16.6	12.4	10.0	16.4	15.4	11.9
Inc. AUSTUDY	24.5	20.4	17.0	15.5	24.8	21.4	16.6
Gap	0.0	3.8	4.6	5.5	8.4	6.0	4.7
Other areas	14.1	9.8	6.9	12.0	18.3	18.6	14.2
Inc. AUSTUDY	14.1	12.3	10.2	19.1	27.9	26.6	20.3
Gap	0.0	2.5	3.3	7.1	9.6	8.0	6.1
<b>Females</b>							
Australian total	16.7	13.0	9.0	4.7	10.5	10.4	8.0
Inc. AUSTUDY	16.7	17.3	14.8	9.4	17.9	16.5	13.1
Gap	0.0	4.3	5.8	4.7	7.4	6.1	5.1
Major urban	19.9	13.7	9.5	4.4	9.1	9.5	7.3
Inc. AUSTUDY	19.9	18.3	15.6	9.0	15.6	15.3	12.1
Gap	0.0	4.6	6.1	4.6	6.5	5.8	4.8
Other areas	13.0	11.8	7.8	4.5	12.4	11.5	8.9
Inc. AUSTUDY	13.0	15.8	13.2	9.3	21.2	17.9	14.3
Gap	0.0	4.0	5.4	4.8	8.8	6.4	5.4

a. Age left school.

b. + indicates rate of return could not be determined.

c. AUSTUDY payments begin at age 16 years.

d. The private rates of return to stay in school until the second rather than first age.

e. Assuming a certificate involves two years of full time study.

f. Assuming a diploma involves two years of full time study.

g. Assuming a degree involves three years of full time study.

h. Assuming a degree involves four years of full time study.

Source: 1991 Census.

### Some issues of interpretation

There are a number of limitations to these results and they should only be taken as indicative of the differences in the rates of return to education for indigenous compared with other Australians living in various locations.

Firstly, a much smaller proportion of indigenous Australians complete high school and tertiary education so it seems reasonable to expect substantial differences in the underlying ability and motivation of indigenous compared with other Australians in this group. The issue of the role of the ability bias in estimates of the rate of return to education is one which has



received considerable attention in the literature (see for example Griliches 1977 and Ashenfelter and Krueger 1994). If the indigenous people who continue their education are on average of higher ability or more highly motivated than the other Australians undertaking post-compulsory education, the results reported here would overestimate the returns to education to indigenous people. These people may well have earned relatively high incomes without additional education.

A second feature of the results is that they are based on cross-sectional data which may not prove to be a reliable estimate of any individual's actual lifetime income. The assumption made in these calculations is that the future income predicted for an individual, for example one aged 21 in 1991, will equal in real terms, the income of those of older ages and the same level of education in 1991. In fact there may be important changes in real wages and relative earnings over time which make this assumption invalid. Of particular importance in this context would be any different longitudinal changes for indigenous Australians compared with other Australians. One example of a source of potential difference between indigenous and other Australians in actual lifetime income arises from their apparent attachment to the labour force. The results presented here assume employment from the completion of education until the age of 65 years. There is considerable case study evidence that indigenous people have higher levels of intermittent attachment to the labour force than do other Australians (Smith 1991) and they also have lower life expectancy (Saggers and Gray 1991). For those who spend less time in paid employment, the private rate of return to education will be reduced.

The results presented here are the average rates of return to those who have actually undertaken the education. They do not predict what might happen if, for example, a large group of people who were planning to leave the education system at year 12 decided instead to proceed to university. These non-marginal changes could make a large difference to the calculated rate of return. Similarly if the ability and motivation of those completing year 12 differs substantially from that of the existing university graduates, then the expansion of university education to include students who would otherwise have left at the end of year 12 may reduce the average rate of return. It has been argued that the expansion of the Australian university system in the 1980s has reduced the private rate of return to a university degree (Maglin 1994 and Gregory 1993). It might be expected that a large increase in the proportion of indigenous Australians completing a university degree would also lower the rate of return to this form of education.

An assumption of the above calculations is that the education received by indigenous Australians is of similar quality and relevance to that received by other Australians. There is some evidence from American studies that the inferior quality of education in the past for black Americans reduced

their returns to education (Card and Krueger 1992). It has also been assumed that on leaving school at a given age, an indigenous and non-indigenous Australian have received the same amount of education. However, young indigenous Australians do less well than other Australians on literacy and numeracy tests and they have relatively high truancy rates (AEP Review 1994 and House of Representatives Standing Committee on Aboriginal and Torres Strait Islander Affairs 1992). A given school leaving age of 18 years, for example, may therefore indicate very different levels of proficiency for indigenous compared with other Australians.

A further important limitation is the sensitivity of the results to the underlying assumptions. For example, the level of income support under ABSTUDY and AUSTUDY makes a substantial difference to the rates of return especially in the years immediately following compulsory schooling when the predicted income from employment is relatively low and AUSTUDY and ABSTUDY payments almost offset any foregone income. An individual making a rational decision about further education needs to be well informed about all the possible options.

The results presented here focus on pecuniary benefits and costs. They neglect any non-pecuniary benefits that individuals might receive from education; for example the consumption benefits of learning. They also ignore any benefits which may arise from additional education increasing the range of options available to young indigenous people. On the cost side, the calculations ignore any foregone non-pecuniary income from a more traditional hunter gatherer lifestyle which some indigenous people may have to give up in order to pursue further education. Estimates typically put a low monetary value on these activities (Fisk 1985 and Altman and Allen 1992) but there may be substantial non-money benefits associated with them.

Another omission from these calculations are any further benefits to the community in which the individual lives or Australian society in general arising from increased educational attainment. These may be substantial in some communities with relatively low levels of education where a group of more educated individuals may provide an important link between the community and mainstream society, for example in providing health education or more articulate political representation.

### **Summary and conclusion**

This paper presents estimates of the private rate of return to education for those in employment (both full- and part-time) and following an adjustment for the probability of being in employment. The results suggest that for indigenous males and females, there are considerable financial benefits to completing a post-secondary qualification, but the return to

additional post-compulsory secondary schooling is less attractive. Compared to others born in Australia, the private rates of return for indigenous Australians were estimated to be lower for post-compulsory schooling and higher for post-secondary qualifications.

The lower private rate of return to post-compulsory schooling could, in part, explain the very low retention rates to year 12 among indigenous youth. Differences in the perceived non-pecuniary costs and benefits for indigenous Australians compared with other Australians are also likely to be important. The lower rates of return might be explained by a variety of factors. Factors such as lower levels of educational attainment for a given school-leaving age and lower attachment to the labour force would act to reduce the private rate of return to education for indigenous Australians compared with other Australians.

The relatively high rates of return to post-secondary qualifications are consistent with the hypothesis that those indigenous Australians who continue to the end of secondary school and complete a post-secondary qualification are particularly highly motivated and able individuals. This group is likely to benefit especially from any positive discrimination in favour of indigenous Australians in both the public and private sectors.

High rates of return to post-secondary qualifications suggest that further expansion of the numbers of indigenous Australians in tertiary institutions is worthwhile, at least from the point of view of the private individual. It is, however, important that the social rates of return to this education are calculated to see if large public subsidies are in fact justified. This is obviously a difficult task as it would involve the estimation of the wider benefits to indigenous communities and Australian society in general of raising educational attainment.

A number of other studies have found that location of residence is correlated with such variables as labour force status and educational attainment for indigenous Australians. Estimates for the private rate of return to education in major urban, other urban and rural Australia have been presented here to test the hypothesis that education has a greater impact on income in areas where there is a more fully developed labour market such as the major urban centres, than in rural areas. These rates of return can only be calculated under the highly restrictive assumption that people do not migrate between sections-of-State. The results show, in general, a higher rate of return in rural areas for post-secondary qualifications. This probably reflects the income loadings received by skilled workers in remote locations and the fact that in areas where educational attainment is low, any qualification probably commands a high premium. The results suggest that for indigenous Australians especially in rural areas, investment in these qualifications is worthwhile. However, there does not appear to be much monetary advantage to indigenous

Australians who plan to live in a rural area, from undertaking only additional years of post-compulsory schooling without continuing on to post-secondary qualifications.

The results presented here show that the private rate of return to indigenous Australians from post-compulsory schooling is relatively low. If this reflects low levels of educational attainment for a given number of years in the education system for indigenous Australians compared with other Australians, then this remains an important issue for educational policy makers. The relatively low returns probably also reflect the lesser attachment of indigenous people to the labour force and any difficulties they face in retaining well-paid employment. Employment and training policies may have a role to play in addressing these issues. If, however, low attachment to the workforce and difficulties in retaining well-paid employment are the dominant causes of the low rate of return to post-compulsory schooling, then reducing the initial costs of acquiring that schooling may not dramatically increase the incentives for indigenous Australians to undertake more schooling. However, for those indigenous people who complete secondary school and post-secondary qualifications, there are substantial monetary benefits.

#### Notes

1. The terms 'indigenous', 'Aboriginal' and 'Aborigines' are used here to refer to the Aboriginal and Torres Strait Islander populations of Australia.
2. The 1 per cent public-use sample of the Population Census only includes a small number of indigenous adults. Regressions specifically for this group were therefore run by the Australian Bureau of Statistics using the full Aboriginal sub-file of the 1991 Census.
3. It has been suggested that as indigenous Australians were more likely to leave the labour force in their fifties than were other Australians, perhaps rates of return should be calculated on the assumption that working life finishes at 50 rather than 64 years. These calculations were undertaken and showed minor reductions in the private rates of return to education compared with those presented in Tables 3, 4, 5 and 6.

## Appendix A

### Definition of variables list and definitions for earnings function 1991 Census.

All variables for ages from 15 to 64 (inclusive).

1. Australian indigenous: Aborigines and Torres Strait Islanders.
2. Australian others: native-born Australians.
3. Age on leaving school (als):
  - dns - did not go to school
  - als14 - age left school at 14 or younger
  - als15 - age left school at 15
  - als16 - age left school at 16
  - als17 - age left school at 17
  - als18 - age left school at 18
  - als19 - age left school at 19 or older.

The omitted age on leaving school grouping is the als 15.

4. *Qualification*
  - i University degree includes higher degree, post graduate diploma and bachelor degree.
  - ii Diploma includes undergraduate diploma, associate diploma.
  - iii Certificate includes skilled vocational, basic vocational and level of attainment inadequately described.
  - iv The omitted qualification grouping denotes those holding no qualification.
5. *Marital status*
  - i Married, single, and other (separated, divorced and widowed).
  - ii The omitted marital status grouping is single.
6. *Dependent children*

Number of dependent offspring present from 0 to 8.
7. *Language*

Takes the value of 1 for those with poor English language skills.

**Table A1. Earnings function for indigenous Australians by section-of-State and gender, 1991.**

Variables	Total areas		Major urban		Other urban		Rural areas	
	Males	Females	Males	Females	Males	Females	Males	Females
Constant	7.8101 (224.4) <sup>b</sup>	7.4795 (157.8) <sup>b</sup>	7.9988 (141.1) <sup>b</sup>	7.3261 (95.2) <sup>b</sup>	7.8482 (142.2) <sup>b</sup>	7.4287 (92.1) <sup>b</sup>	7.801 (136.8) <sup>b</sup>	7.8391 (94.6) <sup>b</sup>
Age	0.0889 (43.4) <sup>b</sup>	0.0983 (34.1) <sup>b</sup>	0.0942 (28.0) <sup>b</sup>	0.1144 (24.6) <sup>b</sup>	0.0937 (29.2) <sup>b</sup>	0.1050 (21.7) <sup>b</sup>	0.0735 (21.8) <sup>b</sup>	0.0650 (12.7) <sup>b</sup>
Age squared	-0.0010 (-37.6) <sup>b</sup>	-0.0012 (-29.2) <sup>b</sup>	-0.0011 (-25.0) <sup>b</sup>	-0.0014 (-21.8) <sup>b</sup>	-0.0011 (-25.9) <sup>b</sup>	-0.0013 (-18.8) <sup>b</sup>	-0.0008 (-17.9) <sup>b</sup>	-0.0007 (-10.3) <sup>b</sup>
Age on leaving school <sup>d</sup>								
No schooling	-0.3834 (-15.4) <sup>b</sup>	-0.2671 (-6.6) <sup>b</sup>	-0.0695 (-1.01)	0.0874 (0.9)	-0.2122 (-3.7) <sup>b</sup>	-0.1573 (-1.8)	-0.3135 (-9.8) <sup>b</sup>	-0.2613 (-5.2) <sup>b</sup>
>=14 years	-0.0606 (-5.4) <sup>b</sup>	-0.0425 (-2.6) <sup>b</sup>	-0.0728 (-3.9) <sup>b</sup>	-0.0378 (-1.4)	-0.0233 (-1.3)	-0.0054 (-0.2)	-0.0295 (-1.6)	-0.0469 (-1.7)
16 years	0.0519 (5.3) <sup>b</sup>	0.1333 (10.7) <sup>b</sup>	0.0721 (4.9) <sup>b</sup>	0.1792 (9.0) <sup>b</sup>	0.0589 (4.0) <sup>b</sup>	0.1445 (7.1) <sup>b</sup>	0.0064 (0.4)	0.0803 (3.5) <sup>b</sup>
17 years	0.1208 (10.1) <sup>b</sup>	0.2414 (16.7) <sup>b</sup>	0.0976 (5.5) <sup>b</sup>	0.2674 (11.8) <sup>b</sup>	0.1599 (8.8) <sup>b</sup>	0.2447 (10.4) <sup>b</sup>	0.0415 (1.9)	0.1906 (6.9) <sup>b</sup>
18 years	0.1591 (9.7) <sup>b</sup>	0.2388 (12.0) <sup>b</sup>	0.1615 (7.4) <sup>b</sup>	0.2580 (8.8) <sup>b</sup>	0.1101 (4.2) <sup>b</sup>	0.2503 (7.4) <sup>b</sup>	0.0688 (2.1) <sup>c</sup>	0.1863 (4.9) <sup>b</sup>
19 years	-0.0303 (-1.3)	0.0920 (3.3) <sup>b</sup>	0.0072 (0.2)	0.1468 (3.3) <sup>b</sup>	0.0612 (1.6)	0.0525 (1.0)	-0.0766 (-2.0) <sup>c</sup>	0.1513 (3.3) <sup>b</sup>
Qualifications <sup>d</sup>								
Certificate	0.3495 (33.7) <sup>b</sup>	0.2278 (13.3) <sup>b</sup>	0.1630 (11.8) <sup>b</sup>	0.1712 (7.0) <sup>b</sup>	0.2367 (15.4) <sup>b</sup>	0.1797 (5.7) <sup>b</sup>	0.4884 (20.9) <sup>b</sup>	0.1971 (4.8) <sup>b</sup>
Diploma	0.4178 (15.4) <sup>b</sup>	0.4147 (20.4) <sup>b</sup>	0.2542 (7.6) <sup>b</sup>	0.2791 (9.8) <sup>b</sup>	0.2746 (6.7) <sup>b</sup>	0.3747 (10.9) <sup>b</sup>	0.565 (8.6) <sup>b</sup>	0.6038 (13.2) <sup>b</sup>
University Degree	0.5759 (19.4) <sup>b</sup>	0.5772 (20.3) <sup>b</sup>	0.3788 (22.0) <sup>b</sup>	0.4442 (12.6) <sup>b</sup>	0.4549 (8.0) <sup>b</sup>	0.5228 (9.1) <sup>b</sup>	0.6818 (8.6) <sup>b</sup>	0.7200 (10.6) <sup>b</sup>
Marital status								
Married	0.1398 (14.9) <sup>b</sup>	-0.1414 (-11.8) <sup>b</sup>	0.1611 (10.5) <sup>b</sup>	-0.1400 (-6.9) <sup>b</sup>	0.1939 (13.2) <sup>b</sup>	-0.1256 (-5.1) <sup>b</sup>	0.1212 (7.8) <sup>b</sup>	-0.0102 (-1.9)
Other	0.0974 (6.6) <sup>b</sup>	0.0537 (3.2) <sup>b</sup>	0.1002 (4.8) <sup>b</sup>	0.0091 (0.4)	0.0550 (2.4) <sup>c</sup>	0.0620 (2.2) <sup>c</sup>	0.0880 (3.2) <sup>b</sup>	0.0632 (1.9)
Dependent children	0.0089 (8.0) <sup>b</sup>	0.0242 (17.6) <sup>b</sup>	0.0063 (3.8) <sup>b</sup>	0.0301 (14.2) <sup>b</sup>	0.0039 (2.3) <sup>c</sup>	0.0192 (8.3) <sup>b</sup>	0.0094 (4.8) <sup>b</sup>	0.0124 (4.7) <sup>b</sup>
Language	-0.4528 (-19.0) <sup>b</sup>	-0.3188 (-9.5) <sup>b</sup>	-0.0541 (-0.6)	-0.3629 (-2.9) <sup>b</sup>	-0.2008 (-2.0) <sup>c</sup>	-0.2108 (-1.4)	-0.2690 (-9.9) <sup>b</sup>	-0.1515 (-4.1) <sup>b</sup>
R <sup>2</sup>	0.23	0.19	0.24	0.21	0.22	0.16	0.19	0.15

a. 't' statistics in parentheses.

b. Significant at 1 per cent level.

c. Significant at 5 per cent level.

d. Joint F-test significant at 1 per cent level (one-side or two-side tests as appropriate).

Source: 1991 Census.

**Table A2. Earnings function for other Australians by section-of-State and gender, 1991.**

Variables	Total areas		Major urban		Other areas	
	Males	Females	Males	Females	Males	Females
Constant	7.3264 (184.5) <sup>b</sup>	6.7494 (131.7) <sup>b</sup>	7.1916 (148.6) <sup>b</sup>	6.7101 (107.4) <sup>b</sup>	7.4894 (115.6) <sup>b</sup>	6.8051 (78.6) <sup>b</sup>
Age	0.1188 (52.7) <sup>b</sup>	0.1243 (40.9) <sup>b</sup>	0.1262 (45.5) <sup>b</sup>	0.1260 (33.8) <sup>b</sup>	0.1102 (30.2) <sup>b</sup>	0.1225 (23.9) <sup>b</sup>
Age squared	-0.0014 (-49.1) <sup>b</sup>	-0.0015 (-37.8) <sup>b</sup>	-0.0014 (-41.0) <sup>b</sup>	-0.0015 (-30.8) <sup>b</sup>	-0.0013 (-29.5) <sup>b</sup>	-0.0015 (-22.6) <sup>b</sup>
Age on leaving school <sup>d</sup>						
No schooling	-0.2720 (-3.0) <sup>b</sup>	-0.3452 (-2.16) <sup>c</sup>	-0.2787 (-2.4) <sup>c</sup>	-0.5207 (-2.5) <sup>c</sup>	-0.2644 (-1.8)	-0.1138 (-0.5)
>=14 years	-0.0412 (-2.7) <sup>b</sup>	-0.0335 (-1.4)	-0.0417 (-2.0) <sup>c</sup>	-0.0178 (-0.6)	-0.0157 (-0.7)	-0.0456 (-1.3)
16 years	0.1432 (13.0) <sup>b</sup>	0.2176 (15.1) <sup>b</sup>	0.1838 (13.0) <sup>b</sup>	0.2545 (13.7) <sup>b</sup>	0.0957 (5.6) <sup>b</sup>	0.1713 (7.6) <sup>b</sup>
17 years	0.1858 (15.7) <sup>b</sup>	0.2864 (18.9) <sup>b</sup>	0.2274 (15.4) <sup>b</sup>	0.2961 (15.7) <sup>b</sup>	0.1162 (6.2) <sup>b</sup>	0.2593 (10.4) <sup>b</sup>
18 years	0.1964 (13.8) <sup>b</sup>	0.2693 (14.0) <sup>b</sup>	0.2274 (13.4) <sup>b</sup>	0.2799 (11.9) <sup>b</sup>	0.1223 (5.0) <sup>b</sup>	0.2381 (7.3) <sup>b</sup>
19 years	0.1363 (6.7) <sup>b</sup>	0.2641 (9.6) <sup>b</sup>	0.1552 (6.6) <sup>b</sup>	0.2621 (8.2) <sup>b</sup>	0.0919 (2.5) <sup>b</sup>	0.2500 (4.9) <sup>b</sup>
Qualifications <sup>d</sup>						
Certificate	0.1702 (18.5) <sup>b</sup>	0.1546 (9.1) <sup>b</sup>	0.1425 (12.2) <sup>b</sup>	0.1451 (7.0) <sup>b</sup>	0.1889 (13.2) <sup>b</sup>	0.1534 (5.4) <sup>b</sup>
Diploma	0.2997 (16.7) <sup>b</sup>	0.2952 (16.7) <sup>b</sup>	0.2636 (12.3) <sup>b</sup>	0.2497 (11.3) <sup>b</sup>	0.3187 (10.6) <sup>b</sup>	0.3588 (12.5) <sup>b</sup>
University degree	0.5226 (38.1) <sup>b</sup>	0.4393 (25.2) <sup>b</sup>	0.4535 (29.1) <sup>b</sup>	0.3949 (19.2) <sup>b</sup>	0.5648 (22.2) <sup>b</sup>	0.4906 (15.7) <sup>b</sup>
Marital status						
Married	0.1628 (13.4) <sup>b</sup>	-0.1524 (-9.8) <sup>b</sup>	0.1755 (12.0) <sup>b</sup>	-0.1102 (-5.9) <sup>b</sup>	0.1743 (8.7) <sup>b</sup>	-0.1922 (-7.1) <sup>b</sup>
Other	0.1056 (5.9) <sup>b</sup>	0.1239 (5.8) <sup>b</sup>	0.0834 (3.8) <sup>b</sup>	0.1444 (5.6) <sup>b</sup>	0.1389 (4.9) <sup>b</sup>	0.0825 (2.2) <sup>c</sup>
Dependent children	0.0167 (13.9) <sup>b</sup>	0.0568 (37.9) <sup>b</sup>	0.0152 (10.3) <sup>b</sup>	0.0597 (32.3) <sup>b</sup>	0.0187 (9.6) <sup>b</sup>	0.0517 (20.7)
Language	0.0978 (0.8)	-0.1070 (-0.8)	0.0782 (0.7)	-0.1273 (-0.9)	0.0329 (0.1)	-0.1577 (-0.6)
R <sup>2</sup>	0.30	0.26	0.38	0.29	0.23	0.22

a. 't' statistics in parentheses.

b. Significant at 1 per cent level.

c. Significant at 5 per cent level.

d. Joint F-test significant at 1 per cent level (one-side or two-side tests as appropriate).

Source: 1991 Census.

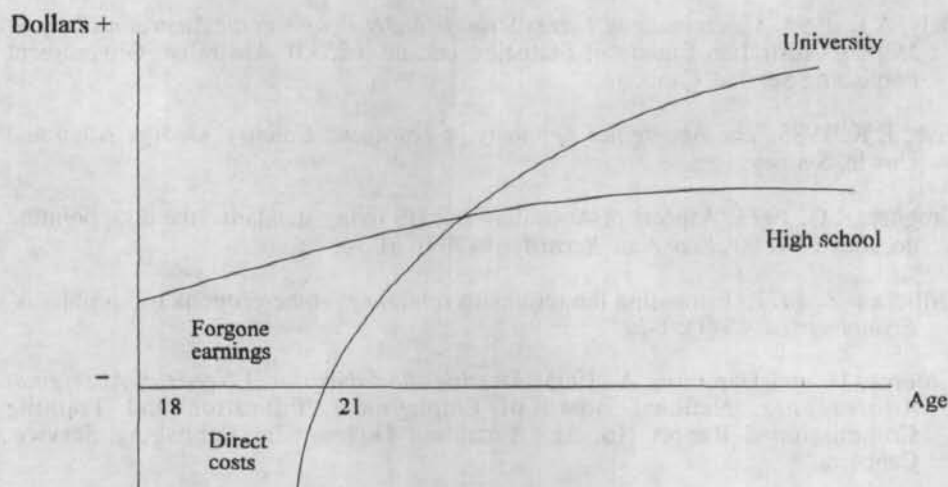
Table A3. AUSTUDY and ABSTUDY rates, 1991 and 1995 dollars.

Age	AUSTUDY		ABSTUDY	
	1991	1995	1991	1995
16	3220	3507	3220	3507
17	3220	3507	3220	3507
18	3872	4218	3872	4218
19	3872	4218	3872	4218
20	3872	4218	3872	4218
21	3872	4218	3872	4218
22	3872	4218	3872	4218

- a. The rates for 1991 are calculated from 1995 data using the Consumer Price Index. Rates do not take account of homelessness, dependent children and partners.

## Appendix B

### Estimating the private rate of return to education.



The calculation of a rate of return is illustrated in the diagram, comparing the expected income stream of an individual leaving the education system at the end of high school with their expected income stream if they complete a university education. The decision to undertake a university education involves incurring some direct costs such as tuition fees and books, and more importantly, the indirect cost of the earnings foregone while undertaking full-time study. The internal rate of return is the discount rate which equates the higher future earnings expected for those with higher levels of qualifications with the initial costs incurred in acquiring the qualifications. It is necessary to discount these values, as a dollar in the future is not worth as much as a dollar now.



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