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**The determinants of employment
income for indigenous Australians**

A.E. Daly

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SERIES NOTE

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- investigate the stimulation of Aboriginal and Torres Strait Islander economic development and issues relating to Aboriginal and Torres Strait Islander employment and unemployment;
- identify and analyse the factors affecting Aboriginal and Torres Strait Islander participation in the labour force; and
- assist in the development of government strategies aimed at raising the level of Aboriginal and Torres Strait Islander participation in the labour market.

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Jon Altman
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ABSTRACT

This paper considers the determinants of employment income for indigenous Australians compared with non-indigenous Australians. Ordinary Least Square (OLS) regression techniques are applied to 1991 Census data to consider the question: does the lower income of these indigenous people reflect differences in their factor endowments (like education) rewarded in the labour market, or are they rewarded differently for the same set of endowments than are non-indigenous Australians. The results show that the main source of lower incomes for indigenous Australians was their smaller endowment of human capital characteristics. The paper concludes with a discussion of the policy implications of these results.

Acknowledgments

This discussion paper forms part of a larger research project on the position of indigenous Australian people in the labour market. I would like to thank Jon Altman for his comments on an earlier draft and Krystyna Szokalski, Linda Roach and Hilary Bek for their help in editing and layout.

Foreword

In April 1992, Dr Anne Daly, Research Fellow at the Centre for Aboriginal Economic Policy Research (CAEPR), ANU, took up a concurrent half-time Australian Bureau of Statistics (ABS) Research Fellowship. The ABS objectives in providing research fellowships are to allow greater use of ABS data in academic research and to encourage the development of new techniques for the analysis of data. In Dr Daly's case, a principal aim of applying for this competitive Fellowship was to allow unimpeded access to the Aboriginal population sub-file so that statistical analysis from the conceptual framework of human capital theory could be undertaken for the first time. Dr Daly's ABS Fellowship ran to 31 March 1994 and in this time she completed research for a monograph with the working title 'Aboriginal and Torres Strait Islander People in the Australian Labour Market'. The monograph is to be completed and published by ABS later this year.

CAEPR Discussion Paper No. 68 uses 1991 Census data to update an earlier discussion paper (No. 32) that examined the determinants of employment income for indigenous Australians using 1986 Census data. What is of special policy significance about this paper is Dr Daly's ability to rigorously assess if indigenous Australians in full-time employment receive lower remuneration than other Australians. The results of her research suggests that discrimination does not play a significant role in wage determination given differences in factor endowments. This paper is of policy topicality; it provides broad support for the overall 'human capital' thrust of government policy that aims to provide education and training opportunities to indigenous Australians. However, it also warns that such a human capital oriented approach will only yield results in situations where mainstream labour markets, and associated employment opportunities, exist.

Dr Daly is publishing this work-in-progress, which will form a chapter in the above-mentioned monograph, for two reasons. First, it is important that the results of her research at CAEPR and ABS are made widely available as soon as completed. Second, Dr Daly is seeking feedback that might assist her overall project. The active collaboration between CAEPR and ABS in this research project is very welcome. I would like to thank Dr Daly for her willingness to disseminate her research findings in the CAEPR Discussion Paper series prior to finalisation in recognition that her research will better inform policy formulation in a very complex area.

Jon Altman
Series Editor
July 1994

This paper focuses on the relatively affluent group of indigenous Australians¹ who were employed full time. Although their incomes were high by indigenous standards, the average income of employed indigenous Australians was below that of the rest of the Australian population. In 1991, the median employed indigenous male had an income of 70 per cent that of an employed non-indigenous male, and, for the median indigenous female, 83 per cent that of an employed non-indigenous female.

There is an extensive literature which aims to explain differences in income according to racial group and gender.² A framework which is frequently adopted, and will be used here, is the human capital model. This model treats activities such as education, on-the-job training, migration and health care as forms of investment which raise productivity and therefore earnings. The individual's problem is to maximise lifetime earnings, given the costs and benefits associated with any investment in human capital. In this framework, the lower levels of education and working experience are important determinants of the lower income of employed indigenous people.

Time spent in education can be seen as an investment in income generating skills, as more highly educated people are likely to be more productive and therefore have higher earnings. Even if education in itself does not directly raise productivity, where educational qualifications are taken as a signal of competence and motivation to work, it may be worthwhile for individuals to acquire these qualifications as an entry requirement to higher paying jobs. On-the-job training is one method by which individuals can acquire productivity-enhancing skills outside a formal classroom environment. As it is difficult to find data on the money or time spent in on-the-job training, the extent of this form of investment has been approximated by a measure of working experience (Mincer 1974). The preferred measure of actual time spent in employment is rarely available, and, therefore, a measure of potential experience (actual age less the age on leaving education), is frequently used. The human capital model predicts that most investment in productivity-enhancing skills will be undertaken by young people. Among older workers, income may actually decline with additional years in the workforce, as investment in new skills ceases and existing skills deteriorate and become obsolete.

Even with the same levels of education and working experience, indigenous people may be paid less than their non-indigenous counterparts. In other words, they may not receive the same financial rewards for investment in human capital as non-indigenous people. This may arise through discrimination against indigenous Australians in the labour market so that otherwise identical indigenous people are paid less than non-indigenous people.³ Alternatively, it may reflect decisions by indigenous Australians not to maximise their money incomes but rather to place greater emphasis on non-pecuniary benefits. An example of this would be

a nursing aide who chose to work for a lower salary in a familiar indigenous community rather than seek promotion involving a move to the city.

There are many other reasons why income may differ between individuals, such as inherited abilities, motivation and good luck. Another factor is the nature of the work; and the theory of compensating differentials formally takes this factor into account.⁴ According to this theory, workers require additional monetary incentives to take on dangerous or unpleasant work or to move to undesirable locations.

Studies of the income status of employed North American Indians (both Canadian and American) based on this human capital model have found contrasting results. Sandefur and Scott's (1983) study of Native Americans concluded that differences in the endowments of measured human capital were the major sources of income differences between Native Americans and Whites. In contrast, Patrinos and Sakellariou's (1992) study of Canadian data found that more than half the income difference was not explained by differences in endowments of human capital. The results presented here will provide a third observation on the determinants of income status for indigenous people in another part of the world.

The model

The earnings equations to be estimated here include variables suggested by the human capital model. Each equation can be thought of as an 'hedonic price function which reflects the equilibrium of the supply and demand for workers at each level of schooling and experience' (Willis 1986: 529). The earnings function will be estimated in semi-log form following Mincer (1974). The basic equation to be estimated separately for indigenous and non-indigenous men and women is the following:

$$\text{Gross weekly income} = f(\text{education, experience, family characteristics, location of residence, English-speaking ability}). \quad (1)$$

A detailed description of the variables is included in Appendix A.

Education and experience are included as central variables in the human capital model. Education has been included in two forms: one variable which measures the years spent at primary and secondary school; and a second group of variables relating to educational qualifications. The coefficient on the years-of-schooling variable shows the percentage increase in income with each additional year of primary and secondary schooling. This enables an estimation of the effect of additional schooling on the income of those who did not have any educational qualifications. Receiving a qualification is a further measure of educational attainment. Four education groups have been distinguished here: those who have no

post secondary qualification (the unqualified); those who held a certificate such as a trade certificate (cert); those who have completed a graduate diploma (dip); and finally those who have completed a university degree either at a bachelor or higher degree level (degree).

Experience is measured in two forms, the first being potential experience in the labour market (current age minus estimated years of full-time education minus 5). A preferred measure of the variable of real interest, the time spent in on-the-job training, is the time actually spent in employment, but this is unavailable in the census. If actual experience in employment and in on-the-job training is substantially less than an individual's potential experience, the estimated impact of experience on income will be understated. This difference between potential and actual experience is important for particular groups, such as those who characteristically have an intermittent attachment to the labour force. For the purposes of this study, potential experience may be a particularly inappropriate measure of the labour market experience of indigenous people. The unemployment rate is much higher than for the rest of the population and there is case study evidence to suggest that indigenous people are more likely to be employed in casual and seasonal work (Smith 1991). For these reasons potential experience is likely to overestimate the actual labour market experience of these people.

The options for adjusting the census measure of potential experience to take into account differences in individuals' attachment to the labour force are limited. The approach adopted here has been to use census data on the employment/population ratio at each age to create an estimate of actual labour market experience. So for example, if half of indigenous males aged 24 years were in employment, indigenous males of this age in full-time employment were given half a year of adjusted labour force experience. An individual's labour force experience was then calculated as the sum of experience at each age up to their current age with appropriate adjustments for the time spent in schooling. This estimate therefore is an average of employment experience at each age and takes into account both full- and part-time employment. If those in full-time employment have greater attachment to the labour force than the rest of the population, this estimate will understate the true extent of their labour force experience. Measures of adjusted experience have been calculated separately for four groups; each sex of both indigenous and non-indigenous Australians.

Many studies of the determinants of income have included family characteristics as important control variables.⁵ An individual's marital status is likely to affect their range of employment opportunities, the type of work they are willing to accept and their level of motivation. Given the traditional patterns of the division of labour within the family, the number of dependent children is expected to have a negative effect on women's income from employment.

Location of residence has been shown to be an important determinant of economic status for both the indigenous and non-indigenous populations.⁶ The section-of-State variable which relates to settlement size has been used here. The coefficient on these locational variables can be seen as measuring the size of the compensating differential required to encourage people to live in particular places. Any difference between the size of the differential for indigenous and non-indigenous people suggests that they value location of residence differently.

Ability to communicate in English has been included, as other studies have found this to be an important determinant of employment status and income (Jones 1990, 1991; Daly 1993). Those with poor English language skills are more likely not to be in employment than those with good language skills. Jones (1990) found that speaking a language other than English was correlated with lower incomes for indigenous Australians.

The data

The data to be used in this analysis come from a randomly selected sample of indigenous and non-indigenous people of working age, taken from the 1991 Population Census. The sample was specifically created by the Australian Bureau of Statistics (ABS) for this research project. It consists of 5,621 indigenous Australians and 10,534 non-indigenous Australians working full time, 35 or more hours per week.

The census has a number of shortcomings for the purpose of this analysis. The preferred measure of income from employment is hourly earnings. However, since 1976, the census has not included a question about sources of income. Consequently, there is no direct information on any individual's earnings from employment. Nor did the census seek detailed information on the number of hours worked each week, but it included broad categories of hours worked. This makes it very difficult to estimate hourly income where the categories cover a broad range of hours (for example 1-15 hours of work per week). In an attempt to reduce the problems associated with these two sources of measurement error in the dependent variable, the estimation presented here has been restricted to full-time workers (those working between 35 or more hours per week). The Income and Housing Survey conducted by the ABS in 1985-86 showed that 85 per cent of the income of those employed full-time came from employment. Thus, the census income figures for this group are probably an adequate indicator of earnings.

As already noted, the census question relates to current employment status. This means that a certain proportion of those currently in full-time employment may not have been in such employment for the year over

which their income has been measured, and that their actual working experience may differ substantially from their potential experience.

Table 1. Mean values of the variables used in the income equations, 1991.

	Males		Females	
	Indigenous	Non-indigenous	Indigenous	Non-indigenous
Income (\$)	371.0	518.0	353.0	427.2
Unqualified	0.79	0.52	0.78	0.62
Certificate	0.18	0.29	0.10	0.12
Diploma	0.02	0.06	0.07	0.12
University graduate	0.01	0.13	0.04	0.14
Years of primary and secondary school	9.34	10.12	9.81	10.34
Potential experience	18.53	22.11	16.60	19.13
Actual experience	8.30	16.99	5.02	11.18
Single	0.46	0.28	0.47	0.37
Married	0.45	0.64	0.39	0.51
Widowed, separated divorced	0.09	0.08	0.14	0.12
Number of dependents				
0	0.50	0.54	0.50	0.65
1	0.17	0.17	0.19	0.15
2-3	0.25	0.27	0.25	0.18
4+	0.08	0.03	0.07	0.01
Poor English	0.02	0.02	0.02	0.01
Urban	0.34	0.64	0.41	0.69
Other urban	0.36	0.21	0.36	0.19
Rural	0.31	0.15	0.23	0.12

Source: 1991 Census.

Table 1 presents the average characteristics of full-time workers in the samples. On average, the indigenous males in the sample had lower levels of education and experience. According to the adjusted measure of experience, indigenous males had less than half the labour force experience of non-indigenous males. Indigenous males were less likely to be legally married and had more dependent children than non-indigenous males. They were more likely to live outside the major urban centres; two-thirds of indigenous males lived in other urban or rural locations compared with 36 per cent of non-indigenous males.

Many of these differences applied also to females. Indigenous females had less education in terms of qualifications than non-indigenous females although the difference in the number of years of primary and secondary schooling was smaller for females than for males. Indigenous females had less potential labour market experience than non-indigenous females and given their much lower rate of employment, had less than half the adjusted

labour market experience of non-indigenous females. They were less likely to be legally married and had more dependent children. Indigenous females, as with indigenous males, worked in different locations to their non-indigenous counterparts. Over half of the indigenous females working full time lived outside major urban areas compared with 31 per cent of non-indigenous females.

The regression results for equation (1) are reported in Table 2 for indigenous and non-indigenous males and females. The constant term in these equations relates to an unqualified urban dweller who is single, has no dependants, no qualifications or years of schooling, no labour market experience, is fluent in English and is not an indigenous Australian. The results for males and females will be considered in turn and will focus on the preferred equations; (2) for males and (4) for females. The preferred equations were determined by deleting all the indigenous interaction terms which were highly insignificant, those with 't' statistics of less than one. In these cases there was no evidence of a statistically significant different relationship between income and the independent variable for indigenous and non-indigenous Australians. For example, the results do not suggest that the effect of marriage on income differs for indigenous compared with non-indigenous males.

The estimated equations show some fairly standard results. Income increased with the level of education. Male university graduates earned 49 per cent more than their unqualified counterparts and female graduates 42 per cent more. Additional labour market experience also raised income for the first 33 years of potential experience for males and 31 years for females. Both males and females who lived outside the major urban centres had lower incomes, other things being equal. Married males had higher incomes than their single counterparts but a statistically significant effect was not found for females. There was a negative effect on income for both males and females of dependent children, perhaps because the number of dependent children is associated with other socioeconomic characteristics. Poor English language skills also had a depressed effect on income.

The results reported in Table 2 column 2 for males show a significant negative effect of Aboriginality on the income of males working full time. According to these estimates, holding everything else constant, indigenous males could expect to have incomes which were 9 per cent below those of their non-indigenous counterparts. This difference may reflect discrimination against indigenous males, or their choice of employment with smaller monetary compensation offset by non-pecuniary benefits (for example, working in an indigenous organisation). It does, however, suggest that indigenous males suffer from an income disadvantage associated with their race. A similar result of a 'Native American' effect on income was found by Sandefur and Scott (1983).

Table 2. Income of indigenous and non-indigenous males and females working full-time, 1991.

	Males		Females	
	(1)	(2)	(3)	(4)
Intercept ^a	5.3082 (122.9**)	5.3276 (156.6**)	5.3359 (90.7**)	5.3294 (114.3**)
Certificate	0.0964 (7.9**)	0.0964 (7.9**)	0.0562 (2.7*)	0.0540 (3.1**)
Diploma	0.3165 (13.4**)	0.3182 (13.6**)	0.2836 (13.0**)	0.2845 (15.5**)
Graduates	0.4868 (27.9**)	0.4868 (29.5**)	0.4178 (20.1**)	0.4176 (20.8**)
Years of primary and secondary schooling	0.0316 (8.74**)	0.0303 (10.9**)	0.0314 (6.2**)	0.0311 (7.9**)
Experience	0.0431 (21.5**)	0.0424 (27.9**)	0.0378 (15.5**)	0.0386 (20.2**)
Experience ²	-0.0007 (-19.3**)	-0.0007 (-24.3**)	-0.0007 (-14.2**)	-0.0007 (-18.0**)
Married	0.1100 (6.6**)	0.1089 (8.7**)	0.0206 (1.1)	0.0178 (1.2)
Widowed, separated, divorced	0.0654 (2.8**)	0.0634 (3.5*)	0.0681 (2.7*)	0.0616 (2.6**)
Number of dependants				
1 dependant	-0.0352 (-2.3**)	-0.0345 (-2.8**)	-0.0731 (-3.9**)	-0.0725 (-3.9**)
2-3 dependants	-0.0021 (-0.1)	-0.0003 (-0.02)	-0.0972 (-5.2**)	-0.0933 (-6.4*)
4+ dependants	-0.0842 (-2.6**)	-0.0976 (-4.55**)	-0.1946 (-3.3**)	-0.1941 (-3.3**)
Other urban	-0.0477 (-3.6**)	-0.0498 (-4.7**)	-0.0954 (-5.6**)	-0.0953 (-5.6**)
Rural	-0.1825 (-12.0**)	-0.1832 (-12.2**)	-0.1997 (-9.5**)	-0.2013 (-9.6**)
Poor English	-0.2022 (-4.7)	-0.2047 (-4.7**)	-0.2670 (-4.7**)	-0.2697 (-4.8**)
Indigenous Australian	-0.0426 (-0.6)	-0.0902 (-6.6**)	-0.0650 (-0.7)	-0.0355 (-1.9)
Ind*cert	0.0521 (2.3*)	0.0508 (2.3**)	-0.0081 (-0.2)	
Ind*dip	-0.0682 (-1.2)	-0.0727 (-1.3)	0.0016 (0.04)	
Ind*graduates	-0.0397 (-0.6)		0.0775 (1.6)	0.0796 (1.67)
Ind*schooling	-0.0028 (-0.5)		0.0005 (0.1)	
Ind*experience	-0.0019 (-0.6)		0.0016 (0.4)	

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Table 2. Continued.

	Males		Females	
	(1)	(2)	(3)	(4)
Ind*exsq	0.00004 (0.7)		0.0000 (0.0)	
Ind*married	-0.0025 (-0.1)		-0.0053 (0.2)	
Ind*widowed etc.	-0.0055 (-0.1)		-0.0447 (-1.1)	-0.0264 (-0.8)
Number of dependants				
Ind*dep1	0.0013 (0.1)		0.0384 (1.3)	0.0349 (1.2)
Ind*dep2/3	-0.0307 (-1.3)	-0.0343 (-1.7)	0.0117 (0.4)	
Ind*dep4	-0.0227 (-0.5)		0.0699 (1.0)	0.0657 (1.0)
Ind*other urban	-0.0058 (-0.3)		0.0401 (1.5)	0.0417 (1.6)
Ind*rural	-0.1160 (-4.8**)	-0.1121 (-5.1**)	-0.1463 (-4.5**)	-0.1423 (-4.5**)
Ind*lang	-0.0848 (-1.1)	-0.0790 (-1.1)	-0.1257 (-1.4)	-0.1202 (-1.3)
R ²	0.34	0.34	0.34	0.34
Mean of dependent variable	6.1360	6.1360	5.9893	5.9893
F test of joint significance of indigenous variables		29.5**		6.3**

a. The constant term measures the natural logarithm of income for an unqualified urban dweller who is single, has no dependants, no qualifications or years of schooling, no labour market experience, is fluent in English and is not an indigenous Australian.

't' statistics are in brackets. Significant test statistics at the 5 per cent level are indicated by * and those at the 1 per cent level by **.

Source: 1991 Census.

There was only evidence of statistically significant differences in the returns to human capital characteristics for a restricted number of these characteristics. The income of indigenous males who held a certificate qualification was 15 per cent higher than an unqualified indigenous male compared with the gap of 10 per cent for non-indigenous males. Indigenous males however, received a smaller return for a diploma than non-indigenous males. Living in a rural location had a particularly strong negative effect on indigenous incomes. Where non-indigenous males who lived in a rural area received 18 per cent less income, other things being equal, than their counterparts in the major urban areas. Indigenous males were estimated to receive 29 per cent less income.

The measured effect of Aboriginality on the incomes of females was smaller than for males. Indigenous women were estimated to receive 4 per cent less income than non-indigenous women, holding everything else constant. There was some evidence of a higher return to university degrees for indigenous females compared with non-indigenous females and living in a rural location had a particularly strong negative effect on income.

Additional regression results are reported in Appendix Table A1 using the alternative adjusted experience measure. These results show higher returns to experience for both males and females than the results reported here, with little change in the coefficients on the education variables. The inclusion of the adjusted experience measure reduced the negative effect of Aboriginality on male incomes and the coefficient on this variable became highly insignificant for females.

The sources of income differences

This section considers the sources of income differences between indigenous and non-indigenous Australians for each sex in terms of endowments of human capital attributes and the rewards to these attributes. The question of the determinants of income differences between indigenous males and females will also be considered.

Any difference in the income of people of different race can be considered in three parts: one which is attributable to differences in human capital endowments, for example education and experience; one which is attributable to differences in the rewards to these endowments; and one which is attributable to the error component in the regression (Oaxaca 1973; Blinder 1973).

$$y_{na} - y_a = (y_{na} - X_{na}b_{na}) - (y_a - X_a b_a) + (X_{na}b_{na} - X_a b_a) \quad (2)$$

$$\text{where } (X_{na}b_{na} - X_a b_a) = (X_{na} - X_a)b_a + X_{na}(b_{na} - b_a) \quad (3)$$

Where y is actual weekly income, X is a vector of endowments, b the estimated regression coefficients. The subscripts a and na refer to the indigenous and non-indigenous populations. The final term in equation 2 can be broken down into that part attributable to differences in endowments (the first term in equation 3) and that part attributable to coefficient differences (the second term in equation 3). This latter term will include any biases introduced by such things as the omission of relevant variables or measurement errors in the included variables, as well as differences between indigenous and non-indigenous Australians in the 'true' coefficients. The decomposition can be best thought of as an accounting exercise.

The results of this exercise are presented in Table 3. For each racial group and sex, the regression coefficients reported in Table 2 can be used to

calculate predicted income for the average in the sample, using both the indigenous and non-indigenous coefficients as weights. The results show that for men, over 90 per cent of the estimated difference in predicted earnings can be accounted for by the lower level of human capital endowments of indigenous men compared with non-indigenous men. The lower levels of education and the greater proportion of indigenous men living outside of the major urban areas were important sources of the endowment differences. Differences in the rewards to these endowments also played a part in explaining their lower income but accounted for less than 10 per cent of the income gap. Similar exercises, which try to explain the difference between the employment income of black and white Americans, have found that between 50 and 80 per cent of the difference can be accounted for by differences in the measured endowments (Ehrenberg and Smith 1987: 537). In the case of Native Americans, Sandefur and Scott (1983) found that most of the earnings difference could be attributed to endowment differences, while Patrinos and Sakellariou (1992) found that only 41 per cent of the income difference between Canadian Natives and other Canadians could be attributed to endowment differences.

Table 3. Estimated sources of income differences between indigenous and non-indigenous males and females, 1991.

	Males (1)	Females (2)
Predicted income (\$)		
Indigenous	411	387
Non-indigenous	580	480
Income gap to explain (per cent) ^a	29.0	19.0
Using indigenous weights		
Attributed to endowments (per cent)	28.0	20.0
Percentage of difference	97.0	105.0
Attributed to coefficients (per cent)	1.0	-1.0
Percentage of difference	3.0	-5.0
Using non-indigenous weights		
Attributed to endowments (per cent)	26.0	19.0
Percentage of difference	90.0	100.0
Attributed to coefficients (per cent)	3.0	0.0
Percentage of difference	10.0	0.0

a. The calculation is based on Table 2, equations 2 and 4.

Source: 1991 Census.

The results presented in Table 3 column 2 for females, show that the gap between the income of indigenous and non-indigenous females working full-time was smaller than for males. Endowment differences accounted for all the gap between the income of indigenous and non-indigenous females. Location of residence outside of the major urban areas, their larger number of dependent children and their lower educational attainment were factors which reduced the relative income of indigenous females. The results of a decomposition using the adjusted experience measure also show that endowment differences were the major source of difference between the income of indigenous and non-indigenous Australians although these were not as important as in the results reported here (see Appendix Table A2).

It is tempting at first glance to attribute any differences in the rewards to endowments to discrimination against indigenous people, and this may indeed be a part of the explanation of the lower returns which indigenous people receive for their human capital attributes. In addition, the results presented here suggest that a major source of income difference is Aboriginality per se which affects all indigenous people. There have been few systematic attempts to collect evidence of discrimination against indigenous Australian people although it is frequently assumed to exist. One study (Larsen et al. 1977) found evidence of discrimination against indigenous people in Townsville in the areas of employment, housing and hotel access.⁷

There are, however, alternative explanations of the lower returns to human capital amongst indigenous Australians. Indigenous people may make employment choices which do not maximise their monetary income potential. Those living in rural areas and unwilling to migrate to more lucrative employment may find themselves restricted in their choice of employment to jobs which do not use their skills fully. Even if such work existed, they may prefer to take casual work which gives them greater flexibility in their use of time.

A third possibility is that the coefficient differences arise because of measurement problems. The explanatory variables included are the best available estimates of a range of underlying factors which are expected to have an important influence on income. As already discussed, there are problems associated with the measurement of labour market experience for a group with intermittent labour supply. Another example is the years-of-schooling variable. American evidence suggests that, on average, black Americans have in the past received lower quality schooling than white Americans. Several studies have attributed part of the relative growth in black incomes in the 1960s and 1970s to raising the quality of schooling (Smith and Ward 1989; Card and Krueger 1992). The results presented here do not support the hypothesis that the schooling received by indigenous Australians has been of inferior quality. However the use of the

crude count of the number of years of schooling may hide important differences. For example, there is evidence of lower literacy and numeracy levels among the current generation of indigenous school children (Department of Employment, Education and Training (DEET) 1994).

It is perhaps safer to think of the coefficient differences as a 'measure of our ignorance', rather than at this stage to attribute the differences to any particular source. However, the strong negative effect of location of residence outside major urban areas on indigenous incomes raises the issue of the importance of locational factors for any policies designed to increase indigenous employment and incomes. The result suggests either that indigenous Australians face particularly strong discrimination in the rural areas or that indigenous people living in these rural areas are willing to sacrifice a large amount of income in order to stay there rather than migrate to employment in a large city. As Altman (1988), Taylor (1988), and Altman and Smith (1990) have shown, there are, however, no easy solutions to the problems of generating employment in remote areas.

Table 4. Estimated sources of income differences between indigenous males and females, 1991.

	Male coefficients	Female coefficients
Income gap to explain ^a	6.0	
Attributed to endowments	-2.0	-4.0
Percentage of difference	-33.0	-66.0
Attributed to coefficients	8.0	10.0
Percentage of difference	133.0	166.0

a. The calculation is based on equation 3.

Source: 1991 Census.

Finally, in Table 4, the incomes of indigenous men and women working full time are compared. The average indigenous male had an income 6 per cent higher than the average indigenous female. The decomposition of this gap into endowment and coefficient differences is presented, using both sets of coefficient weights. The results show that endowment differences accounted for none of the income differences; indigenous females had greater human capital endowments than indigenous males. Coefficient differences were the source of lower incomes for working indigenous women. Among these, the strong negative effect of rural residence and the different effects on income of family characteristics for indigenous females were most important. Family characteristics also had different effects on the income of non-indigenous men and women. This more general result probably reflects the division of labour within the family.

Conclusion

Although indigenous people in full-time employment have lower incomes, on average, than non-indigenous Australians in full-time employment, they are a privileged group in terms of income, when compared with indigenous people who are not in employment. This paper has used the framework of human capital theory to decompose the differences in income for indigenous and non-indigenous men and women in full-time work into that part which can be accounted for by differences in the labour market attributes of indigenous people and unexplained differences in the rewards to these endowments.

The results show that the main source of lower incomes for indigenous males compared with their non-indigenous counterparts was their lower level of human capital endowments rather than the rewards they received for these endowments. An even stronger result held for females; endowment differences were estimated to account for all the difference in income between indigenous and non-indigenous females. These results emphasising the role of human capital differences in determining income differences, are similar to those reported by Sandefur and Scott (1983) for Native American males and in contrast to Canadian results which emphasise the role of unexplained factors (Patrinos and Sakellariou 1992).

In comparing across the sexes, however, the estimates presented here show that the differences in rewards for endowments more than accounted for the income gap. Given their endowments of human capital, indigenous females could be expected to earn more than indigenous males while the actual outcome was that they earned less. The result of large differences in the rewards for human capital characteristics across the sexes has been found in other studies of the gender pay gap (Gregory et al. 1989; Chapman and Mulvey 1986; Gunderson 1989). In fact, it has been argued in the United States context, that income differentials according to race are more susceptible to change than is the gender income ratio (Fuchs 1988).

The results have several policy implications. They emphasise the role of education and working experience in raising income. An important issue requiring further investigation is the ability of indigenous people to access the education system. Evidence from the United States suggests that raising the quality of education offered to black Americans made an important contribution to improvements in their relative income.

Another issue requiring further study is the association between labour market experience and income. Indigenous people employed under the Community Development Employment Projects (CDEP) scheme will be accumulating labour market experience. The human capital model suggests that these people learning work skills on-the-job, should become more productive the longer they are on the scheme. However, unless this

experience can be used to gain mainstream employment, it will not result in higher incomes, as the wage these people receive is based on welfare entitlements rather than working experience. The lack of monetary reward for investment in training under the scheme may reduce the incentives to undertake on-the-job training.

As described in this discussion paper, human capital endowments and the rewards for them also influence the probability of being in employment. The earlier results showed that indigenous Australians are less likely to be in full-time employment than non-indigenous Australians. This may reflect either discrimination against indigenous Australians on the demand side of the labour market or their different preferences about labour supply. It is possible that these effects are more apparent at the point of entry to employment rather than among those already in full-time employment. The evidence presented here does not support the hypothesis that indigenous people working full time face a high level of discrimination in the earnings they receive. Perhaps this reflects the Australian system of wage determination which has limited the extent to which the earnings of individuals can differ from award rates.

Notes

1. The terms 'Aboriginal' and 'indigenous Australians' will be used throughout this paper to describe both the Aboriginal and Torres Strait Islander populations of Australia.
2. For surveys of this literature see Ehrenberg and Smith (1987) and Siebert (1985).
3. For recent surveys of the discrimination literature see Blau and Ferber (1987) and Gunderson (1989).
4. The theory was originally expounded by Adam Smith in *The Wealth of Nations*. For a more modern treatment see Rosen (1986).
5. See Gregory et al. (1989) and Chapman and Mulvey (1986) for Australia and Sandefur and Scott (1983) and Patrinos and Sakellariou (1992) for North America. Hill (1979) presents a survey of American evidence and a discussion of the reasons for including marital status in earnings regressions.
6. The geographical divisions of Australia have provided a framework for a number of studies of indigenous economic status. See, for example, Altman and Nieuwenhuysen (1979), Fisk (1985) and Tesfaghiorghis (1991a, 1991b). Location of residence has also been shown to be important for the income status of the Australian population in general. See, for example, Gregory et al. (1989) and Chiswick and Miller (1985). Geographical indicators were also used by Sandefur and Scott (1983) and Patrinos and Sakellariou (1992) for North America.
7. Riach and Rich (1987) conducted a similar test for sexual discrimination among a group of Melbourne employers and concluded that women did face discrimination.

Appendix A

Definition of variables

Education

- i Years of schooling: years of primary and secondary schooling were calculated by age left school minus 5 with a maximum value of 12.
- ii Unqualified: a dummy variable taking the value of one for those who had no post-secondary qualification.
- iii Cert: a dummy variable taking the value of one for those with a post secondary certificate, for example a trade certificate.
- iv Diploma: a dummy variable taking the value of one for those with an undergraduate or associate diploma.
- v University graduate: a dummy variable taking the value of one for those who had completed an undergraduate or postgraduate degree.

Experience

- i Potential experience: current age minus the estimated years in education minus 5.
- ii Adjusted experience: measured by calculating the employment/population ratio at each age between 15 and 64 years and assuming that this represented the extent of labour force experience for people of this age during that year. Adjusted experience was then the sum of this measure of experience at each age up to the current age with an appropriate deduction for years of schooling.

Family characteristics

- i Married: a dummy variable taking the value of one for those who were legally married.
- ii Widowed, separated and divorced: a dummy variable taking the value of one for those who were widowed, separated or divorced.
- iii Single: a dummy variable taking the value of one for those who had never been married.
- iv Number of dependent children: three dummy variables, 1 for those with one dependant child, 2-3 for those with 2-3 dependent children, 4+ for those with 4 or more dependent children.

Location

- i Major urban: a dummy variable taking the value of one for those who lived in major urban settlements (of more than 100,000 inhabitants).
- ii Other urban: a dummy variable taking the value of one for those who lived in other urban settlements (of between 1,000 and 99,999 inhabitants).
- iii Rural: a dummy variable taking the value of one for those who lived in rural areas (of less than 1,000 inhabitants). This category also included migratory people.

Language

- i Poor English: a dummy variable taking the value of one for those who registered an inability to communicate easily in English.

Table A1. Income of indigenous and non-indigenous men and women working full-time, 1991.

	Males		Females	
	(1)	(2)	(3)	(4)
Intercept ^a	5.4071 (134.2**)	5.4267 (167.7**)	5.3516 (94.8**)	5.3749 (119.7**)
Certificate	0.0980 (8.0**)	0.0968 (8.0**)	0.0528 (2.5*)	0.0512 (3.0**)
Diploma	0.3150 (13.3**)	0.3155 (13.4**)	0.2769 (12.7**)	0.2792 (15.3**)
Graduates	0.4837 (27.9**)	0.4825 (29.2**)	0.4089 (19.7**)	0.4121 (20.6**)
Years of primary and secondary schooling	0.0294 (8.5**)	0.0277 (10.4**)	0.0316 (6.4**)	0.0293 (7.8**)
Adjusted experience	0.0533 (21.4**)	0.0536 (22.8**)	0.0668 (16.6**)	0.0665 (17.5**)
Adjusted experience ²	-0.0013 (-19.2**)	-0.0013 (-20.1**)	-0.0023 (-15.3**)	-0.0023 (-15.8**)
Married	0.1114 (6.7**)	0.1117 (8.9**)	0.0128 (0.7)	0.0140 (1.0)
Widowed, separated, divorced	0.0640 (2.7**)	0.0621 (3.4**)	0.0590 (2.3*)	0.0470 (2.4**)
Number of dependants				
1 dependant	-0.0388 (-2.5*)	-0.0387 (-3.1**)	-0.0703 (-3.7**)	-0.0597 (-4.0**)
2-3 dependants	-0.0110 (-0.8)	-0.0121 (-0.9)	-0.1026 (-5.5**)	-0.1008 (-6.9*)
4+ dependants	-0.0926 (-2.8**)	-0.1071 (-5.0**)	-0.2021 (-3.5**)	-0.1558 (-4.9**)
Other urban	-0.0471 (-3.5**)	-0.0497 (-4.7**)	-0.0936 (-5.5**)	-0.0949 (-5.6**)
Rural	-0.1822 (-11.9**)	-0.1835 (-12.2**)	-0.1999 (-9.5**)	-0.2019 (-9.7**)
Poor English	-0.2070 (-4.8**)	-0.2332 (-6.6**)	-0.2750 (-4.9**)	-0.2831 (-5.1**)
Indigenous Australian	-0.0283 (-0.5)	-0.0762 (-3.1**)	0.0269 (0.3)	-0.0229 (-0.8)
Ind*cert	0.0492 (2.1*)	0.0512 (2.3**)	-0.0061 (-0.2)	
Ind*dip	-0.0701 (-1.2)	-0.0727 (-1.3)	0.0060 (0.1)	
Ind*graduates	-0.0467 (-0.7)		0.0836 (1.7)	0.0734 (1.5)
Ind*schooling	-0.0043 (-0.8)		-0.0050 (-0.6)	
Ind*experience	0.0272 (5.1)	0.0268 (5.3**)	0.0544 (5.3**)	0.0559 (6.1**)
Ind*exsq	-0.0018 (-7.9)	-0.0017 (-8.1**)	-0.0053 (-7.5**)	-0.0054 (-8.0**)
Ind*married	0.0009 (0.0)		-0.0044 (0.2)	
Ind*widowed etc.	-0.0040 (-0.1)		-0.0306 (-0.8)	

Continued over page.

Table A1. Continued.

	Males		Females	
	(1)	(2)	(3)	(4)
Number of dependants				
Ind*dep1	0.0014 (0.1)		0.0289 (0.9)	
Ind*dep2/3	-0.0302 (-1.3)	-0.0283 (-1.3)	0.0075 (0.3)	
Ind*dep4	-0.0240 (-0.6)		0.0679 (1.0)	
Ind*other urban	-0.0061 (-0.3)		0.0396 (1.5)	0.0435 (1.6)
Ind*rural	-0.1149 (-4.8**)	-0.1121 (-5.1**)	-0.1419 (-4.4**)	-0.1360 (-4.3**)
Ind*lang	-0.0733 (-1.0)		-0.1261 (-1.4)	-0.1059 (-1.2)
R ²	0.34	0.34	0.34	0.34
F test of joint significance of indigenous variables		26.5**		18.2**

a. The constant term measures the natural logarithm of income for an unqualified urban dweller who is single, has no dependants, no qualifications or years of schooling, no labour market experience, is fluent in English and is not an indigenous Australian.

't' statistics are in brackets. Significant test statistics at the 5 per cent level are indicated by * and those at the 1 per cent level by **.

Source: 1991 Census.

Table A2. Estimated sources of income differences between indigenous and non-indigenous males and females (adjusted experience), 1991.

	Males	Females
Predicted income (\$)		
Indigenous	485	389
Non-indigenous	586	478
Income gap to explain (per cent) ^a	17.0	19.0
Using indigenous weights		
Attributed to endowments (per cent)	59.0	15.0
Percentage of difference	350.0	79.0
Attributed to coefficients (per cent)	-42.0	4.0
Percentage of difference	-250.0	21.0
Using non-indigenous weights		
Attributed to endowments (per cent)	34.0	28.0
Percentage of difference	202.0	150.0
Attributed to coefficients (per cent)	-17.0	-9.0
Percentage of difference	-100.0	-47.0

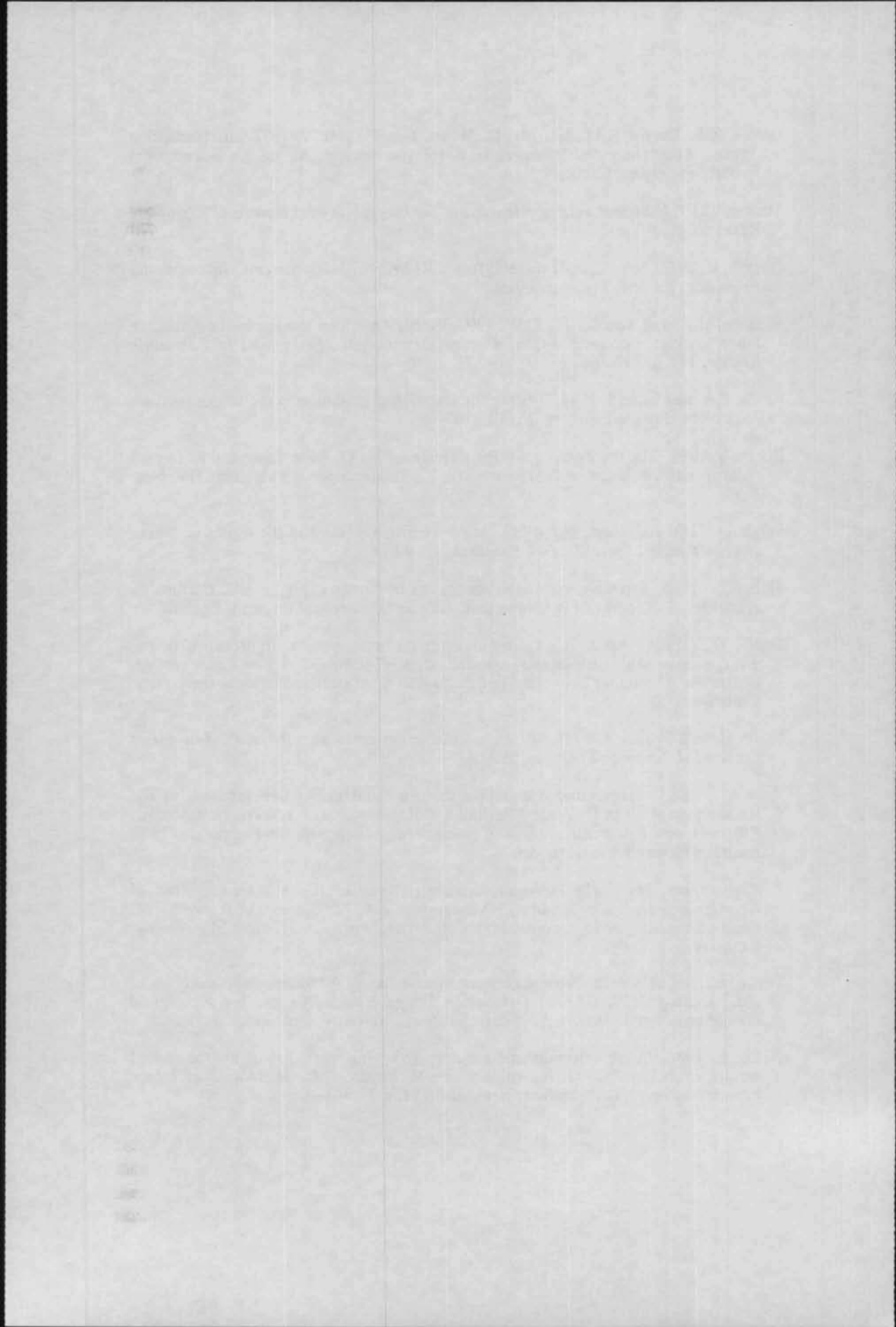
a. The calculation is based on Appendix Table A1 equations 2 and 4.

Source: 1991 Census.

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