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The determinants of indigenous educational outcomes

B. Hunter and R.G. Schwab

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Summary

This study examines the determinants of the educational attainment of young indigenous Australians using data from the last three censuses and the 1994 National Aboriginal and Torres Strait Islander Survey (NATSIS).

An overview of indigenous people within the education system

- Indigenous teenagers stayed on at school longer between 1986 and 1996. Unfortunately, while the relative situation between indigenous and non-indigenous Australians improved marginally for most age groups, the absolute difference in the percentages at school increased for all age groups over 15. Indigenous participation at the pre-school and primary school levels is high, but drops dramatically among older children.
- Indigenous people are about ten times less likely to have a degree than other Australians. At the other end of the educational spectrum, Australia's indigenous population was 21.6 per cent more likely to be unqualified. Notwithstanding this, there was some minor improvement in the qualification rate, relative to the rest of the population, in the last inter-censal period
- This educational disadvantage is highlighted by the fact that Aboriginal and Torres Strait Islander people have poorer educational outcomes than the indigenous populations of the Canada and New Zealand.

Modelling indigenous education

The NATSIS analysis of the determinants of education outcomes for indigenous teenagers, youth and adults reveals that:

- The experience of arrest reduces the probability of attending school by 25.6 and 18.4 per cent for males and females respectively, but is not significantly related to having a post-school qualification for adults.
- Place of residence appears to be a problem only for teenagers in remote areas who are about 20 percentage points less likely to be in school.
- Local social environments in the household are strongly associated with increased attendance and retention rates at high school. For males, poor quality housing reduces the probability of being at school almost in half. Similarly, living in households where others have been arrested reduces the probability of attending school by an additional 23.3 and 19.8 percentage points for males and females respectively. The presence of household members who are qualified or at school significantly increases the chance that a person will be at school.
- In addition, difficulty with English is a powerful predictor of whether or not an indigenous adult has a Degree, Diploma or other qualifications.

The inescapable conclusion is that family and social variables dominate the decision to stay on at school. The effect of the geography variable, representing proximity to educational institutions, is in general dwarfed by the influence of the local social and family environment.

Policy implications

Increasing retention rates and education levels among indigenous people relative to the rest of the population may be extremely difficult where there is no attempt to address ongoing social inequities, especially the high rates of arrest among indigenous youth and poor housing stock of many indigenous households.

Policy attention should also be focused on reducing the extent of contact, especially avoidable contact, of indigenous teenagers with the criminal justice system. Where detention is unavoidable, policy efforts should focus on ensuring indigenous people have the opportunity to finish high school.

Improving adult language skills could well provide an important approach to improving indigenous education outcomes in terms of qualifications. One of the most effective means to improve language skills is through work or task-based adult education.

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Introduction

Knowledge, as Francis Bacon pointed out, is power, and participation in formal education provides one means by which citizens can gain access to power.[1] Indeed, it is widely believed that true democracy is only possible where citizens have the knowledge and skills necessary to participate fully and ensure their effective representation in government. The consistently lower levels of educational participation and achievement among indigenous Australians results in a lack of access to the structures of participatory democracy. At the same time, it signals their deep alienation from other institutions.

Not only does poor educational attainment among many indigenous people impede effective participation, but lower levels of educational attainment significantly constrain opportunities for securing the resources to maintain a reasonable standard of well-being. Hunter (1997) shows that more than half of the relatively poor employment of indigenous Australians can be attributed to low levels of educational qualification. These adverse employment outcomes and concomitant low wages are reflected directly in the high levels of poverty among indigenous Australians (Henderson 1975; Ross and Mikalauskas 1996).

Given the importance of education for the most disadvantaged sector of Australian society, the limited amount of systematic analysis of its determinants in the indigenous population is surprising. The 1994 National Aboriginal and Torres Strait Islander Survey (NATSIS) provides the opportunity to redress this situation. The NATSIS data are a rich source of information about social and economic factors which determine whether an individual will participate and succeed in the education system. For indigenous people, one potentially important factor limiting educational achievement is the high rate of arrest among indigenous youth. For example, almost 50 per cent of indigenous males aged between 20 and 24 have been arrested in the past five years (Australian Bureau of Statistics (ABS) 1995: 57).

This paper attempts to tease out what factors affect the level of education among indigenous Australians. The empirical analysis focuses on the factors affecting the human capital formation of young indigenous people under 25 years of age. However, given the paucity of analysis about the determinants of educational attainment among indigenous Australians, a multivariate analysis of the incidence of post-schooling qualifications among older indigenous people is also undertaken. The analysis of indigenous qualifications merely identifies the extent of correlation between certain characteristics, for example location, and whether an individual has a qualification.

The analysis commences with an overview of the position of indigenous Australians within the education system, and then touches briefly on patterns of indigenous education in the context of theories of human capital investment. Next, the model used is introduced and the results are presented separately for the school age population (13 to 17 year olds) and adults (aged 18 years and

over). The paper concludes with a discussion of implications of the analysis for policy.

An overview of indigenous people within the education system

International comparisons

A limited international comparison of educational outcomes for indigenous people in three countries is presented in Table 1. Drawing on outcome data as reported for 'educational qualification' from each country's 1991 Census, the table shows that Aboriginal and Torres Strait Islander people fare much worse than Canada's Aboriginal population and the Maori of New Zealand. In Canada, 50.6 per cent of all indigenous people aged 15 and older who identify as aboriginal lack educational qualifications; in comparison, 37.9 per cent of other Canadians lack qualifications. In New Zealand, 76.5 per cent of Maori people report no educational qualifications compared to 60.7 for the remaining population. The proportion of non-qualified indigenous Australians, however, is higher than for indigenous people in both Canada and New Zealand with 91.2 per cent of indigenous Australians indicating they hold no qualifications; in comparison, 69.6 per cent of other Australians are unqualified.

Table 1. Comparisons of indigenous persons over 15 without high school or other qualifications: Australia, New Zealand and Canada, 1991

	Indigenous per cent	Non-indigenous per cent	Ratio of indigenous/non-indigenous
Australia	91.2	69.6	1.31
New Zealand (single Maori origin)	78.6	60.7	1.29
New Zealand (any Maori origin)	76.5		1.26
Canada (registered Indian)	51.8	37.9	1.37
Canada (any aboriginal origin)	50.6		1.34

Source: ABS (1991), Department of Indian Affairs and Northern Development (1995, 1997); Department of Statistics (1992a, 1992b).

In absolute terms, Australia's indigenous population is far less qualified than its counterparts in New Zealand and Canada. However, in relative terms, indigenous people in all of these developed countries are equally educationally disadvantaged compared to their respective non-indigenous populations being about 30 per cent less likely to be qualified. Indeed, in contrast to the absolute statistics detailed above, Canada's Indian, Inuit Mêtis population are slightly more disadvantaged, relatively speaking, than Australia's Aboriginal and Torres Strait Islander population. That is, the absolute disadvantage of Australia's

indigenous population is largely explained by the fact that fewer non-indigenous Australians finish high school than their New Zealand or Canadian counterparts.

Recent educational trends in Australia

Indigenous people were nearly ten times less likely to have a graduate degree than other Australians in 1991 (Table 2). At the other end of the educational spectrum, indigenous population were 21.6 percentage points more likely to be unqualified than their non-indigenous counterparts in that Census.

The percentage of indigenous people holding educational qualifications increased between 1991 and 1996. For example, the proportion of the indigenous population with degrees more than doubled in size from 0.9 to 2.2 per cent. There were smaller increases for the other educational qualifications. In contrast, there was a substantial compositional shift in the non-indigenous qualifications with many people upgrading from basic and trade qualifications to diploma or degree qualifications. It is important to note, however, that while it is clear that indigenous participation in higher education has increased, indigenous people are markedly over-represented at the lowest levels of the course continuum and under-represented at the upper levels (Schwab 1996: 10-11).

Table 2. Percentage of population over 15 with educational qualifications, 1991 and 1996

	Indigenous		Non-indigenous	
	1991	1996	1991	1996
Degree or higher	0.9	2.2	8.8	11.2
Diploma	1.6	3.2	6.0	13.5
Trade qualification	4.2	5.2	11.8	11.4
Basic qualification	2.0	2.2	3.8	3.0
No qualification	91.2	87.2	69.6	60.9
Total	100.0	100.0	100.0	100.0
Number (,000s)	160	218	12,925	13,697

Note: The not stated and inadequately described categories are proportionately allocated to other cells. The qualification categories changed significantly between 1986 and 1991 (ABS 1993: 227).

Source: ABS (1991); unpublished cross-tabs from 1996 Census.

Overall, the last inter-censal period saw substantial improvements in the educational qualifications of many Australians (Table 2). While the proportion with qualifications increased for both indigenous and non-indigenous Australians between 1991 and 1996, the change was smaller in absolute terms for indigenous people. However, in relative terms the level of indigenous qualifications improves from 28.9 to 32.7 per cent of the analogous non-indigenous outcome.[2]

This relatively low level of qualification is partly a reflection of the tendency among indigenous people to leave school at a young age. At one extreme the

indigenous population are about five times more likely to have never attended school than the non-indigenous population.

At the other extreme, indigenous people are about twice as likely not to have completed high school. The proportionally large number of indigenous youth at school reflects the relatively flat age pyramid of this group. That is, high mortality among older indigenous Australians combine with high fertility rates resulting in a relatively large school age population among indigenous Australians. In order to account for the differences in the age structure of the respective populations it is worthwhile examining the proportion of each age group that is still at school in the later teenage years (Table 3).

Table 3. Proportion of age group still at school in 1986 and 1996

	Indigenous		Non-indigenous	
	1991 per cent	1996 per cent	1991 per cent	1996 per cent
Male				
Aged 15	63.5	61.2	88.6	84.5
Aged 16	36.4	42.3	64.8	74.0
Aged 17	17.6	27.5	38.8	56.2
Aged 18	4.1	8.9	8.5	15.9
Aged 19	0.9	2.4	1.8	3.4
Female				
Aged 15	69.6	65.2	90.1	86.7
Aged 16	40.2	49.5	68.1	79.6
Aged 17	18.6	28.8	42.5	63.5
Aged 18	4.5	8.0	6.9	15.1
Aged 19	0.8	2.1	1.4	3.0

Source: Unpublished data from the 1986 and 1996 Censuses.

While there has been improvement in recent years, levels of indigenous educational attainment are clearly lower than those of other Australians. Though continuing to lag behind, they have tracked upward with the rapid expansion in educational qualifications seen in the populace at large. Table 3 shows that there has been some improvement in retention with more indigenous teenagers of most age groups staying on at school longer between 1986 and 1996. Unfortunately, while the relative situation between indigenous and non-indigenous Australians improved marginally for all ages (except 18 year old females), the absolute difference in the percentages at school increased for all age groups over 15. Indigenous participation at the pre-school and primary school levels is high, but drops dramatically among older children. There is an obvious implication in this trend for participation at the post-secondary level; without qualifications, indigenous people are much less likely to re-engage with the educational system. This finding suggests there is cause for concern that recent moves by the Federal Government to pare back the indigenous education support program, ABSTUDY,

may result in a further deterioration in indigenous participation (Schwab and Campbell 1997).

Given the fact that the Aboriginal and Torres Strait Islander population is educationally disadvantaged, in both absolute and relative terms, the lack of empirical modelling of indigenous education in Australia is surprising. The model developed below is intended to measure the influence of several important factors underlying the low educational attainment among indigenous Australians.

Indigenous education and human capital theory

One of the most prominent contemporary approaches to the economics of education is human capital theory. The essential assumption of the human capital approach is that investment in education increases productivity, and hence earnings, for both individuals and society and that individuals make rational decisions designed to maximise the net present value of their earnings; individuals invest in education because it will result in higher future earnings. In stark economic terms, individuals weigh up the costs and benefits of continuing with studies and withdraw or take a qualification where the marginal increase in earnings (net of the costs of schooling) exceeds the interest rates at which an individual can borrow money (or alternatively the rate at which future earnings can be discounted).

One of the problems with the human capital approach is that many indigenous Australians appear to employ a cost benefit analysis for education that differs from that of other Australians. Specifically, there are unique social factors and cultural considerations that influence decisions regarding investment in education (Schwab 1996, 1997). Once we acknowledge that rational choice models may not tell the whole story, there are some uncomfortable implications for neo-classical theories of education such as human capital theory. For example, to the extent that arrest and conviction reduces future earnings through removing people from the workforce for a period of time, and given that indigenous criminal activity is often not financially remunerated,[3] it is difficult to reconcile it with the rational choice basis of human capital theory. This criticism is not merely pointing to the wedge between ex-ante and ex-post returns to educational investment for an individual indigenous person, but rather the inconsistency in assuming a rational (in the neo-classical sense) basis for educational investment when 'non-rational' or local social and cultural factors may be at odds with the simple formulation of human capital theory (Schwab 1996).

Notwithstanding the problems with the conventional formulation of the rational choice model of educational outcomes, there is value in attempting to develop a structural model of education versus labour supply decision (that is, including the expected wage of an individual). Unfortunately, idiosyncratic institutional complexities of the indigenous labour market (see Hunter and Borland's (1997) discussion of the Community Development Employment Projects

scheme) and the limited nature of NATSIS data means that a more modest descriptive approach is adopted here. However, this paper is a first step in attempting to identify the relative importance of social and economic factors underlying indigenous educational outcomes.

Modelling indigenous education

A multivariate technique, known in the statistical literature as probit analysis, is used to analyse indigenous educational participation. The probit model provides a rigorous technique which identifies the significance of correlations between certain characteristics, for example location or local social environment, and whether an individual is participating in secondary school or has a post-secondary qualification. A separate analysis is conducted for the school-aged population, young adults and other adults aged 25 and over.

Explanatory variables

Individuals' observed education outcomes will depend on the interaction of labour demand and labour supply factors. Hence, we seek to include as explanatory variables in the education equation a range of other factors which are likely to capture both effects of labour demand and labour supply on education. These factors can be classified under four main types of variables: age; location; family; and socioeconomic.

To capture the effect of being in a particular age cohort, dummy variables for age are included. The locational determinants of education are measured by the region of current residence (capital city, other urban, rural or remote). Access to educational institutions is also likely to vary significantly across these regional indicators. Indeed, the remote variable is defined as being in a rural area that is more than 100 kilometres from the nearest TAFE (Hunter and Borland 1997).

The family variable captures a complex mixture of resource and social constraints affecting the success of individuals in furthering their education. Family-type variables included in the education equation are dummy variables for whether married, whether a sole parent, whether living in a mixed family, and number of children. In addition to these variables a set of household variables is included to test the importance of immediate social environment. Given the possibility that educational outcomes and the family or household environment are simultaneously determined, the regression analysis was conducted both with and without these variables. The results for the other explanatory variables were not sensitive to the inclusion of these environmental variables.

Possible socioeconomic influences on education are represented by dummy variables for whether an individual: speaks an indigenous language, spent time in hunting and gathering activities in the previous year, had a long-term health condition, and is a Torres Strait Islander.

The affect of being arrested in the five years before the NATSIS on education outcomes is a special case of socioeconomic or household variables. There are several reasons why we might expect arrest to adversely affect educational attainment. For example, being detained in either youth detention centres or jails directly interferes with the process of human capital formation by removing individuals from familiar surroundings. While people in detention have more time to study, they may be less motivated to do so. Also, when peers have lower educational attainment the motivation to continue or recommence studies may be reduced. To the extent that experience of arrest reduces one's employment prospects or wage levels there is a feedback which reduces the returns to education and therefore further diminishes the incentive to pursue education. Hunter's (1998a) analysis shows that the direction of causality appears to be from arrest to education rather than vice versa.[4]

Data used in the regression analysis are taken from the NATSIS and are described in the Appendix A. The analysis in this paper focuses on three indigenous groups: school-aged population (13 to 17 year olds), young adults (18 to 24 year olds) and older adults (25 years and older). The dependent variable for the youngest group is whether an individual is still at school. The small numbers of indigenous adults at secondary and primary school mean that attendance at school is only modelled for the school-aged population. The analysis for adults focuses on whether an individual has a post-secondary qualification for those adults who have left school. For older adults, a separate analysis of degrees/diploma and other qualifications was possible. Given that English may still be taught at secondary school, it is not appropriate to include difficulty in speaking English as a determinant of attendance at school. However, since difficulty in communicating is a potentially important impediment to gaining post-secondary qualifications it is included in the analysis of indigenous people over 18 years old.

Estimation results

The results of the regression analysis are reported in Appendix A.[5] One of the major findings is that the experience of arrest affects the probability of attending school but is not generally significantly related to having a post-school qualification for adults. Given the paucity of analysis of the determinants of education outcomes for indigenous Australians it is important to provide a detailed analysis for each demographic group.

School-aged population

The results are presented as marginal effects of the various factors on attendance at school for ease of interpretation (Table 4).[6] The marginal effects measures the change in probability of being at school relative to a hypothetical reference person. The characteristics of the reference person chosen for this purpose are as follows: Aboriginal; living in an Aboriginal-only household in an

capital city; is single without children under 13; does not engage in hunting and gathering or speak an indigenous language; does not have a long-term health condition; has a room in a house where all the major utilities work; other household members have not been arrested in the last five years; and other household members are either at school or have a post-schooling qualification. One example of the way to interpret Table 4 is that the experience of arrest significantly reduces the probability of being at school, relative to this reference person, by 25.6 and 18.4 per cent for males and females respectively.

Table 4 also points to the relative importance of other explanatory variables. Place of residence appears to be a problem only for youth in remote areas who are about 20 percentage points less likely to be in school. Living in a rural area is only a problem for females whose probability of attending school is 8.5 percentage points lower. Being a Torres Strait Islander does not significantly affect the chance of attending school for either sex.

The social and family factors underlying ongoing attendance at school are even more important than the geographic constraints on going to school. For example, relative to the reference person, being married increases the chances of attending school by about 25 percentage points for both males and females. Similarly, being a sole parent increases the chance of being at school by 25.3 and 20.9 percentage points for males and females, respectively. The presence of children under age 13 in a family where the parents are married or defacto does not have any additional effect on whether a person is at school. The results for the martial status variables appear to indicate that having family responsibilities increases the awareness of the importance of getting an education. In addition, a 'mixed' family where one parent is indigenous and the other non-indigenous is associated with higher school attendance for females; girls from such households are 8.2 per cent more likely to be in school. Being in such mixed families do not significantly affect retention rates of school-aged males.

Hunting and gathering activities may significantly reduce the amount of time an individual has for schooling. For the purposes of our analysis, we suggest that participation in hunting and gathering could well signal the retention of other 'traditional' cultural activities; in this analysis we have also included the ability to speak an indigenous language as an indicator of affiliation with 'traditional culture'. If a greater affiliation with indigenous culture leads to less social alienation, then speaking an indigenous language may keep students on at school significantly longer. The net effect of these two variables is that male attendance at school is significantly increased by 7.0 percentage points, but female attendance is significantly reduced by 12.4 percentage points. That is, the negative effect on school attendance of hunting and gathering is outweighed by the positive influence of speaking an indigenous language for males but not for females.

Table 4. Marginal effect on probability of educational outcomes-indigenous Australians, 1994

	Attendance at school 13 to 17 year olds		Any post-school qualification 18 to 24 year olds	
	Males	Females	Males	Females
Probability for the reference person	0.586	0.544	0.195	0.214
Change in probability of attendance at school or having a post-school qualification				
1. Arrest	-0.256*	-0.184*	-0.023	0.051
2. Other urban area	-0.082	0.055	0.036	-0.032
3. Rural area	-0.031	-0.085*	-0.060	-0.076
4. Remote area	-0.207*	-0.231*	-0.116*	-0.090*
5. TSI (given in remote area)	0.041	0.008	0.008	0.073
6. Married	0.236*	0.261*	0.051*	-0.035
7. Children under 13 (given married)	0.006	-0.005	-0.071*	-0.061*
8. Sole parent	0.253*	0.209*	0.027	0.008
9. Mixed family	0.034	0.082*	0.027	0.083*
10. Hunter-gather with an indigenous language	0.070*	-0.124*	0.084	-0.006
11. Has difficulty speaking English			-0.060*	-0.077*
12. Long-term health condition	0.141*	0.112*	0.022	0.032
13. Shares a bedroom with 3 others and household utilities do not work	-0.284*	-0.121*	-0.121*	-0.029*
14. Other household members have been arrested	-0.233*	-0.198*	-0.002	-0.102*
15. Other householders qualified or at school	0.162*	0.231*	0.105*	0.150*

Note: The reference person is an Aboriginal; living in an Aboriginal-only household in an capital city; is single without children under 13; does not engage in hunting and gathering or speak an indigenous language; does not have a long-term health condition; has a room in a house where all the major utilities work; other household members have not been arrested in the last five years; and other household members are either at school or have a post-schooling qualification. The reference person for analysis of post-school qualifications also includes people who do not have any difficulty in speaking English. An * denotes that a marginal change was significant at the 5 per cent level.

Source: Appendix Tables A5 and A6.

Long-term health problems, where people had a disease(s)/disorder(s) for more than six months (ABS 1996), appear to increase the probability of attending school by 14.1 and 11.2 per cent for males and females respectively.[7] One interpretation of these findings is that having a long-term health condition may reduce alternative activities for school-aged children and subsequently increase the likelihood of attendance. Another interpretation is that families with children exhibiting long-term health problems may rely on institutions such as schools for social support.

As mentioned above, the variables which attempt to capture the role of the local social environment in the household show they are strongly associated with increased attendance and retention rates at high school. For males, poor quality housing is even more significant than arrest in predicting whether or not an individual will be at school. Sharing a bedroom with three others and being a member of a household where none of the major household utilities work reduces the probability that school aged males attend school by 28.4 percentage points. That is, poor quality housing reduces the probability of being at school by nearly half.

Similarly, living in households where others have been arrested reduces the probability of males attending school by an additional 23.3 percentage points. Less powerful, but important nonetheless, is the apparent impact of the presence of household members with educational qualifications or who are at school. When such persons are present, the probability of males attending school increases by 16.2 per cent. For females, the local social environment in the household, as measured by the proportion of other household members who were arrested or with a post-schooling qualifications, also appears to have a stronger affect than does arrest. Where other household members are qualified there is a 23.1 percentage points greater chance that a female will be at school. The negative social influence of living in a household where others have been arrested is almost as large as this (19.8 percentage points).

Other variables, not referred to above, are not significant predictors of whether a school-aged youth is at school. Notable among these is fact that being a Torres Strait Islander does not appear to increase the likelihood that a person will be at school when compared to other indigenous teenagers. This finding is in contrast to the simple descriptive statistics which indicate that Torres Strait Islanders are between 6 and 11 per cent more likely to have completed years 11 or 12 (ABS/CAEPR 1997: 15).[8] The apparent inconsistency between the above results and the descriptive statistics of ABS/CAEPR (1997) is explained by the fact that multivariate analysis permits differences in other characteristics of Torres Strait Islanders and Aborigines to be taken into account. For example, the higher retention rates might be explained by the fact a greater proportion of the Torres Strait Islander population live in non-remote areas. Table 4 also indicates that being of Torres Strait Islander descent does not affect the likelihood of having educational qualifications for older Torres Strait Islanders relative to the Aboriginal population. The lack of a significant effect for Torres Strait Islanders probably reflects the relatively small size of the Islander population in the NATSIS data.

The inescapable conclusion of the results presented in Table 4 is that family and social variables dominate the decision to stay on at school. The effect of the geography variable, representing proximity to educational institutions, is dwarfed by the influence of the local social and family environment. Increasing attendance and retention rates among indigenous people relative to the rest of the population may be an uphill battle where there is no attempt to address ongoing social

inequities, especially the high rates of arrest among indigenous youth and the poor housing stock of many indigenous households.

Young adults

In contrast to the above analysis, the probit analysis of educational qualifications among young adults shows that there is no significant influence of arrest on educational qualifications (Table 4). That is, the major impact of arrest occurs through its effect on participation in secondary school.

Table 4 also points to the relative importance of other factors. The only geographic variable which remains significant for young adults is the remote area variable. This is probably not surprising since this variable was partially defined by the distance from the local TAFE college. The access to educational institutions appears to have a significant impact on whether an individual has a qualification since living in a remote area reduces the probability of having a post-secondary qualification by between 11.6 and 9.0 per cent for males and females respectively.

Another significant factor is whether or not an individual has difficulty speaking English. Not surprisingly, individuals who have difficulty with English are less likely to hold educational qualifications. English language problems reduce the probability of being qualified by 6.0 and 7.7 per cent for male and females.

In terms of the family variables, being married only has a significant impact for males whose probability of being qualified increases by 5.1 per cent. Having children under 13 years old in a family has a significant negative association for both married males and females by reducing the probability of being qualified by 7.1 and 6.1 respectively. Being a sole parent does not have a significant impact on educational qualifications for young adults.

The importance of the local social environment for young adults is evident in the significance of household quality and whether other household members have been arrested or hold educational qualifications. Living in poor quality housing with four people sleeping in a bedroom significantly reduces the probability of having a qualification by 12.1 and 2.9 per cent for males and females respectively. Similarly, living in a house where at least one other person is qualified increases the probability of a young adult having a qualification by 10.5 per cent for males and 15.0 per cent for females. The social influence of co-habitants is particularly strong for females as living in a house where other people have been arrested reduces their chance of being qualified by 10.2 per cent; the impact is not significant, however, for males. In addition, living in a family with both indigenous and non-indigenous members increases the female probability of qualification by 8.3 per cent but has no significant effect on males.

Older adults

The results for the older population need to be interpreted with some caution. Given that the analysis indicates the correlation of current variables with whether a person has ever got a post-schooling qualification, readers should avoid a behavioural interpretation of the results. That is, since most qualifications for this group will have been acquired many years ago it may strain credibility to claim that current circumstances are causing people to have a qualification.[9] It is more appropriate to interpret the correlations as describing what sort of people have degrees, diplomas and other post-schooling qualifications.

Notwithstanding the above caveat, the analysis of older adults suggests that several factors are important (Appendix Tables A5 and A6). While difficulty in speaking English and the number of bedrooms were again significant, geographic factors were also very important. All the respondents who lived outside capital cities were much less likely to have a post-school qualification. If the correlation is believed to be behavioural, then the problem of access was most pronounced for males attempting to secure a degree or diploma. For females, access was only an issue for people getting other post-school qualifications. Thus physical access to educational institutions may be an ongoing impediment to improving indigenous economic outcomes.

It is probably not surprising that the local social environment is less important for older indigenous adults than it was for people under 25. For example, the immediate family variables such as marital status, the presence of children under 13, and sole parent status are not significant predictors of educational qualifications.

Still, the local social environment may play some role for older indigenous population. For example, poor housing stock, as measured by the number of rooms per person, has a negative correlation with all qualification types. The presence of other qualified adults in a household is strongly correlated with higher qualifications, while the presence of others in a household who were arrested in the last five years was only significantly correlated with other non-degree qualifications for females. As mentioned above, an older adult's experience of arrest in the last five years has no significant association with the presence or absence of educational qualifications.

Finally, as with young adults, difficulty with English is a powerful predictor of whether or not an older adult has a degree, diploma or other qualifications.

Policy implications

This paper has identified some of the factors associated with indigenous educational participation. In this section of the paper, we explore some of these factors and suggest implications for policy formulation.

The impact of indigenous arrests on education and returns to schooling

The main effect of arrest on education is through its effect on indigenous attendance at secondary school. That is, arrest and subsequent detention have most of its impact on human capital formation for the school-aged population. Being detained in either youth detention centres or jails may directly interfere with the process of human capital formations by removing individuals from familiar surroundings. While people in detention have more time to study, they may be less motivated to do so if their delinquent peers have less motivation to continue or recommence studies. Since most juvenile facilities now provide the opportunity to study, the mechanism is likely to involve social (alienation) factors which further diminish the individual's incentive to study.

Police discrimination, evident in the exceptionally high rates of arrest among indigenous juveniles,[10] might not be reflected in decomposition of the wage differential into components attributable to discrimination and the differences in characteristics of indigenous and other workers if it is already reflected in the poor educational outcomes in the indigenous population. It is not that racial discrimination does not occur in Australia, rather that discrimination will already be reflected in the educational endowments. The endowment component of the income differential between indigenous and non-indigenous Australians is more than two-thirds (Daly 1995). For indigenous females, endowments explain as much as 82.1 per cent of the income differential.[11] This contribution from endowments is relatively high compared to Patrinos and Sakellariou's (1992) study of wage differentials between Canadian Natives and other Canadians, but is of a similar order of magnitude to Sandefur and Scott's (1983) analogous study in the United States.

Chapman (1991: 138) showed that increases in the number of years of secondary education for indigenous males had only a 'modest influence on relative incomes'. Daly and Liu (1995) confirmed Chapman's findings, yet showed that when post-secondary education is considered, it is apparent that investment in higher education pays a significant income dividend for indigenous people. Of course, the obvious means of increasing the level of post-secondary qualifications in the indigenous population is to ensure that more people finish school. Ironically, the de facto 'constraints' on the number of indigenous people finishing high school will probably mean that the returns to post-school qualifications remain relatively high compared to the rest of the Australian populace.[12]

Policy attention should be focused on reducing the extent of contact, especially the needless and avoidable contact, of indigenous teenagers with the criminal justice system (Gale, Bailey-Harris and Wundersitz 1990). Where detention is unavoidable, policy efforts should focus on ensuring indigenous people have the opportunity to finish high school.

Harding (1997) has suggested several means of reducing juvenile detention rates among the indigenous population. First, to reduce all kinds of unwanted

contact with the police by enacting and enforcing a new code of arrest protocols. Second, to create a police culture within which indigenous people are treated no less favourably than others in terms of the use of informal procedures such as cautions. Third, to encourage culturally appropriate self-policing. Fourth, to strengthen 'gatekeeping' at the door of the court so that youth justice coordinators can filter out unnecessary charges. Finally, to appoint an Aboriginal or Children's Ombudsman within each jurisdiction. While such steps would not in themselves be enough to achieve a reversal of the structural inequities in arrest rates, they could provide a good start.

Housing and education

There is ample evidence to demonstrate that indigenous Australians suffer poorer quality and more crowded housing than do other Australians and that this situation is linked to poverty (Jones 1994). Quality and relative crowding of households were shown to be strongly negatively associated with school attendance, particularly for boys. It is likely that crowding affects attendance in many ways. Crowded houses are often noisy and disruptive. Clothing necessary to attend school is shared and sometimes disappears, books are lost, there is little room to study, and people come and go disturbing sleep patterns. Older siblings are frequently required to baby-sit younger children. Tired children often fail to engage with learning and grow frustrated and disappointed with the educational experience. This, in turn, contributes to experiences of failure and further increases the likelihood of non-attendance (Schwab 1996).

Broken utilities may affect the ability of households to store and prepare food, or wash clothes. While the linkages between suitable, uncrowded, functional housing and indigenous health are well documented (Pholeros, Rainow and Torzillo 1993), such linkages cannot explain poor educational outcomes because long-term health problems have a direct positive effect on school attendance.

Policy makers have long recognised the need to improve indigenous housing in order to improve health, but this research suggests that improvements in housing could positively affect school attendance as well.

Integration of schools and community services

The finding that long-term health problems are associated with increased attendance for both boys and girls is intriguing. We interpret this apparently perverse result to suggest that long-term health concerns both limit extracurricular options for these children and signal dependence of the child and that child's family on community institutions such as the school. We believe this finding suggests an opportunity for policy makers to reconsider the ways in which a range of community services are delivered. A closer link or even integration of the school with other agencies serving children and families (for example, health and social welfare) could provide efficiencies and bring families and children into

the school. In this way, the physical co-location of services and schooling may assist in lowering barriers to attendance while supporting indigenous families.

Language and literacy

Our study revealed that difficulty speaking English is negatively associated with holding school qualifications. This in itself is hardly a surprising finding since formal education generally requires proficiency in English. Obvious though it may be, improving adult language skills could well be an effective approach to improving indigenous education outcomes in terms of qualifications. While there is often attention paid to the significance of early literacy in indigenous communities, there has traditionally been less emphasis on literacy training for adults. One of the most effective means to improve adult language skills is through work or task-based adult education, an approach flagged in the Ministerial Council for Employment, Education Training and Youth Affairs' National Strategy for the Education of Aboriginal and Torres Strait Islander Peoples (Ministerial Council for Employment, Education Training and Youth Affairs 1996). The full implementation of strategies to integrate literacy support with vocational education and training is supported by our research.

Social alienation and the importance of local social environment

The ethereal nature of a sense of belonging makes it difficult to pin down. However, the indigenous population is unlikely to feel part of the Australian community while the government fails to acknowledge responsibility and rectify through apology the personal and cultural disruption suffered by the 'stolen generation' or continuing attempts to legislate to unilaterally extinguish property rights recently recognised by the High Court of Australia.[13]

The emphasis of the role of social alienation in maintaining the relative disadvantage of indigenous people may seem vague and abstract. But, the fact that social factors such as arrest and household composition are statistically demonstrated to be more important than access to educational institutions means that the social environment cannot be ignored. It is not simply a matter of building schools and providing books. The paradigm presented by mainstream society plays an important part in whether indigenous people feel the desire to play a full role in Australian society.

While education may be power, there appears to be several psychological prerequisites for people to want to avail themselves of that power. Two psychological hurdles for indigenous people are that they both understand and feel at home with the culture of the mainstream society and feel able to partake in the material benefits of that culture. Overcoming 200 years of distrust of mainstream institutions might not be achieved by simply supplying books and teachers or even reducing the levels of indigenous juvenile arrest. A meaningful process of national reconciliation, with *all* parties committed to the process,

would have profound implications for Australian society over and beyond the goodwill it directly generates.

Notes

1. Francis Bacon quoted in Fraser (1983: 15).
2. Hunter (1998b) shows, using Analysis of Variance (ANOVA) techniques, that qualification rate increases significantly for the indigenous but not the non-indigenous population.
3. Theft constitutes only a small fraction of indigenous crime (Hunter and Borland 1997).
4. Classic delinquency theories suggest that school failure causes crime rather than vice versa (Farrington et al. 1986). According to such theories, teenagers whose parents were less likely to have taught them middle-class manners, avoidance of aggression and postponement of immediate gratification are more likely to fail school and are consequently driven to illegitimate means to achieve wealth and success. Another aspect of this line of reasoning, is that securing employment after leaving school would be associated with less offending. This line of reasoning does not appear to be valid for indigenous youths whose offences are dominated by substance abuse and drinking-related rather than economic crime. For example, theft is only a minor fraction of indigenous arrests (Hunter 1998a). Since the direction of causality is not easily discerned, caution should be exercised in interpreting the strong negative correlations between arrest and educational attainment. Hunter (1998a), using a similar model to that used by Borland and Hunter (1997) to examine arrest and employment, tentatively concludes that the evidence, for the indigenous population at least, indicates that joint endogeneity between arrest and education is not important. More precisely, the unobservable characteristics of those arrested does not appear to be driving the correlation between arrest and attendance at school. Unfortunately, while is difficult to draw strong conclusions using cross-sectional data, the evidence seems to point to arrest affecting schooling rather than vice versa.
5. Notwithstanding the apparent insignificance of some explanatory variables in Appendix Tables A5 and A6, the joint significance of variable groups for age, regional, family, socioeconomic and household factors, means that the individually insignificant variables should not be excluded from our analysis. The joint significance is measured by the Wald test of the restriction that all variables in the variable group equals zero.
6. Marginal effects are calculated as:

$$\Theta(x_1 b) - \Theta(x_0 b) \qquad (A)$$

where b is the vector of coefficient estimates from the probit regression for educational outcomes, Θ is the cumulative normal distribution function, x_0 is a vector of characteristics with the arrest record variable equal to zero, and x_1 is a vector of characteristics which differs from x_0 only in that the arrest record variable equals one.

7. The diseases specifically cited in NATSIS documentation are: infectious and parasitic diseases; neoplasms; endocrine, nutritional, metabolic diseases; diseases of the blood; mental disorders; diseases of the nervous system and senses; diseases of the circulatory system; diseases of the respiratory system; diseases of the digestive system; diseases of the genitourinary system; complications of pregnancy and childbirth; diseases of the skin and subcutaneous tissue; diseases of the musculoskeletal system; congenital anomalies; and injury and poisoning (ABS 1996).

8. The only Torres Strait Islander population for which there is accurate data from the NATSIS was in Queensland (ABS/CAEPR 1997).

9. A similar criticism could be made of the Probit analysis of young adults. However, given that the decision to acquire a post-school qualification for 18 to 24 year olds must have been made in the very recent past, it strains the credibility less to claim that current circumstances are the same as those experienced when the educational decision was being made.

10. See Harding et al.'s (1995: 6-10) discussion of police discrimination against indigenous people and the theory of 'labelling'.

11. Similarly, the majority of employment differential between indigenous and non-indigenous Australians is explained solely by differences in educational attainment (Hunter 1997).

12. This assumes, of course, that indigenous labour is not easily substituted for non-indigenous labour. The rise of indigenous-specific bureaucracies and indigenous tourist enterprises, such as the Tjapukai dance theatre company in Cairns, are two examples of non-substitutability of the two types of labour.

13. The findings of the Commonwealth inquiry into the 'stolen generation' appears in *Bringing Them Home: National Inquiry into the Separation of Aboriginal and Torres Strait Islander Children from their Families* (Commonwealth of Australia 1997).

    In 1992 and 1996 the High Court of Australia made seminal judgments which recognised the limited set of property rights for traditional indigenous Australians who can exhibit ongoing connection with either vacant Crown land and pastoral leases. The present federal Government has proposed controversial legislation which seeks to create certainty by extinguishing this 'native title'. The legislation makes some provision for compensation, but is not generally supported by the indigenous leadership.

Appendix A. Probit analysis of educational attainment among indigenous Australians, 1994

Table A1. Variable definitions for regressions in alphabetical order

Dependent Variables	
ARRESTED=	Whether an individual has been arrested in the previous 5 years
STILLSCH=	Whether an individual is still at secondary school
POSTSCH=	Whether an individual has a post-secondary qualification
Explanatory Variables	
AGED XX=	Various age groups
ARRE17OH	Other householders under 18 have been arrested
ARRESTOH	Other householders aged 18 and over have been arrested
CAPCITY =	Lives in a capital city
DIFINENG =	Has difficulty in speaking English (only used for qualification equations)
HEALTH =	Have a long-term health condition
HOUSQUAL	All major household utilities (electricity, gas, water, sewerage) worked
HUNTGATH =	Spent time in last week in hunting and gathering activity
INDIGLAN =	Speaks indigenous language
MARRIED =	Whether married
MIXEDFAM =	Lives in family with non-indigenous persons
NEARABLE	Within 50 km of Aboriginal Legal Aid (used to identify arrest equation)
NOKIDS =	No children aged 0-12 years
OTHURBAN =	Lives in non-capital city urban area
POSTSCOH	Other householders aged 18 and over are qualified
REMOTE =	Lives in a rural remote area (more than 100 kilometres from a TAFE institution)
ROOMPPER	Number of bedrooms per person
RURAL =	Lives in rural non-remote area (less than 100 kilometres from a TAFE institution)
SOLEPAR =	Sole parent
STIL17OH	Other householders under 18 are at school
TAKEN =	Taken from natural family (used to identify arrest equation)
TSI =	Whether a Torres Strait Islander
TWOTHKID =	2-3 children aged 0-12 years
VOTED =	Voted in one of most recent Federal, State, ATSIC, or local Land Council elections

Table A2. Descriptive statistics for regression models, indigenous Australians aged 13 to 17 years, 1994

	Males		Females	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Arrested in last 5 years	0.115	0.320	0.032	0.177
Generalised residual	0.000	0.581	0.000	0.390
Torres Strait Islander	0.070	0.255	0.065	0.246
Other urban area	0.439	0.497	0.492	0.500
Rural area	0.222	0.416	0.183	0.387
Remote area	0.192	0.394	0.181	0.385
Married	0.274	0.446	0.291	0.454
No children under 12	0.373	0.484	0.372	0.484
Sole parent	0.130	0.336	0.162	0.369
Mixed family	0.247	0.432	0.231	0.421
Hunter gatherer	0.057	0.231	0.031	0.174
Indigenous language	0.173	0.379	0.198	0.399
Difficulty in English	0.238	0.426	0.225	0.418
Long-term health problem	0.201	0.401	0.260	0.439
Taken from natural family	0.023	0.149	0.029	0.168
Within 50 km of Aboriginal Legal Aid	0.551	0.498	0.567	0.496
Number of bedrooms per person	0.590	0.333	0.584	0.329
Household utilities worked	0.935	0.247	0.956	0.205
Householders under 18 arrested	0.368	0.483	0.294	0.456
Householders over 18 arrested	0.118	0.322	0.126	0.332
Householders under 18 at school	0.477	0.500	0.419	0.494
Householders over 18 qualified	0.092	0.289	0.105	0.307
Post-school qualification	0.008	0.090	0.003	0.059
Still at school	0.619	0.486	0.694	0.461
Number of observations	970		863	

Source: NATSIS unit record file.

Table A3. Descriptive statistics for regression models, indigenous Australians aged 18 to 24 years, 1994

	Males		Females	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Arrested in last 5 years	0.371	0.483	0.138	0.345
Generalised residual	0.000	0.750	0.000	0.611
Aged 18 to 19	0.272	0.445	0.265	0.442
Torres Strait Islander	0.060	0.237	0.074	0.263
Other urban area	0.432	0.496	0.468	0.499
Rural area	0.171	0.376	0.162	0.369
Remote area	0.269	0.444	0.262	0.440
Married	0.301	0.459	0.372	0.483
No children under 12	0.489	0.500	0.342	0.475
Sole parent	0.027	0.163	0.214	0.410
Mixed family	0.198	0.399	0.132	0.339
Hunter-gatherer	0.128	0.334	0.091	0.288
Indigenous language	0.232	0.422	0.269	0.444
Difficulty in English	0.278	0.448	0.201	0.401
Long-term health problem	0.173	0.378	0.268	0.443
Taken from natural family	0.038	0.192	0.047	0.213
Within 50 km of Aboriginal Legal Aid	0.497	0.500	0.496	0.500
Number of bedrooms per person	0.641	0.438	0.642	0.424
Household utilities worked	0.914	0.280	0.926	0.261
Householders under 18 arrested	0.037	0.190	0.030	0.170
Householders over 18 arrested	0.263	0.441	0.209	0.407
Householders under 18 at school	0.051	0.220	0.034	0.182
Householders over 18 qualified	0.182	0.386	0.132	0.339
Post-school qualification	0.120	0.325	0.114	0.317
Still at school	0.000	0.000	0.000	0.000
Number of observations	885		1074	

Source: NATSIS unit record file.

Table A4. Descriptive statistics for regression models, indigenous Australians aged 25 and over, 1994

	Males		Females	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Arrested in last 5 years	0.269	0.444	0.092	0.288
Generalised residual	0.000	0.702	0.000	0.539
Aged 25 to 29	0.216	0.412	0.215	0.411
Aged 30 to 34	0.187	0.390	0.195	0.397
Aged 35 to 39	0.150	0.357	0.153	0.360
Aged 40 to 44	0.115	0.319	0.116	0.320
Aged 45 to 49	0.096	0.295	0.086	0.280
Aged 50 to 54	0.082	0.275	0.075	0.264
Aged 55 to 59	0.050	0.218	0.052	0.223
Aged 60 to 64	0.037	0.189	0.043	0.203
Aged 65 plus	0.066	0.249	0.064	0.245
Torres Strait Islander	0.080	0.272	0.071	0.257
Other urban area	0.463	0.499	0.481	0.500
Rural area	0.182	0.386	0.163	0.370
Remote area	0.254	0.435	0.226	0.418
Married	0.647	0.478	0.571	0.495
No children under 12	0.454	0.498	0.389	0.488
Sole parent	0.027	0.162	0.187	0.390
Mixed family	0.156	0.363	0.178	0.382
Hunter gatherer	0.162	0.369	0.099	0.299
Indigenous language	0.325	0.468	0.301	0.459
Difficulty in English	0.217	0.413	0.211	0.408
Long-term health problem	0.375	0.484	0.444	0.497
Number of bedrooms per person	0.729	0.535	0.723	0.484
Household utilities worked	0.920	0.271	0.928	0.259
Householders under 18 arrested	0.067	0.250	0.085	0.278
Householders over 18 arrested	0.171	0.376	0.167	0.373
Householders under 18 at school	0.087	0.282	0.107	0.309
Householders over 18 qualified	0.103	0.304	0.089	0.285
Degree or diploma	0.019	0.136	0.042	0.201
Other post-school qualification	0.132	0.339	0.111	0.314
Still at school	0.000	0.000	0.000	0.000
Number of observations	2962		3453	

Source: NATSIS unit record file.

Table A5. Determinants of educational outcomes for indigenous males—probit estimates, 1994

Age Group	13 to 17 year old	18 to 24 year old	25 years and over	25 years and over
Dependent Variable:	(1)Still at School	(2)Any Post-School qualifications	(3) Diploma or Degree	(4)Other Post-School qualifications
ARRESTED	-0.657*	-0.085	0.064	-0.200
	(0.143)	(0.128)	(0.072)	(0.131)
TSI	0.106	0.050	-0.045	0.210
	(0.177)	(0.264)	(0.128)	(0.187)
OTHURBAN	0.207	-0.126	-0.314*	-0.224
	(0.130)	(0.163)	(0.095)	(0.157)
RURAL	0.129	-0.370	-0.365*	-0.294
	(0.158)	(0.213)	(0.117)	(0.204)
REMOTE	-0.320*	-0.682*	-0.409*	-0.246
	(0.167)	(0.236)	(0.122)	(0.188)
MARRIED	0.704*	0.173	0.118	0.166
	(0.111)	(0.135)	(0.081)	(0.159)
NOKIDS	-0.023	0.248*	-0.117	-0.079
	(0.095)	(0.130)	(0.076)	(0.124)
SOLEPAR	0.772*	0.094	0.110	-0.120
	(0.144)	(0.365)	(0.193)	(0.394)
MIXEDF	0.088	0.093	0.298*	0.164
	(0.110)	(0.144)	(0.081)	(0.148)
HUNTGATH	-0.314	0.173	0.203*	-0.085
	(0.211)	(0.199)	(0.090)	(0.168)
INDIGLAN	0.495*	0.257	-0.190*	0.324*
	(0.137)	(0.192)	(0.088)	(0.137)
DIFINENG		-0.675*	-0.580*	-0.533*
		(0.168)	(0.099)	(0.227)
HEALTH	0.388*	0.078	0.026	0.360*
	(0.117)	(0.154)	(0.068)	(0.117)
ROOMPPER	0.206	0.262*	0.115*	0.260*
	(0.150)	(0.129)	(0.065)	(0.100)
HOUSQUAL	0.580*	0.392	0.054	-0.147
	(0.191)	(0.306)	(0.133)	(0.229)

Table A5 (continued over)

Table A5. (continued)

ARRE17OH	-0.298*	0.026	-0.154	-0.383
	(0.154)	(0.559)	(0.219)	(0.338)
ARRESTOH	-0.298*	-0.033	-0.102	-0.184
	(0.155)	(0.149)	(0.096)	(0.195)
STIL17OH	0.254	-0.170	0.332*	0.373
	(0.158)	(0.485)	(0.193)	(0.275)
POSTSCOH	0.196	0.505*	0.425*	0.074
	(0.167)	(0.146)	(0.099)	(0.210)
CONSTANT	-0.754	-1.637*	-0.873*	-2.322*
	(0.252)	(0.379)	(0.190)	(0.360)
Log Likelihood	-555	-281	-1037	-249
Pseudo R-squared	0.140	0.133	0.105	0.102
Number of observations	970	885	2,962	2,962

Notes: A full set of age dummies are included in each regression. CAPCITY is the omitted dummy variable for the geographic variables; the coefficients for the age dummies are not reported to save space; standard errors are in parentheses; to counter the possibility that heteroscedasticity is effecting the results a robust estimator (White 1980) of the covariance matrix is used; * denotes significant at the 10 per cent level.

Table A6. Determinants of educational outcomes for indigenous females—probit estimates

Age Group	13 to 17 year old	18 to 24 year old	25 years and over	25 years and over
Dependent Variable:	(1)Still at School	(2)Any Post-School qualifications	(3) Diploma or Degree	(4)Other Post-School qualifications
ARRESTED	-0.468*	0.166	-0.059	-0.251
	(0.252)	(0.159)	(0.103)	(0.158)
TSI	0.021	0.305	0.134	0.105
	(0.196)	(0.188)	(0.118)	(0.155)
OTHURBAN	-0.140	0.115	-0.072	-0.427*
	(0.146)	(0.170)	(0.087)	(0.107)
RURAL	-0.354	-0.183	-0.150	-0.519*
	(0.177)	(0.213)	(0.111)	(0.139)
REMOTE	-0.738*	-0.248	-0.278*	-0.635*
	(0.184)	(0.232)	(0.121)	(0.168)
MARRIED	0.751*	-0.125	-0.074	-0.046
	(0.124)	(0.131)	(0.088)	(0.120)
NOKIDS	0.017	0.264*	-0.045	0.025
	(0.108)	(0.132)	(0.078)	(0.104)
SOLEPAR	0.575*	0.028	-0.051	-0.070
	(0.140)	(0.159)	(0.105)	(0.144)
MIXEDF	0.212*	0.260*	0.180*	0.150
	(0.122)	(0.147)	(0.080)	(0.106)
HUNTGATH	-0.885*	0.123	0.014	0.418*
	(0.281)	(0.233)	(0.112)	(0.138)
INDIGLAN	0.489*	-0.152	-0.244*	-0.117
	(0.142)	(0.160)	(0.087)	(0.120)
DIFINENG		-0.522*	-0.362*	-0.961*
		(0.175)	(0.091)	(0.206)
HEALTH	0.291*	0.107	0.101	-0.034
	(0.114)	(0.120)	(0.062)	(0.087)
ROOMPPER	-0.088	0.336*	0.091	0.198*
	(0.172)	(0.122)	(0.071)	(0.080)
HOUSQUAL	0.371*	-0.150	-0.062	-0.091
	(0.226)	(0.238)	(0.131)	(0.184)

Table A6 (continued over)

Table A6. (continued)

ARRE17OH	-0.391*	-0.200	-0.135	-0.027
	(0.172)	(0.365)	(0.188)	(0.261)
ARRESTOH	-0.116	-0.223	-0.076	-0.236*
	(0.155)	(0.155)	(0.093)	(0.141)
STIL17OH	0.461*	NA	0.241	-0.099
	(0.169)		(0.170)	(0.234)
POSTSCOH	0.183	0.446*	0.294*	0.169
	(0.169)	(0.152)	(0.104)	(0.147)
CONSTANT	-0.049	-1.360*	-0.899*	-1.419*
	(0.292)	(0.334)	(0.191)	(0.250)
Log Likelihood	-473	-339	-1108	-544
Pseudo R-squared	0.110	0.109	0.077	0.100
Number of observations	863	1,074	3,453	3,453

Notes: A full set of age dummies are included in each regression. CAPCITY is the omitted dummy variable for the geographic variables; the coefficients for the age dummies are not reported to save space; standard errors are in parentheses; to counter the possibility that heteroscedasticity is effecting the results a robust estimator (White 1980) of the covariance matrix is used; * denotes significant at the 10 per cent level.

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