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The Forgotten Second Quartile: Parental Income and Youth Post-Secondary Education Enrolment in Australia

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The Forgotten Second Quartile: Parental Income and Youth Post-secondary Education Enrolment in Australia*

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Abstract

The relationship between parental income and the post-secondary education enrolment of youth aged 18-19 in Australia is investigated. Firstly, Census data from 1991 to 2006 are employed using the sample of youth still residing with parents. HILDA data are then used to analyze all youth over the 2004-2008 period, irrespective of living arrangements. The estimates highlight a strongly convex relationship for university enrolment, with enrolment rates essentially the same for the lowest two parental income quartiles, rising moderately for the third quartile then steeply for the top income quartile. This pattern is also observed if either parental occupation or postcode-based SES measures are employed rather than parental income. For other post-secondary enrolment, the relationship is an inverted U-shape. Parental education levels may have a large role in understanding these relationships.

Keywords: University enrolment, parental income, equity.

JEL codes: I21, I28

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I. Introduction

There is considerable policy focus in Australia on raising the proportion of students from low socio-economic status (SES) backgrounds enrolling in higher education. Universities are currently being offered financial incentives to increase the proportion of students from the lowest quartile of the SES distribution to 20 per cent by 2020, with payments for each low SES student enrolled. There is considerable evidence that higher levels of education are strongly related to labour market success, in Australia as in many other countries. The concern is that individuals from low SES backgrounds do not have the same opportunities as those from other backgrounds to obtain higher education levels and thus to achieve the same labour market success.

The main objective of this study is to ascertain whether university and other post-secondary education enrolment among 18-19 year-old youth have become more or less equitable over the past two decades. Over this period household income inequality and the costs of university attendance have both increased. At the same time, access to financial aid has changed, while the overall proportion of youth enrolling at university has increased considerably. The expansion of the university sector has in part been financed by increased student contributions via the Higher Education Contribution Scheme (HECS). The investigation involves the construction of direct measures of the relationship between parental income levels and enrolment, rather than using the indirect postcode-based measures currently being reported by universities. Jones (2001) has shown, while Western et al (1998) have argued, that such postcode-based measures are not an accurate method for measuring individual parental SES, or for identifying disadvantaged youth.

The main data sets employed in the investigation are the Australian Censuses for the years of 1991, 1996, 2001 and 2006.[1] The advantages of using Census data in the Australian context is the regularity of the surveys, and that they cover a relatively long period of time. The main drawback of the Census data is that parental income and other parental background measures are only available for youth who still live with their parents. Approximately two thirds of youth aged 18-19 reside with parents in the Census data, and this proportion has remained quite stable over the 1991 to 2006 period.[2]

There is precedence for using information only on youth still residing with parents to study changes in the relationship between parental income and youth education outcomes in the US and Canadian literature. Examples in the US include very influential studies by Hauser (1993) and Kane (1994), and a more recent study by Black and Sufi (2002). Examples in Canada include Christofides, Cirello and Hoy (2001) and Neill (2009). As with this study, the benefit of using data in this way is the ability to analyze trends over time, which is not generally possible in more specialized data sets that include direct measures of parental income and the education enrolment of youth.

[1] This study expands on Tay (2007), who constructed similar measures using data from the 1991, 1996 and 2001 Censuses. Measures for 1986 could not be constructed, as individual age was not provided for youth in the public use CURF file. Measures for 1981 could also not be constructed, as education attendance by type of institution information (i.e. university, TAFE or high school) was not provided.

[2] This finding is consistent with Weston et al (2001), who found that the proportion of Australian youth aged 15 to 19 living with parents has remained stable over the period 1990 to 2000, using data from the Labour Force Survey.

To ascertain whether there are any large biases in the results from using Census data on only those youth still living with their parents, data from the Household Income and Labour Dynamics in Australia (HILDA) is also investigated. The useful feature of this data is that it is possible to link parental information on income and other relevant characteristics to the vast majority of youth, irrespective of whether they continue to live with their parents at age 18 and 19. The drawbacks of this data are the small sample sizes available, and that only the period 2004 to 2008 can be analyzed.

The HILDA data are also used to investigate the relationship between post-secondary education enrolment and other commonly used measures of parental SES in the Australian literature: parental occupation level and home postcode SES. It is also possible to confirm the finding of Jones (2001) that postcode-based SES is an inaccurate proxy for individual parental SES.

The main findings of the analysis are as follows. There is a strongly convex relationship between parental SES and university enrolment, with enrolment rates essentially the same for the lowest two quartiles, rising moderately for the third quartile then steeply for the top quartile. This relationship has remained essentially unchanged from 1991 to 2006. For other post-secondary enrolment (Vocational Education and Training – VET), the relationship is an inverted U-shape. Enrolment rates in these certificate and diploma level qualifications are highest among youth from the middle two SES quartiles, and falling at either end of the SES distribution. These relationships hold in all three potential measures of parental SES: parental income, parental occupation level and postcode-based measures. As in many previous studies, parental education levels are very strongly related to the probability of university enrolment, and differences across parental SES quartiles may explain the observed SES – university enrolment relationship.

The outline of the paper is as follows. The related Australian literature is discussed in Section II. A discussion of an underlying economic model of the decision of youth to attend post-secondary education is provided in Section III. Background information on the Australian post-secondary education system is provided in Section IV. Measures of the relationship between parental income and the post-secondary enrolment of 18-19 year-old youth over the 1991 to 2006 period using Census data are provided in Section V. Measures using the HILDA data are provided in Section VI, along with analyses of alternative measures of parental SES. Section VII concludes.

II. The Australian Literature

There have been a large number of studies of the relationship between parental background and post-secondary education enrolment in Australia. This empirical literature can be broken into two main groups. Studies in the first group have attempted to investigate the relationship between parental SES and university enrolment using a postcode-based measure of SES, while studies in the second group have employed individual-based measures. Individual level information on parental SES was not collected from university enrollees, so the missing information has been proxied using a measure of the average SES (based on occupation levels and education levels) of individuals living in the same postcode area that the student reports to the university as their permanent address. A particular postcode-based measure is currently how universities report their success in terms of equity of enrolment based on SES to the government and the community at large. The focus is on the proportion of university enrollees

that have their permanent home address in an area determined to be in the lowest 25 per cent of local areas according to the socio-economic status of residents.

Studies in this first group that have used this postcode based measure in their analyses include Department of Education, Science and Training (2003). It is shown that the proportion of university students from the lowest SES quartile has remained steady at around 15 per cent over the period from 1991 to 2000. This rate is less than half the enrolment rate of youth from the highest quartile. Data from the Department of Education, Employment and Workplace Relations website show that this proportion has remained stable over the 2003 to 2008 period. Andrews (1999) investigated the effect of the introduction of the three HECS bands in 1997 on enrolment by band. No evidence was found that enrolment among low SES students fell in the highest HECS band (law and medicine) upon introduction. The rate of enrolment in these fields had always been much lower among low SES students. Aungles et al (2002) undertake a similar analysis to Andrews (1999), but using data over a slightly longer period and a slightly different functional form for the estimating equation. They found that the overall proportion of university commencements among low SES students (based on postcode) did not fall over the 1991 to 2001 period, but it did fall marginally among the highest HECS band courses (from 14% to 12%).

The second main group of the empirical literature employed individual based measures of parental SES. Studies in this group have largely employed the series of Youth in Transition Surveys (YITS) and the Longitudinal Surveys of Australian Youth (LSAY). The measures of parental background studied include parental education level, parental SES based on occupation, and a specific measure of household "wealth". Parental occupation is sometimes transformed into an occupational "prestige" measure prior to analysis (See Jones and McMillan, 2001). Wealth has been measured using answers to questions regarding the types of objects in the family home when the youth was aged 15, such as telephones, dishwashers, number of bedrooms and bathrooms. No direct measure of parental income is available in these surveys. In addition, the parental occupation and education information is collected from the youth, not directly from parents, so may suffer from reporting error.

Long et al (1999) conduct a detailed investigation of data from the four YITS data sets, covering youth aged 19 in 1980, 1984, 1989 and 1994. They investigate both Year 12 completion and post-secondary enrolment (higher education versus TAFE, apprenticeships and traineeships). The authors document the relationship between parental education, parental occupation level (6 broad categories) and "wealth" (bedrooms, bathrooms, telephones and dishwashers) and higher education enrolment. They find that the relationships between university enrolment and the various parental background measures are strong, but they have not become particularly stronger over the period.

Marks and McMillan (2003) investigate changes over time in the relationship between family SES and youth education outcomes in Australia using the four YITS and two LSAY data sets (aged 19 in 1999 and 2002, i.e. the 1995 and 1998 cohorts of 15 year olds). Socio-economic status is measured using father's occupation, and if missing, mother's occupation. The authors extend the measurement of SES by adding information on parental education, on "wealth" (based on items in the home), and on cultural capital (frequency of going to the library, museums, art galleries, concerts, live theatre, listening to classical music, and reading books). They find that there has been a reduction over time in the influence of parental SES and "ability" (measured by literacy and numeracy scores on tests taken at age 15) on both Year 12 completion and on rates of university entrance immediately after high school.

Other studies that employed a measure of household "wealth" to identify disadvantaged youth in the LSAY and YIT data include Chapman (1997) and Chapman and Ryan (2002, 2005). Chapman (1997) provides some statistics from two Youth in Transition surveys on enrolment by wealth quartile (measured by items in the home). The two surveys cover cohorts entering university in 1988 and 1993 i.e. before and after the introduction of HECS. The author finds that university enrolment rates grew for all quartiles, though perhaps slightly slower for the lowest quartile. He concludes that HECS has not materially affected access by disadvantaged groups. Chapman and Ryan (2002) report that enrolment rates grew for the middle two and highest wealth quartiles from 1988 to 1993, but not for the lowest quartile. Enrolment rates grew for all quartiles from 1993 to 1998. The results are considered in more detail in Chapman and Ryan (2005).

Cardak and Ryan (2006, 2009) use data on youth from two LSAY cohorts (the 1995 and 1998 cohorts of 15 year olds) to investigate the transition process from age 15 literacy and numeracy scores to the probability of university entry. They break down this process into a number of stages: the probability of gaining an Equivalent National Tertiary Entry Rank (ENTER)[3] score at the end of year 12, the level of ENTER score obtained, and whether or not the individual enrolls at university. They find that conditional upon a youth's ENTER score, there is no effect of parental SES (based on occupation) on the probability of university entry. Given this finding, the authors conclude that credit constraints cannot explain university enrolment differences by SES in Australia.[4] Occupation-based SES does influence the other three stages of the process i.e. on the literacy and numeracy scores obtained at age 15, the probability of obtaining an ENTER score, and on the level of ENTER score obtained.

Le and Miller (2005) study the effect of parental background, literacy and numeracy scores, school characteristics and neighbourhood characteristics on Year 12 completion and university entry using the LSAY 1995 cohort. Parental background is measured by father's occupation level, and by the highest education level of either parent. Father's occupation level and parental education level were found to have significant effects on university enrolment, even after controlling for literacy and numeracy test scores at age 15. These test scores also had a strong effect on enrolment. The central part of the analysis was investigating at what education stage the effect of parental SES was important. It had a small effect on whether individuals remained in school beyond Year 10, but conditional on completing Year 12, there was still a significant SES effect on university enrolment. This result contrasted with the Miller and Volker (1989) study of earlier cohorts of Australian youth.

One main focus of the literature on the relationship between parental background and university enrolment has been to attempt to discern the effect of the introduction of HECS on the SES mix of university students. The general conclusion drawn from those studies employing the postcode based measures is that the SES mix of students enrolling at university has not changed much at all over the period from 1991 to 2008. The studies reporting results using various individual based measures of parental background (education, occupation SES

[3] The ENTER terminology used by Cardak and Ryan (2006, 2009) was only used regularly in Victoria for this university entrance rank. It was referred to as a Universities Admission Index (UAI) in New South Wales and the Australian Capital Territory, and to simply the Tertiary Entrance Rank (TER) in South Australia, Western Australia, Tasmania and the Northern Territory. Queensland uses a separate ranking system and scale termed the Overall Position (OP). All states except Queensland have gradually introduced the Australian Tertiary Admission Rank (ATAR) over 2009 and 2010.

[4] There remains an effect of parental education on this last stage in the process, however, suggesting that parental background does have an influence on it.

or household "wealth") have reached a variety of conclusions, as discussed above, depending on the measure of SES employed and the functional form of the estimated relationships.[5]

A small number of studies have attempted to investigate the relationship between direct measures of parental or family income and youth education outcomes in Australia. Birrell et al (2000) investigated the effect of family income[6] and parental occupation on university and TAFE enrolment using Census data for 1996. The study employed information only on the 65 per cent of youth still residing with their parents at that age. The authors found that within broad parental occupation groups, family income also affected university enrolment of 18-19 year-old youth significantly, except among the blue-collar occupation groups (trades and labourers). The Office of the Vice-Chancellor, University of Melbourne (2008) found similar results using the 2006 Census. Tay (2007) investigated the effect of parental income and education on the university enrolment of 18 and 19 year-old youth using Census data for 1991, 1996 and 2001, again only for youth still residing with parents. The author found that parental income still had a significant effect on university enrolment even after controlling for parental education, which had a stronger effect than income. Todhunter (2009) employed HILDA data to investigate the effect of permanent equivalised household disposable income on the probability of 17 to 19 year-old youth completing a minimum level of schooling i.e. finishing Year 12 or completing a certificate. She found that parental education was more important than her permanent income measure. She also found that neighbourhood SES had a significant relationship with completion, and accounted for some of the initial household income effect.[7]

This study extends the work of Birrell et al (2000), Office of the Vice-Chancellor, University of Melbourne (2008), Tay (2007) and Todhunter (2009) in several dimensions. The Tay (2007) analysis is updated by also investigating data from the 2006 Census, and looking at enrolment in TAFE and other VET institutions in addition to enrolment at university. This analysis compares the results from employing Census data to those when employing HILDA data, which allows youth that have moved out of the parental home to also be included in the estimates. Using HILDA data also allows the investigation of how the results based on parental income compare to results based on alternative measures of family background, such as: the SES of the postcode where the family lives and measures of parental SES based on direct measures of parental occupation. This study also can confirm the finding of Jones (2001) who highlighted how poorly postcode-based measures of SES compare to direct measures of parental education and occupation.

III. The Underlying Economic Model

When attempting to interpret the estimates to follow, it is useful to have in mind what these estimates may represent using a standard economic model of the decision to attend post-

[5] In related studies, Robertson et al (1990) investigated the initial impact of HECS on the composition of students in higher education in Victoria and Western Australia. The study employed surveys of potential and actual students that specifically asked questions about the impact of HECS on their education decisions. James et al (2002) report on the results of a survey of Year 10 students on their aspirations and expectations for university study. Direct measures of parental education and occupation plus post-code of permanent home address were employed to identify low SES youth.

[6] Whole family income was measured rather than just the income of the parents in the household, so the income of siblings may be included.

[7] In related research using HILDA data, Chapman and Lounkaew (2009) investigated the relationship between receipt of Independent at Home (IAH) Youth Allowance payments and parental income.

secondary education. The predominant model employed in the economics literature begins with a rational individual choosing an optimal level of education in order to maximize expected lifetime utility. Each individual weighs the expected future benefits of completing further education, appropriately discounted, against the more near term costs. If the expected net benefits are positive, the individual will choose to attend.

The expected future benefits of continuing to higher education levels include higher wages from employment, a lower probability of unemployment, higher occupational prestige, and perhaps consumption benefits from having undertaken further education (for example, learning about art and thus being able to appreciate art better). Private benefits may also include improved health. The formation of expectations regarding the benefits of further education may depend on parents, peers and other role models in the neighbourhood. The expected labour market benefits of further education will also depend on expected labour force participation choices, particularly for females considering having children.

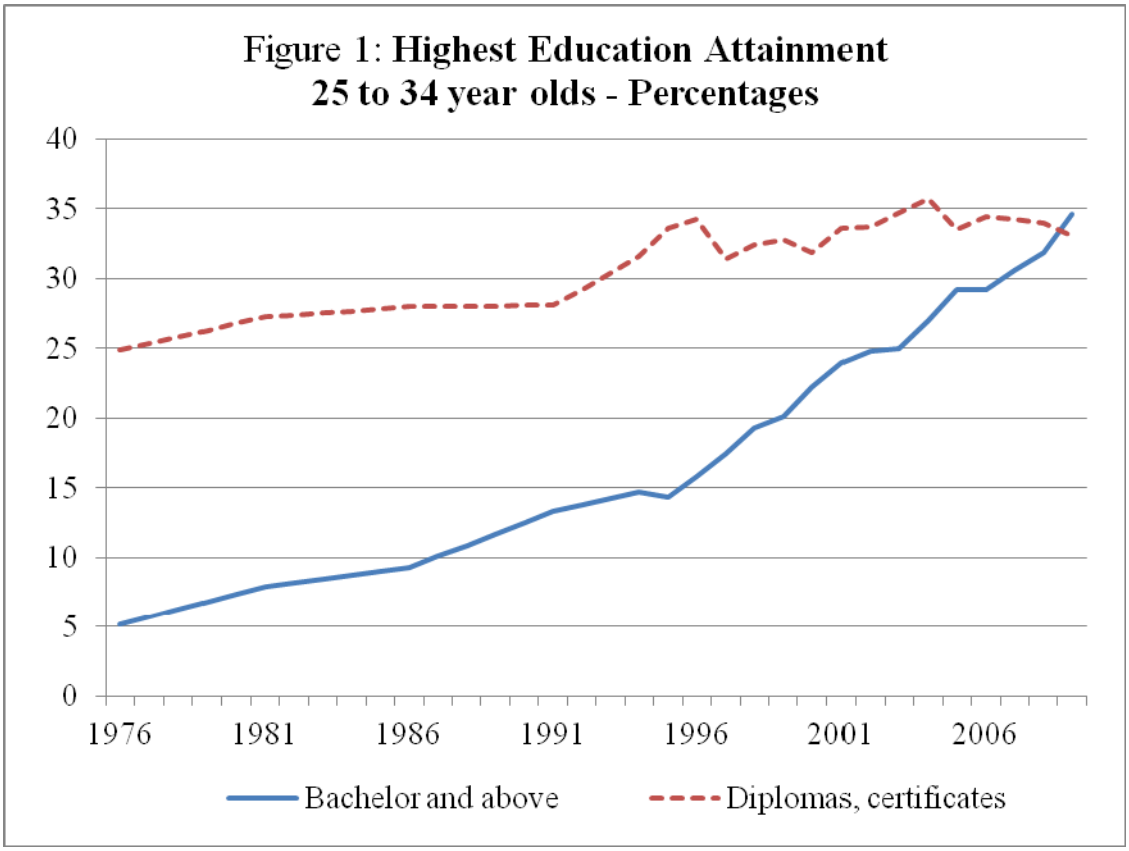
The costs of further education include direct attendance costs such as tuition fees, books, and potentially the costs of moving to attend higher education institutions, particularly for those in rural and remote areas. The costs also include the opportunity cost of time, which is generally equated to wages foregone as the individual could work instead of attending further education. The net costs of education are constructed by subtracting from total costs any transfers from governments (via scholarships or bursaries) and transfers from other family members. Transfers from family members, usually parents, will depend on parental resources (income and wealth) and parental preferences for the education of their children. Such preferences may depend on many factors, including the parents' own education background. The full costs of further education will include potential direct utility costs (or consumption benefits), where some individuals may find it more difficult to succeed at higher education levels than others. These direct utility costs will in turn depend on innate ability and prior school preparation.

The estimates below are constructed based on observed enrolment at university and other post-secondary institutions such as TAFE. Such enrolment is based on both the decision to attend, as described above, and on being accepted by an education institution. Acceptance at university is based on observable achievement while in high school, currently measured by a student's Australian Tertiary Admission Rank (ATAR) score in most states in Australia[8]. Not all individuals who apply to attend university are offered a place. The overall number of places provided by universities has predominantly been determined by the federal government's allocation of Commonwealth Supported Places (CSPs) among universities and courses. The demand for these places from school leavers depends on the number of people at the normal age of university enrolment (age 18), the proportion that has completed year 12 and the proportion of year 12 completers who wish to proceed to university study. A significant amount of demand in Australia also comes from more mature-age entrants, some perhaps transitioning from other post-secondary education institutions. Acceptance at TAFE institutions is generally regarded as being more open, with the vast majority of youth wanting to attend being accepted.

[8] Queensland still employs a separate ranking system and scale termed the Overall Position (OP).

IV. Higher Education in Australia Background

The post-secondary education attainment of young adults in Australia has grown considerably over the past three decades, particularly at the university level (bachelor degrees and above). Trends in the highest level of education attained for 25 to 34 year-olds in Australia are provided in Figure 1. Note that growth at the vocational education level (certificates and diplomas) has been much more moderate, but this may understate overall attainment at these levels, if a proportion of certificate and diploma holders go on to complete a bachelor degree or higher also.



This increase in bachelor level attainment and above has occurred despite increases in the direct costs of attendance (tuition fees), albeit these fees can be deferred until the individual graduates and earns a particular income under Australia's Higher Education Contribution Scheme (HECS).[9] The scheme was first introduced in 1989, with the HECS charge initially set at a flat rate of $1,800 per year of study for all courses. The scheme followed 16 years of free university education in Australia.[10] This HECS rate rose approximately with inflation until 1997, when a three tier HECS system was introduced. In 1997, HECS charges increased by on average 40 per cent. Courses were allocated to these three tiers based on both course costs and the future expected earning ability of graduates. HECS charges again increased with inflation until 2005, when universities were allowed to charge fees for Commonwealth Supported Places of anywhere between zero and 125 per cent of the previous HECS levels for

[9] HECS charges can be paid by students up front at a discount, or delayed and repaid via the tax system once income surpasses a certain threshold level of income. This threshold has changed over time, and was $41,595 in 2009/2010.

[10] A $250 Higher Education Administration Charge (HEAC) was levied by universities and other higher education institutions on students in 1987. This charge was increased to $263 in 1988.

each tier.[11] Most universities raised their student contributions to the highest level possible in these new ranges almost immediately.

There have also been many changes in access to and the level of student financial support for youth from less-advantaged backgrounds since the 1970s. These means-tested student financial support schemes have had several names over the period. Originally called the Tertiary Education Assistance Scheme (TEAS) in 1973, it was replaced by AUSTUDY in 1987, and then for individuals in their mid-20s or younger, by the Youth Allowance from 1998. Financial support for dependent youth is a function of parental income, with the threshold level of parental income where support is withdrawn having changed over time. The introduction of HECS in 1989 coincided with an increase in the generosity of AUSTUDY payments. The changes to HECS in 1997 coincided with increases in the age at which a youth was considered independent of their parents. Independence essentially means that financial support is not a function of parental income. There have also been reductions over time in the work requirements for being considered financially independent of parents. These changes essentially increased access of youth from more advantaged backgrounds to financial support (see Chapman and Lounkaew, 2009). The overall effect of these changes on trends in university demand for youth with different parental income backgrounds is difficult to establish. See Hastings (2008) for more details of the history of student financial support in Australia.

The period under investigation has also seen a widening of income inequality in Australia. The 75-25 percentile ratio of parental income increased over the period from 1991 to 2006 from 2.62 to 2.98.[12] If income affects enrolment, this widening in the distribution of parental income may also lead to a widening in the gap in university enrolment by parental income group. The period has also witnessed an increase in the education level of parents, which may also affect the education enrolment decisions of youth.

The overall increase in bachelor level education in Australia has occurred as the demand for university educated workers in the labour market has increased. This world-wide increase in demand for high skilled workers is often attributed to changes in technology. Although it appears that the full-time worker earnings gains from obtaining bachelor level education has not increased over the period (Coelli and Wilkins, 2009), obtaining higher levels of education is increasingly linked to the probability of obtaining full-time employment (Gregory, 1995; Lee and Coelli, 2010).

As discussed in Section III above, the proportion of youth enrolling in higher education will be a function of the aggregate demand for and supply of university places. This will be a function of the size of the cohort of youth at normal high school completion age (18). If there are changes in the size of this cohort over time, then there will be changes in the probability that any youth who wants to attend university can obtain a place. It will also be a function of government funding of universities, with increased funding allowing an expansion of places. Student contributions via HECS have been one major source of funding for universities over the past two decades.

Other factors that may affect higher education enrolment over time include changes in preferences, for example, society may look less favorably on apprenticeships and trade

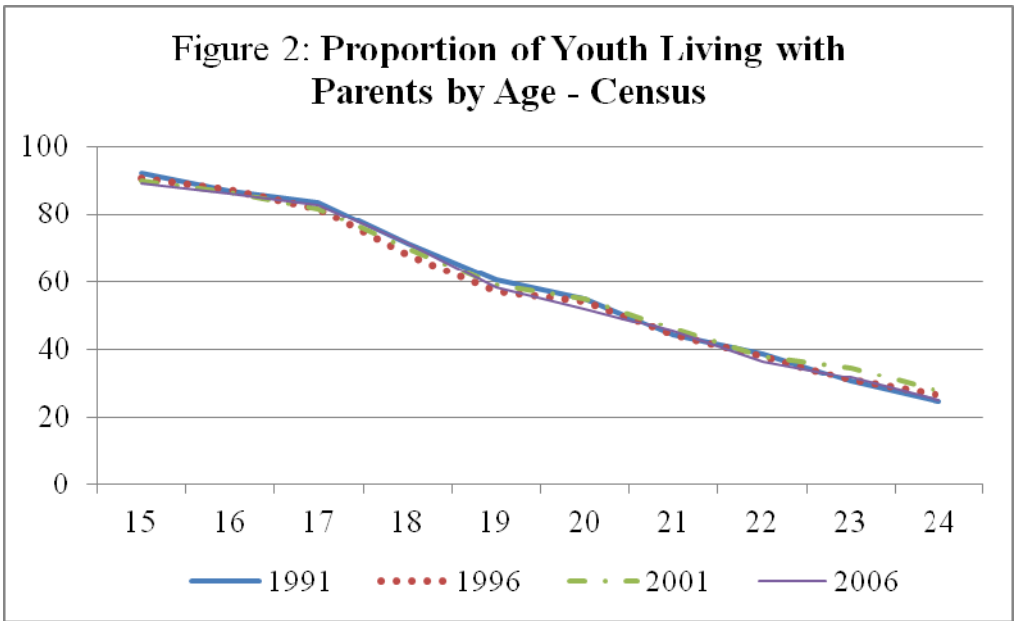
[11] A new lower tier for the national priority areas of nursing and teaching was also introduced at this time.
[12] This measure is based on the combined income of parents with a child aged 15 to 19 living at home, and was constructed by the author using Census CURF Microdata.

qualifications. University enrolment may also be affected by changes in the availability of other education options i.e. TAFE moving in to areas previously the domain of universities, and expansion in private provision of further education (business colleges, IT colleges). Changes in the state of the economy can also affect the decision to attend further education. For example, if unemployment is high, the opportunity cost of studying falls, as employment opportunities for school leavers are reduced. The quality of preparation for further education while in high school may also have changed over time, potentially affecting the SES mix of students attending university. For example, there may have been a relative deterioration (or improvement) in schools in low income areas. Finally, universities have been directly targeting less-advantaged students over the past few years, providing scholarships and basing entry decisions on more than just the achieved tertiary admissions rank for students from all backgrounds.

This description of the background to the Australian Higher Education sector highlights many changes which could potentially have affected the relationship between family background and higher education enrolment.[13] The likely trend over time in the relationship is not readily predictable from this myriad of changes.

V. Census Measures

Two separate data sources (Censuses and HILDA) are employed to document and investigate the relationship between direct measures of parental income and the post-secondary education enrolment of youth aged 18 and 19. Youth of this age have often just completed high school, so this study investigates initial entry to post-secondary education only, and not entry delayed by two years or more (e.g. students taking two "gap" years perhaps in order to obtain independence status and thus be able to receive AUSTUDY payments, mature age entry). This focus on 18 and 19 year-old youth only is predicated on the available data sources, to be discussed below.



[13] A number of these issues were discussed in Long et al (1999).

To begin, Australian Census of Population and Housing public use Confidentialised Unit Record File (CURF) data for the years of 1991, 1996, 2001 and 2006 are employed to document and investigate the relationship between parental income and post-secondary education enrolment over time.[14] The samples of youth investigated are restricted to those that still live with at least one parent, as parental income and other parental background information is only available in the Census data for such youth. The potential effects of this sample selection on the estimates are discussed further below.

The proportion of youth in the Census data that still reside with parents at ages 18 and 19 have remained remarkably stable over the period from 1991 to 2006. Figure 2 shows the proportion of youth living with parents by age separately for the four Census data sets employed. The lines for each Census year lie very closely together, thus implying that the propensity of youth to live with their parents has changed very little over this period. The decision to focus on 18 and 19 year-old youth in the Census data was made as a trade-off between observing youth when they are old enough to attend post-secondary education, and observing a majority of youth in order to minimize any potential sample selection problems. This choice of focusing on 18-19 year-olds is consistent with Birrell et al (2000), Hauser (1993), Kane (1994) and Black and Sufi (2002).

Post-secondary enrolment and living arrangements may be directly related, if certain youth must leave home to attend university, or if youth must remain at home in order to afford to attend further education. Enrolment rates of 18-19 year-old youth by living arrangements are provided in Table 1. University enrolment rates are a little higher among youth who do not live with at least one parent, with statistically different rates in 1991 and 2001. Enrolment rates at TAFE and other post-secondary institutions are higher among those living with parents in 1991, 1996 and 2001, but not in 2006. University enrolment rates overall increased between 1991 and 1996, but have remained steady since then. TAFE and other post-secondary enrolment rates, however, increased between 1996 and 2001. Note that these enrolment rates, and those provided below, are based on reports of whether the youth is currently (on Census night) enrolled at such an institution, or they had already obtained a qualification at that level.[15] Note that if some youth already hold a TAFE level qualification but are now studying at the university level, they are recorded in that latter category only.

Table 2 provides measures of enrolment rates separately by parental income quartile, specifically for youth still residing with parents. Parental income is simply the addition of the individual incomes of the parents (or one parent only in many cases) residing with the youth at the time.[16] Note the strong convex relationship between parental income and university enrolment, with low enrolment rates for youth from both the lowest and second quartiles, rising for the third quartile, then rising steeply for the top quartile. In 2001 and 2006 in

[14] Census data for 1986 could not be employed as individual age information could not be determined specifically for 18 and 19 year old youth in the public use CURF data (ages were grouped to include all those aged 15 to 19). Census data for 1981 could not be employed either as information on the specific level of education attendance (university, CAE, TAFE, high school) of individuals was not provided.

[15] Although there are potentially exceptions to this allocation rule, certificate and diploma holders were included in the TAFE and other post-secondary group, while bachelor holders (extremely rare at these ages) were included in the university group.

[16] Individual income is recorded in categories in the Census, with the number of positive income categories ranging from 10 in 2006 to 14 in the other three Census years analyzed. Mid-points in categories were employed to construct continuous measures for each parent, which were then added to construct an overall parental income measure. This use of midpoints (and associated choice of level used in the highest category) should not affect the estimates to any real extent, given that parental income is grouped into quartiles before analysis.

particular, university enrolment rates are equally as low for the lowest and second quartiles. Note also that the gap between the enrolment rates of the top income group and the other groups has remained essentially unchanged over the period, with equity of enrolment remaining constant. In the middle of the table are figures denoting the percentage of all university enrolments that are youth from the lowest income quartile. This rate appears to have risen over time, mostly due to a relative decline in enrolment among youth in the second quartile. It also appears higher than the 15 per cent rate reported by universities using postcode-based measures of parental socio-economic status (SES).

Table 1: **Post-secondary Enrolment Rates by Living Arrangement - Census**

	1991	1996	2001	2006
		University		
With parents	20.9	27.0	25.3	26.2
	(0.7)	(0.8)	(0.7)	(0.8)
Independent	26.9	28.2	29.3	29.5
	(1.0)	(1.0)	(1.1)	(1.1)
Total	22.9	27.4	26.7	27.4
	(0.6)	(0.6)	(0.6)	(0.6)
		TAFE and other Post-secondary		
With parents	23.8	22.3	26.9	27.0
	(0.7)	(0.7)	(0.8)	(0.8)
Independent	18.0	18.7	26.3	28.8
	(0.9)	(0.9)	(1.0)	(1.1)
Total	21.8	21.7	26.7	27.6
	(0.6)	(0.6)	(0.6)	(0.6)
Observations	5,581	4,987	5,239	5,212

Note: figures in brackets are standard errors on the estimates of enrolment rates.

In the lower panel of Table 2, enrolment rates at TAFE and other post-secondary institutions are provided by parental income quartile. In this case enrolment rates reveal a slight inverted U-shaped pattern, with slightly higher rates in the middle two quartiles than in the lowest and top quartiles. The relationship with parental income, however, is much less pronounced at this level of education than at the university level.

As discussed in Section III above, the post-secondary education enrolment outcome of youth is the result of both the decision to attend, and the probability of acceptance among those that apply. The decision to attend is potentially a function of parental income, if transfers from parents assist youth to fund attendance. This decision is also, however, a function of the expected benefits of further education and non-monetary costs. These may be a function of parental preferences for further education and parental assistance in preparing their children for further education when the children are still in school (or even before school entry). Thus the observed relationship between parental income and post-secondary education enrolment may not be at all causal. Parents with higher education levels themselves may have both higher income and may directly influence their children's education outcomes.

Table 2: **Post-secondary Enrolment Rates by Parental Income Quartile – Census**

	1991	1996	2001	2006
		University		
Lowest 25 %	12.1	19.1	19.7	21.0
	(1.2)	(1.4)	(1.5)	(1.5)
Second 25 %	17.3	24.3	17.4	18.3
	(1.4)	(1.7)	(1.3)	(1.5)
Third 25 %	22.0	24.9	25.3	25.8
	(1.5)	(1.7)	(1.7)	(1.6)
Top 25 %	36.1	41.1	40.7	40.2
	(1.7)	(1.9)	(1.7)	(1.7)
% from lowest 25 %	14.1	17.8	17.9	19.1
		TAFE and other Post-secondary		
Lowest 25 %	22.8	22.3	29.3	27.7
	(1.5)	(1.5)	(1.7)	(1.6)
Second 25 %	24.0	25.0	28.9	28.6
	(1.6)	(1.8)	(1.6)	(1.7)
Third 25 %	26.0	25.2	30.9	29.6
	(1.6)	(1.7)	(1.8)	(1.7)
Top 25 %	22.1	20.8	21.8	25.2
	(1.5)	(1.5)	(1.5)	(1.5)
Observations	3,063	2,709	3,032	3,005

Note: figures in brackets are standard errors on the estimates of enrolment rates.

One common method employed to get closer to an estimate of the effect of parental income alone on youth education outcomes is to estimate a model of the enrolment outcome as a function of parental income, parental education plus other demographic characteristics (collected in the matrix X_i) that may affect the decision to attend. The results of such estimations using Census data are presented in Table 3.[17] The dependent variable is a binary indicator I_i which is equal to one if the youth enrolls at university and equal to zero otherwise. This is thus a simple Linear Probability Model estimation.[18] The coefficient estimates (the elements of the vector β) are measures of the relationship between each particular variable with the probability of university enrolment, holding all other regressors fixed.

$$I_i = X_i \beta + \varepsilon_i$$

The coefficients on the parental income quartile indicators are provided at the top of Table 3, with the effects measured relative to the missing lowest income quartile. Even after controlling for parental education, parental income still has a significant relationship with

[17] The estimates here may still not reflect causal income effects, as there may be unobservable characteristics (to the researcher) that affect both parental income and the university enrolment of youth, such as persistence, innate inheritable ability, et cetera.

[18] Estimates using the Probit technique yielded similar results.

enrolment, albeit a much smaller relationship than that observed in the unconditional estimates of Table 2. In these estimates, youth with parents in the highest income quartile had a 7 to 13 percentage point higher probability of university enrolment than youth with parents in the lowest income quartile, holding parental education and other observed characteristics fixed. Parental education is included in the estimates using indicators for the highest level of qualification achieved by either parent.[19] The missing or base category denotes those youth where neither parent (or the sole parent) completed high school or obtained a post-secondary education credential.

Table 3: **LPM Estimates of University Enrolment of 18-19 Year Olds - Census**

	1991	1996	2001	2006
Parental income quartile 2	2.7	5.4**	-1.9	-1.9
	(2.1)	(2.5)	(2.3)	(2.4)
Parental income quartile 3	5.5**	4.6*	4.6*	0.8
	(2.2)	(2.5)	(2.5)	(2.4)
Parental income quartile 4	12.0***	13.4***	11.1***	6.7***
	(2.4)	(2.7)	(2.6)	(2.6)
Parent post-graduate	28.8***	29.5***	21.0***	24.7***
	(3.7)	(3.7)	(3.3)	(2.9)
Parent bachelor	25.2***	24.0***	30.5***	26.2***
	(2.8)	(2.8)	(2.4)	(2.4)
Parent diploma	9.1***	10.3***	14.5***	8.8***
	(2.4)	(2.8)	(2.6)	(2.5)
Parent certificate	0.8	0.5	-0.2	4.4**
	(1.9)	(2.2)	(2.0)	(2.0)
Parent high school only [#]	4.3*	8.8***	9.3***	7.8***
	(2.2)	(2.2)	(2.3)	(2.3)
Male	-8.9***	-12.6***	-10.9***	-8.3***
	(1.5)	(1.7)	(1.6)	(1.6)
English spoken at home	-4.8*	-9.8***	-9.7***	-15.3***
	(2.6)	(2.8)	(2.8)	(2.7)
Youth an immigrant	2.1	0.3	4.3	0.0
	(2.6)	(2.9)	(2.8)	(3.0)
Parent an immigrant	-0.3	-4.3**	0.4	4.3**
	(1.8)	(2.1)	(2.0)	(2.0)
Aged 18	-4.8***	-7.8***	-8.7***	-10.3***
	(1.5)	(1.7)	(1.6)	(1.6)
Urban residence	6.0***	12.8***	6.0***	13.0***
	(2.1)	(2.1)	(1.9)	(1.9)
Observations	2,516	2,280	2,524	2,552

Notes: Standard errors are in parentheses. One, two and three *'s denote statistical significance at the 10, 5 and 1 per cent levels respectively. Indicators of state of residence also included in model. [#] In 1991 and 1996, high school completion information was not provided. In these cases, high school completion was proxied using an indicator of leaving school at age 17 or older.

[19] Measures using the highest education level of either parent had a stronger relationship with youth university attendance than either mother or father education separately. This measure also had a slightly stronger relationship with youth university attendance than if both mother and father education levels were included separately (if both present).

Note the strong relationship between parental education and the university enrolment of youth in the estimates of Table 3. This relationship is stronger than that with parental income – a common finding in studies in other countries. Note also that in three out of four of the years investigated, youth with parents that hold at most a certificate have enrolment rates as low as those with parents who hold no qualifications and did not complete high school. Youth with parents who completed Year 12 but did not obtain any post-secondary qualifications are more likely to enroll at university than these youth with certificate holding parents.

The remaining estimates in Table 3 reveal that females are 8 to 13 percentage points more likely to enroll at university than males. Youth from homes where a language other than English is spoken are also more likely to enroll at university than other youth, with the relationship appearing to get stronger over time. This indicator may be proxying the higher preferences for further education held by parents from non-English speaking backgrounds, such as Asia. Controlling for language spoken at home, whether or not the youth or either parent was an immigrant bore no consistent relationship with university enrolment. As could be expected, youth aged 18 were less likely to be enrolled at university than 19 year olds. Finally, note that youth living in urban areas are more likely to enroll at university in these estimates, but this may reflect that our sample of youth includes just those who are still living with parents. Youth in non-urban areas may be less likely to have a university near the parental home, so may have to leave to attend university.

These estimates are constructed using just those youth who still live with at least one parent. What effect might this sample selection rule have on the estimates? In other words, will this particular sample selection lead to estimation bias? The estimates may be biased in the selected sample if the regressor or independent (X_i) variables are not orthogonal to the unobserved error (ε_i) in this sample. If sample selection is purely a function of our independent (X_i) variables, then there should be no bias in the estimated relationship between those regressor variables and our dependent variable (university enrolment).[20] There may be a loss in estimation efficiency, but no bias per se should result. The assumed orthogonality of X_i and ε_i in the population should remain in the selected sample.

If, however, sample selection is a function of both X_i and ε_i simultaneously, then orthogonality of X_i and ε_i in the selected sample may no longer hold, and estimation bias may result. This will be the case if sample selection is a function of the outcome (university enrolment). This may occur here if those youth who enroll at university are less or more likely to live with their parents than other youth, due to the need to move to attend university or to save on living expenses respectively. In the cases of either positive or negative outcome-based sample selection, the likely effect is that regression coefficient estimates are attenuated towards zero.[21] In other words, the estimates in Tables 2 and 3 of the relationships between parental income and education and university enrolment may understate the true relationships.

One way to ascertain the size of any potential bias in the estimates in Tables 2 and 3 is to investigate the same relationships using a data set that does not have the feature of only being able to observe the parental income and education of youth who still live with their parents. The HILDA data set is able to provide measures of parental income and education for all

[20] Goldberger (1981) shows this result for the case of continuous variables. If sample selection is based purely on the unobservable ε_i but not on X_i, then there will be bias in the estimate of the constant term but not in any of the other coefficients.

[21] Goldberger (1981) shows this result for the case of continuous variables also. Whether the result holds in the case of discrete outcome and discrete regressor variables has yet to be shown.

youth, irrespective of living arrangements. This data set will be investigated in the following section.

VI. HILDA Measures

In this section, data from the Household, Income and Labour Dynamics in Australia (HILDA) survey are employed to investigate the relationship between parental background and the post-secondary education enrolment of 18 and 19 year-old youth. This survey is a longitudinal survey of Australian households, with members of all originally sampled households interviewed annually since 2001. The following analysis employs information on appropriately aged individuals who were members of the originally sampled households in 2001, and uses response data from 2001 to 2008.

The HILDA data has the advantage of allowing us to obtain direct reports of parental background (income, education, et cetera) for all youth irrespective of whether or not they live with their parents at age 18 and 19. Using HILDA data allows us to check whether the estimates using the Census data on youth living with parents only is indicative of all youth. The drawbacks of the HILDA data relative to the Census data are as follows. First, the number of youth of the appropriate age we can observe is limited (small sample sizes). Second, we only observe youth post-secondary enrolment outcomes over the period from 2004 to 2008, thus not allowing us to observe any potential trends over time. Finally, HILDA is a longitudinal survey, so panel attrition (originally sampled household members no longer responding to the survey) may also result in a specific form of sample selection bias. Panel attrition is discussed in detail in Appendix A.

In this part of the investigation, I employ information from the HILDA data as follows. Youth are first observed at the age of 15. At this age, the vast majority (98 per cent) live with at least one of their parents in the HILDA data. We can thus link the vast majority of youth to their parents, and construct direct measures of parental background (income, education, et cetera). We then observe the education outcomes of youth up to age 18 or 19. Even if the youth leaves the parental home before these ages, the HILDA survey team members go to significant lengths to track such youth to their new residences to interview them. Given I use HILDA data over the period from 2001 to 2008, I observe 5 separate age cohorts to age 18 (aged 15 in 2001 to 2005), but only 4 cohorts to age 19 (age 15 in 2001 to 2004).

Post-secondary enrolment rates by parental income quartile at ages 18 and age 19 using the HILDA data are provided in Table 4. Parental income here was averaged over the four years when the youth was aged 15 to 18, in order to get a more precise measure of permanent income.[22] Note also that unlike the Census, post-secondary enrolment rates are reported in HILDA according to the type of qualification the individual is studying for (for example, bachelor degree, certificate level III/IV, et cetera), rather than according to the type of institution attended (university versus TAFE). Nonetheless, the basic patterns we observed in Table 2 using Census data for university level study are confirmed here using HILDA data. University enrolment rates of 18 and 19 year-old youth are equally low at around 20 per cent among youth in the lowest and second lowest parental income quartiles. University enrolment is higher among youth from the third parental income quartile; a little higher for this group in HILDA than in the Census data for 2006, a comparable time period. University enrolment is

[22] Parental income was first deflated using the overall Australian *Labour Price Index* (Australian Bureau of Statistics, catalogue number 6345.0), to control for nominal earnings growth over time.

higher again at around 40 per cent for youth from the top parental income quartile. Note that enrolment rates at the certificate and diploma level are all higher in the HILDA data than in the Census data, but the same inverted U-shaped relationship with parental income is observed.[23]

Table 4: **Post-secondary Enrolment Rates by Parental Income Quartile – HILDA**

	Age 18	Age 19	Age 18-19
		Bachelor plus	
Lowest 25 %	15.3	22.3	18.4
	(2.4)	(3.2)	(2.0)
Second 25 %	15.3	25.8	19.9
	(2.4)	(3.3)	(2.0)
Third 25 %	28.2	36.1	31.7
	(3.0)	(3.6)	(2.3)
Top 25 %	35.5	43.8	39.0
	(3.1)	(3.7)	(2.4)
% from lowest 25 %	16.1	17.3	16.6
	(2.5)	(2.5)	(1.7)
		Certificates and Diplomas	
Lowest 25 %	33.8	40.2	36.6
	(3.2)	(3.7)	(2.4)
Second 25 %	43.0	44.2	43.5
	(3.3)	(3.8)	(2.5)
Third 25 %	33.3	41.4	36.8
	(3.1)	(3.7)	(2.4)
Top 25 %	30.9	36.9	33.5
	(3.0)	(3.6)	(2.3)
Observations	902	701	1,603

Notes: Standard errors are in parentheses. HILDA longitudinal weights for the youth were employed. The final column is a simple weighted average of the columns at age 18 and 19. The standard errors do not take into account the fact that in many cases the same youth are observed in both columns.

The HILDA data was also employed to estimate a Linear Probability Model of the university enrolment of 18 and 19 year-old youth. The results are presented in Table 5. The results presented are quite similar to those presented in Table 3 using Census data, with quite similar coefficients on the parental income quartile indicators and the highest parental education qualification indicators. One difference is the larger coefficient on the indicator of whether the youth is an immigrant in the age 19 estimates. A second difference is the much smaller coefficient on the city indicator here than what was estimated on the urban indicator in Table 3. Recall the caveat on the estimates using the Census data on this coefficient. It may reflect

[23] The higher rates may reflect that in HILDA, youth report whether they studied for a particular qualification at any stage in the year since the last interview, while in the Census, youth report whether they are currently attending an education institution.

the sample selection in the Census estimates i.e. only youth still living with a parent were included. Thus the positive urban estimate may reflect the higher probability that youth in urban areas do not need to leave the parental home in order to attend university. These estimates based on all youth, irrespective of their living arrangements at age 18 and 19, show relationships between parental income and education that are consistent with that in the Census data. This provides some confidence that what we observe in the Census measures are not heavily influenced by the sample selection we are required to use.

More background variables were included in the estimates presented in Table 5 than were included in the estimates of Table 3, as more detailed information is available in HILDA. Including these extra variables did not alter the coefficients on the original set of variables to any extent. Note the large positive coefficient on the eldest child in the family indicator (also indicating lone children), while there is an insignificant coefficient on the number of children. This may reflect larger investments in the education of the eldest child. Note also the large negative effect of having a young mother on the probability of university enrolment, with such youth having a 25 per cent lower probability of university enrolment by age 19.

Table 5: **LPM Estimates of University Enrolment of 18 and 19 Year Olds – HILDA**

	Age 18		Age 19	
	Coefficient	Stand. Error	Coefficient	Stand. Error
Parental income quartile 2	-0.8	(4.3)	4.7	(5.4)
Parental income quartile 3	7.9*	(4.6)	8.9	(5.6)
Parental income quartile 4	11.3**	(4.9)	10.6*	(6.0)
Parent post-graduate	24.1***	(5.3)	27.8***	(6.3)
Parent bachelor	22.3***	(5.1)	21.9***	(6.0)
Parent diploma	2.7	(5.8)	7.5	(6.9)
Parent certificate	1.6	(4.3)	-6.3	(5.3)
Parent high school only	7.7	(6.0)	0.3	(7.4)
Male	-5.9**	(2.8)	-7.9**	(3.4)
Non-English first language	22.7**	(10.8)	17.4	(13.0)
Youth immigrant	0.6	(8.9)	19.1*	(10.7)
Number of children	-0.9	(1.0)	0.8	(1.2)
Eldest child	8.1***	(3.0)	14.4***	(3.6)
ATSI	-2.0	(7.2)	-2.0	(8.3)
Parent immigrant	1.7	(3.3)	1.7	(4.1)
Mother lone parent	2.4	(4.3)	-0.6	(5.4)
Father lone parent	7.5	(8.0)	3.0	(9.6)
Mother < 40 [#]	-21.3***	(4.9)	-24.9***	(6.2)
Mother > 54 [#]	-4.1	(5.8)	-2.3	(7.1)
City	3.2	(3.1)	3.4	(3.8)
Observations	835		655	

Notes: Standard errors are in parentheses. One, two and three *'s denote statistical significance at the 10, 5 and 1 per cent levels respectively. HILDA longitudinal weights for the youth were employed during estimation. Indicators for state of residence also included in estimated models.

[#] Denotes that the father's age is used if youth only resides with the father at age 15 (rare).

One consistent finding in the Census and HILDA data is the equally low university enrolment rates of youth from the lowest two parental income quartiles. The HILDA data provide sufficient information to allow us to observe whether this pattern also exists in alternative measures of parental SES previously employed in the Australian literature i.e. using postcode-based measures or individual SES measures based on parental occupation. Estimates of post-secondary education enrolment rates by parental SES measured using parental occupation and postcode are provided in Tables 6 and 7 respectively. In both cases, equally low enrolment rates in the lower quantiles can be observed.

Looking first at Table 6, parental occupation was divided into quartiles based on the ANU4 scale of occupational prestige (see Jones and McMillan, 2001), as constructed by the HILDA team. The highest occupational prestige of either parent was employed in this table, but using just father's occupation yielded similar results. The relationship here is starker than that observed in Table 4, where parental income was used to define quartiles. At age 19, university enrolment is equally low in the lowest two quartiles, rises steeply in the third quartile and steeply again in the fourth quartile. An inverted U-shaped pattern between parental occupation level and enrolment in certificate and diploma level study is observed here too, as it was in Table 4, but the relationship appears even stronger here.

Table 6: **Post-secondary Enrolment Rates by Parental Occupation Quartile – HILDA**

	Bachelor plus		Certificates and Diplomas	
	Age 18	Age 19	Age 18	Age 19
Lowest 25 %	9.6	18.1	35.0	34.9
	(2.0)	(2.9)	(3.2)	(3.6)
Second 25 %	16.0	17.7	44.5	56.7
	(2.6)	(3.1)	(3.5)	(4.0)
Third 25 %	28.8	35.9	40.2	46.8
	(2.9)	(3.5)	(3.2)	(3.6)
Top 25 %	40.3	55.3	22.7	26.6
	(3.3)	(3.8)	(2.8)	(3.4)
% from lowest 25 %	10.7	15.0		
	(2.1)	(2.4)		
Observations	874	685	874	685

Notes: Standard errors are in parentheses. HILDA longitudinal weights for the youth were employed.

Now turning to Table 7, enrolment rates are provided by quintile[24] based on the socio-economic status of the area where the family (and the youth) resided when the youth was aged 15. The measure of socio-economic status employed here is the Socio-Economic Indicators for Areas (SEIFA) measure of the occupation and education levels of people living in the area. This is the same postcode-based SEIFA measure employed by universities to report the SES of university students, and thus to construct measures of the proportion of students from

[24] The SEIFA measures are recorded by decile only in the HILDA public use micro-data files, so it was not possible to construct measures by quartile.

the lowest SES quartile.[25] A convex relationship between this measure of SES and university enrolment is also apparent. The university enrolment rates of youth from the second quintile are slightly lower than that for youth from the lowest quintile, and the rates for youth from the middle quintile are only a little higher. Formal tests of equality for the rates in these three groups do not reject the null. University enrolment rates, however, rise steeply for youth from the fourth and highest quintiles. A strong inverted U-shaped pattern between postcode SES and enrolment in certificate and diploma level study is again observed here.

Table 7: **Post-secondary Enrolment Rates by Postcode SES Quintile – HILDA**

	Bachelor plus		Certificates and Diplomas	
	Age 18	Age 19	Age 18	Age 19
Lowest 20 %	16.1	22.7	35.2	41.3
	(2.7)	(3.4)	(3.5)	(4.0)
Second 20 %	9.6	16.9	44.2	47.7
	(2.1)	(3.1)	(3.6)	(4.1)
Middle 20 %	21.6	25.2	43.2	49.8
	(3.0)	(3.5)	(3.6)	(4.1)
Fourth 20 %	27.3	40.7	31.9	39.1
	(3.2)	(4.1)	(3.4)	(4.1)
Top 20 %	41.8	52.9	22.9	26.6
	(3.5)	(3.9)	(3.0)	(3.5)
Observations	950	752	950	752

Notes: Standard errors are in parentheses. HILDA longitudinal weights for the youth were employed.

This common finding of university enrolment rates being equally low among youth from the lowest two quartiles of the SES distribution, irrespective of how SES is measured (income, occupation, postcode) in the HILDA and Census data, is also entirely consistent with information from the Youth in Transition Surveys for 19 year-old youth in 1980, 1984, 1990 and 1994 provided by Long et al (1999). This comprehensive study of the relationship between the family background of youth and their education outcomes by age 19 showed that both the education and occupation levels of parents were strongly related to higher education (university and CAE) enrolment. The higher education enrolment rates of youth with parents in the semi-skilled and unskilled occupations (based primarily on father's occupation) were equally low in both these groups. These parental occupation groups covered a third of all youth. The higher education enrolment rates of youth with parents in the next highest occupation category (denoted "skilled") were as low as the rates for the lower occupation groups in two of the four years, and only marginally higher in the other two years. These three occupation groups together comprise 50 per cent of all youth (the lowest two quartiles). The higher three occupation groups were professional, managerial and clerical. Higher education enrolment rates were much higher in these three groups than in the lower three groups, especially in the professional group. Thus the lowest two quartiles in this measure of SES were equally under-represented in higher education.

[25] The other SEIFA measures available are: Disadvantage, Advantage/Disadvantage and Resources. See ABS Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia (ABS Cat. No. 2033.0.30.001) for further details.

Table 8: **Extended LPM Estimates of University Enrolment of 19 Year Olds – HILDA**

	Postcode	Occupation	Both
Parental income quartile 2	3.9	2.9	1.9
	(5.4)	(5.6)	(5.6)
Parental income quartile 3	7.4	5.9	5.1
	(5.6)	(5.9)	(5.9)
Parental income quartile 4	7.8	8.6	6.8
	(6.1)	(6.3)	(6.3)
Parent post-graduate	22.4***	13.8*	10.4
	(6.6)	(7.3)	(7.5)
Parent bachelor	17.3***	8.3	5.5
	(6.2)	(6.8)	(6.9)
Parent diploma	4.5	0.4	-0.9
	(7.0)	(7.3)	(7.4)
Parent certificate	-7.9	-10.3*	-11.1**
	(5.3)	(5.4)	(5.4)
Parent high school only	-1.7	-1.8	-3.2
	(7.4)	(7.5)	(7.5)
Postcode SES quintile 2	-3.2		-3.8
	(5.6)		(5.8)
Postcode SES quintile 3	1.3		-4.5
	(5.9)		(6.2)
Postcode SES quintile 4	6.8		3.2
	(6.1)		(6.3)
Postcode SES quintile 5	16.9***		13.9**
	(6.3)		(6.6)
Parent occupation quartile 2		2.9	3.6
		(5.0)	(5.0)
Parent occupation quartile 3		11.4**	11.0**
		(5.3)	(5.5)
Parent occupation quartile 4		22.6***	21.5***
		(6.2)	(6.3)
Other covariates	Yes	Yes	Yes
Observations	655	629	629

Notes: Standard errors are in parentheses. One, two and three *'s denote statistical significance at the 10, 5 and 1 per cent levels respectively. HILDA longitudinal weights for the youth were employed during estimation. Indicators for state of residence also included in estimated models, as well as the extra covariates included in Table 5, such as gender, immigrant status, mother's age, et cetera.

This pattern is also observed in LSAY data for youth aged 19 in 1999 (1995 cohort), as presented by Marks et al (2000). The university enrolment rates of youth with parents in the

lowest three occupation groups (skilled, semi-skilled and unskilled) are all equally low. Enrolment rates are much higher among youth with parents in the higher occupation groups, again particularly among professional occupation parents.

One final set of extended regression estimates of the university enrolment of age 19 youth in the HILDA data are reported in Table 8. These estimates include indicators of SES based on parental occupation and on postcode SEIFA measures, as well as all the variables included in the models of Table 5. These extended estimates provide us with more information on what particular measures of parental background bear the strongest relationships with youth university enrolment, and may provide some guidance to policymakers regarding the most important measure of SES background and regarding the appropriate formation of higher education policies. Note that these measures are correlated, so the reduction in the precision of the parameter estimates is understandable.

The inclusion of postcode quintile indicators in column 1 results in slightly lower coefficients on the individual parental income and education indicators. It is interesting that even controlling for individual parental education and income, there is still a large positive effect of living in a high SES area on university enrolment. This is even the case if parental occupation quartile indicators are also included (column 3). This could reflect some unobserved characteristic of parents related both to their residence decisions and their support for their children's education. It could, however, reflect the effect of the quality of the neighbourhood on the probability of university enrolment. This could be due to the local schools being of higher quality, or from there being more potential role models who have made a success of obtaining a university education. Other aspects of neighbourhoods that may affect the enrolment decision are the closeness of a university, or the cultural resources nearby (libraries, galleries, performing arts venues, bookshops, et cetera). Including parental occupation quartile indicators in columns 2 and 3 results in the coefficients on the parental education indicators falling considerably. The coefficients on the parental occupation indicators are also large and of the expected sign. Education and occupation level are highly correlated, so these two variables seem to be capturing the same underlying characteristic.

The HILDA data also allow us to investigate how well postcode-based measures of SES reflect individual-based measures. Jones (2001) found that postcode-based measures do not reflect individual-based measures of parental occupation and education particularly closely, but they are related. The HILDA data confirms this finding, and also that the postcode-based measures are related to parental income, but not particularly closely. The results of this investigation are provided in Appendix B.

What may underlie this finding of equally low enrolment rates among youth from the lowest two parental SES quartiles, irrespective of how parental SES is measured (income, occupation, postcode)? The regression estimates of Tables 3 and 5 in particular highlight the very significant relationship between parental education and youth university enrolment. Youth with parents that do not hold any post-secondary qualifications and did not complete high school (the base parental education category in the regressions) and youth with parents who hold a certificate qualification at most are equally unlikely to enroll at university. Youth with highly educated parents are much more likely to enroll at university. In Table 9, information is provided showing the percentage of parents with each education level within each parental income quartile. What can be observed is that there are an equally high percentage of parents with these two lowest education levels (first two rows) in the two lowest parental income quartiles (59% and 64% respectively). The same observation can be

made when splitting parents by occupation quartile in Table 10. The lowest two quartiles have equally high percentages of parents with education levels corresponding to very low youth university enrolment (71% and 69% respectively).[26]

Table 9: **Percentages of Parents Holding each Education Level by Income Quartile**

	Parental income quartile			
Parental education	lowest	second	third	highest
Less than Year 12 only	33	27	8	4
Certificate	26	37	34	20
Year 12 only	13	5	7	7
Diploma	11	8	10	8
Bachelor	10	17	20	24
Post-graduate	6	6	22	36
TOTAL	100	100	100	100

Notes: Information based on HILDA data.

Table 10: **Percentages of Parents Holding each Education Level by Occupation Quartile**

	Parental occupation quartile			
Parental education	lowest	second	third	highest
Less than Year 12 only	35	25	8	0
Certificate	36	44	28	6
Year 12 only	15	9	9	3
Diploma	7	11	12	10
Bachelor	6	6	26	34
Post-graduate	2	5	17	48
TOTAL	100	100	100	100

Notes: Information based on HILDA data.

VII. Concluding remarks

This article provides estimates of the relationship between direct measures of parental income and the post-secondary education enrolment of youth aged 18 and 19 in Australia over time. Such measures have not been readily available in the past. These measures show that the relationship has not changed much over the period from 1991 to 2006. Parental income is strongly related to university enrolment in particular, with a strong convex relationship observed. The relationship with other post-secondary enrolment (Vocational Education and Training) is less strong, and has an inverted U-shaped pattern i.e. higher enrolment in the middle two parental income quartiles than at either end.

The results here suggest that focusing policy effort on raising the university enrolment rates of youth from the lowest quartile of the socio-economic status distribution may be too narrow. The second lowest quartile has participation rates equally as low as the lowest quartile, in

[26] The same observation can be made when splitting parents by postcode SES quintiles in the HILDA data, and when splitting parents by parental income in the Census data. Results are available upon request.

2001 and 2006 in particular. A focus purely on the lowest quartile may be at the expense of second quartile youth, who may be equally in need of assistance. There is suggestive evidence that parental education may be driving these results, with equally low parental education levels in the lowest two parental income quartiles.

Focusing on measuring parental SES using parental education appears to be an appropriate change in procedure in Australia for universities to identify low SES youth. Universities started collecting and reporting information from students on parental education in 2010 (see Department of Education, Employment and Workplace Relations, 2009). If Australian universities and government do shift towards using parental education as an indicator of low SES students, it will mean that low SES will no longer be just the lowest 25 per cent of youth. The lowest 50 per cent of youth based on parental education level currently have equally low university enrolment.

It appears from the results of this study, however, that other indicators of parental background (income and area of residence) are also related to university enrolment, even after controlling for parental education level. In contrast, it was found that parental education level and parental occupation level are essentially measuring the same underlying characteristic (these two measures are highly correlated with each other) in terms of their relationship with youth university enrolment. It may be appropriate to expand the background characteristics used to identify low SES youth beyond parental education to include income and area of residence, but also including occupation level does not appear crucial.

The question that remains is why youth with parents holding either certificate level qualifications or who did not complete high school do not enroll at university. Is it due to the lack of income to fund investments in education, either during school to prepare for university study or at high school completion? Is it due to preferences for particular occupations or types of study that are perhaps influenced by parental experience or knowledge? Is it due to genetically transmitted academic ability versus ability on other dimensions (manual, etcetera)? Is it due to the investments highly educated parents make in their children's early learning, via reading, cultural experiences, et cetera?

Prior Australian research has shown the close relationship between parental background and age 15 literacy and numeracy test scores, the probability of completing high school, and final high school achievement levels. These intermediate education outcomes are also strongly related to university entry (see for example Long et al, 1999; Cardak and Ryan, 2006, 2009). What are also unknown are the causal factors behind these intermediate education outcomes. These relationships may also reflect parental income, genetics, parental investments or preferences for academic study. Understanding why youth with less educated parents do not enroll in university study may thus prove particularly challenging.

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APPENDIX A

The HILDA data employed in the analysis of Section VI suffers from panel attrition. That is, we cannot analyze the post-secondary enrolment outcomes of all youth that we observe in the data at the start of the panel in 2001. There may be concern that this panel attrition may not be random, and thus the estimates based on the sample of youth that can be observed fully may be biased estimates of the true relationships. This appendix provides details on the sources of panel attrition in the data employed, and the potential consequences of that attrition. The discussion will focus on the youth we want to investigate at age 19.

Of the 1,249 youth of the correct age to be included in the age 19 outcome analysis in HILDA longitudinal households in wave 1 (2001), only data from 655 (52%) could be employed in the regression analysis of Tables 5 and 8 (different numbers could be employed in certain tables). The cumulative reasons why 48% of observations could not be employed in the regression analysis are provided below:

1. The household did not respond to the survey when the youth was aged 15 (household attrition) – 24%.
2. The youth was not living with a parent at age 15 if observed – 1%.
3. Parental income information was not available for all four years when the youth was aged 15 to age 18 (household attrition) – 15%.
4. Parental characteristics (particularly education level) were also not available (household non-response) – 2%.
5. Youth education enrolment information not reported at age 19 (youth attrition or non-response) – 6%.

The vast majority of this sample loss is due to household attrition rather than just youth dropping out alone or not responding to the education questions. Youth attrition or non-response to education questions may be a cause for concern in terms of non-random attrition based on the outcome (education enrolment). Such outcome based selection can bias our estimates, as discussed at the end of Section V. If the household attrition is not based on the youth education outcome but only on observable characteristics, then no bias in the estimates should result.

Note that the sample loss observed here is no higher than that encountered when using the YITS and LSAY data, the main data sets used to investigate youth post-secondary education enrolment outcomes in Australia. Attrition rates by age 19 ranged from 43% to 67% in the four YITS data sets (see Long et al, 1999). In the Le and Miller (2005) study using the 1995 LSAY cohort, 54% of the original set of observations could not be employed in estimation.

To gain some understanding of the sample attrition, a simple Linear Probability Model (OLS) was estimated with the dependent variable being whether or not the observation could be used during estimation. The independent variables were all those included in the original regressions, where they could be measured i.e. if at least the household responded when the youth was aged 15. Thus this estimation does not capture sample attrition due to the first two reasons in the above list. In addition, the parental income quantiles were constructed using parental income when the youth was aged 15, rather than the four year average used in the estimates in the main paper. The results of this estimation are presented in Table A1.

Table A1: **LPM of Inclusion in Estimation Sample, Age 19 Youth – HILDA**

	Coefficient	Standard Error
Parental Income Quartile 2	0.025	(0.045)
Parental Income Quartile 3	0.048	(0.048)
Parental Income Quartile 4	0.016	(0.052)
Parent post-graduate	0.110**	(0.056)
Parent bachelor	0.052	(0.053)
Parent diploma	0.007	(0.060)
Parent certificate	0.003	(0.046)
Parent high school only	-0.056	(0.063)
Male	-0.041	(0.030)
Non-English first language	0.094	(0.114)
Youth immigrant	0.007	(0.089)
Number of children	0.000	(0.010)
Eldest child	0.065**	(0.032)
ATSI	-0.033	(0.084)
Parent immigrant	-0.074**	(0.036)
Mother lone parent	0.026	(0.045)
Father lone parent	-0.032	(0.084)
Mother* < 40	-0.118**	(0.049)
Mother* > 54	0.074	(0.065)
City	-0.042	(0.033)
NSW	-0.020	(0.041)
Queensland	-0.074*	(0.044)
South Australia	-0.028	(0.059)
Western Australia	-0.064	(0.057)
Tasmania	-0.055	(0.086)
Northern Territory	-0.068	(0.219)
Australian Capital Territory	-0.002	(0.090)
Age 15 in 2002	0.025	(0.041)
Age 15 in 2003	0.074*	(0.043)
Age 15 in 2004	0.125***	(0.042)
Observations	879	

Notes: Standard errors are in parentheses. One, two and three *'s denote statistical significance at the 10, 5 and 1 per cent levels respectively.

These estimates reveal that sample loss was not purely random. Certain observable characteristics are related to sample inclusion. In particular, youth with highly educated parents were more likely to remain in the sample. Youth with immigrant parents or young mothers were less likely, as were youth from Queensland (relative to Victoria). If the youth was the eldest child, they were more likely to remain in the sample. The year the youth was aged 15 is also related to sample inclusion. More recent observations were more likely to remain (age 15 in 2001 is the base case), conditional on the household responding when the youth was aged 15. This most likely reflects higher sample attrition in the early waves of

HILDA i.e. those households that drop out do so early, with those remaining after each wave being a more select stable sample. It is not clear from these estimates, however, that sample inclusion is related to the education outcome. The variables that are related to sample inclusion bear some similarities to those related to university enrolment (Table 5), but the relationships are not the same. Thus even though sample inclusion is not random, these estimates do not raise any significant concerns that outcome based selection (and thus potential estimation bias) is occurring to a large extent.

APPENDIX B

The HILDA data includes the details we need to investigate whether postcode based measures of parental SES are a reasonable proxy for individual SES background. Note that the postcode based measure employed in this investigation is based on where the youth was living at age 15, prior to leaving the family home and potentially attending higher education. There is a related issue of whether the permanent home address that university students report to the university is actually their parental home, or where they are currently living, potentially not with their parents. This issue cannot be explored directly with the HILDA data, as we do not observe the address details students provide to the university that they are enrolled in. Instead, the issue of whether those youth who are enrolled at university but do not live with their parents at age 19 live in higher SES postcodes than those that they lived in at age 15 will be explored.

To begin, the relationships between the SES quintile of the postcode where youth lived at age 15 and three individual-based measures of parental SES (income, occupation prestige and education) are investigated. The results of simple frequency cross-tabulations of the postcode SES quintiles with the three measures of SES are presented in Tables B1, B2 and B3. In Table B1, if the postcode based measure of SES was a perfect proxy for individual parental income, we would see frequency percentages of approximately 20 along the leading diagonal of the table (the bold figures) and zeros for the off-diagonal elements. This is not at all what is observed in the HILDA data. There is a relationship between the two measures, that is, more high income parents are living in high SES postcodes, but there are also low income parents living in the same postcode SES quintile, and vice versa.

Table B1: **Relationship between Average Parental Income and Postcode SES at 15**

	Postcode SES quintile					
	Lowest	Second	Middle	Fourth	Highest	TOTAL
Parental income						
Lowest 20 %	**6**	5	3	3	3	20
Second 20 %	5	**7**	4	2	2	20
Middle 20 %	4	4	**5**	4	3	20
Fourth 20 %	3	3	3	**6**	4	20
Top 20 %	0	2	4	6	**8**	20
TOTAL	18	21	19	21	21	100

Notes: These frequency percentages were constructed using HILDA data and longitudinal weights.

In Table B2, we also see that there is a relationship between parental occupation level and the SES of the postcode where the parents live, but again this relationship is not one for one. A

large proportion of parents in lower level occupations live in high SES postcodes, and vice versa.

Table B2: **Relationship between Parental Occupation Level and Postcode SES at 15**

	Postcode SES quintile					
	Lowest	Second	Middle	Fourth	Highest	TOTAL
Parental occupation						
Lowest 20 %	**7**	7	2	3	1	20
Second 20 %	4	**6**	4	4	2	20
Middle 20 %	2	5	**5**	4	3	20
Fourth 20 %	2	2	5	**5**	6	20
Top 20 %	2	2	3	6	**7**	20
TOTAL	17	21	19	22	20	100

Notes: These frequency percentages were constructed using HILDA data and longitudinal weights.

Finally, the relationship between the highest parental education level and the SES of the postcode where the parents live is presented in Table B3. Again we observe a less than perfect relationship, with low educated parents living in high SES postcodes and vice versa. Thus no matter which individual measure of SES we use, its relationship with the postcode based measure is far from perfect, highlighting the problem of trying to identify youth from low SES backgrounds using postcode based measures.

Table B3: **Relationship between Parental Education Level and Postcode SES at 15**

	Postcode SES quintile					
	Lowest	Second	Middle	Fourth	Highest	TOTAL
Parental education						
Less than Year 12	5	6	3	1	2	18
Certificate	6	7	7	5	3	28
Year 12 only	2	2	2	2	2	9
Diploma	2	2	2	2	2	10
Bachelor	2	2	3	6	6	18
Post-graduate	1	2	2	5	6	17
TOTAL	17	21	19	22	21	100

Notes: These frequency percentages were constructed using HILDA data and longitudinal weights.

Now the issue of whether those youth who are enrolled at university but do not live with their parents at age 19 live in higher SES postcodes than those that they lived in at age 15 is explored. In Table B4, the percentage of university enrolled age 19 youth in each postcode quintile is provided separately at age 15 and age 19, and separately for youth who do and do not remain living with parents at age 19 while attending university. In the first two columns are percentages for youth who have left the parental home to study at university. At age 15, such youth are predominantly in the middle and fourth quintiles, and to a lesser extent in the lowest quintile. After leaving home, however, they then reside in postcodes predominantly in the highest two quintiles. Thus youth who leave home to attend university tend to live in higher SES postcodes than they did when living with their parents. As a comparison, the last two columns present the postcode quintile percentages for university enrolled youth (at age 19) who remain living with their parents at age 19 while studying. In this case, such youth are

more likely to be living in high SES postcode areas than those who move, and the SES quintile does not change much between age 15 and age 19. We would not expect any change if parents do not move where they live (and there are no reporting errors).

Table B4: **Postcode SES Quintile of University Enrolled Youth at age 19 Split by Whether or Not the Youth Had Left the Parental Home by age 19**

	Youth who leave		Youth who remain	
	at age 15	at age 19	at age 15	at age 19
Postcode SES				
Lowest 20 %	17	4	11	10
Second 20 %	9	6	12	10
Middle 20 %	33	17	11	12
Fourth 20 %	31	35	27	30
Top 20 %	10	37	38	38
TOTAL	100	100	100	100

Notes: These frequency percentages were constructed using HILDA data and longitudinal weights.

These results suggest that if youth report to universities their current home address rather than their parental home address as their "permanent" home address, measures of enrolment rates by postcode SES may understate the rates for youth who grew up in the lowest SES areas. This again suggests that postcode based measures of SES based on student reports may not identify low SES youth particularly well.