The Effects of In-School and In-Tertiary Employment on Academic Achievement and Labour Market Transitions: Evidence from the Christchurch Health and Development Study

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REPORT TO THE LABOUR MARKET POLICY GROUP

NEW ZEALAND DEPARTMENT OF LABOUR

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Executive Summary

Work for pay by students could have both negative and positive effects on their lives. The most commonly cited detrimental effects relate to both the quality of their academic performance and the eventual quantity of their educational attainment. The most commonly cited beneficial effects relate to the facilitation of labour market transitions and the development of human capital. Ultimately, the consequences of student work experiences are empirical questions. To answer these questions, however, we need data that allow us to control for a wide variety of factors that would otherwise make it difficult to isolate the genuine effects of these early student work histories on subsequent outcomes.

Overseas studies have found relatively modest and often inconsistent evidence on the detrimental effects of in-school work on academic and educational outcomes. If these negative effects exist, they appear to be largely relegated to students who work excessively long hours and to those who come from relatively disadvantaged backgrounds. Other studies find evidence of positive effects from in-school work on subsequent wages and employment opportunities. Again, however, these results are *not* uniform across this literature.

The key methodological issues in this research area relate to unobserved heterogeneity and sample selection bias. The principal problem is that the estimated effects from these studies are generated from non-experimental data. Youth (and their families) chose whether or not they will work while in school, subject to possibly different labour market opportunities and constraints. Factors that influence early work histories may also affect later educational and labour market outcomes. If these variables cannot be quantified and included in these regressions, then the estimated coefficients on early work histories may be biased due to this unobserved heterogeneity. A slightly different perspective is to consider the endogeneity of the decision to work while enrolled in school. However, unless instrumental variables can be found (i.e., factors that directly influence this early work decision, but do *not* directly affect subsequent education and labour market outcomes), there is little chance of controlling for this sample selection process.

The approach taken in this current study is to take advantage of a rich and diverse set of personal, family, school and other characteristics available through the Christchurch Health and Development Study (CHDS). By controlling for the observed heterogeneity among the subjects of this longitudinal study, we should be able to better isolate the various immediate and long-term effects of the early work histories of students on their own eventual educational and labour market outcomes.

Slightly less than one-third of the 774 young people in our sample were observed working while enrolled in school between the ages of 13 and 16. This employment propensity nearly doubles between the ages of 13 and 16. Yet, 'excessive' hours of work per week are quite rare in this sample. By the standards in the overseas literature, 20 hours of work per week is commonly used as this threshold. There were only six observed instances of students working more than 20 hours per week in the CHDS through age 16. Thus, if the detrimental effects of work on academic achievement are largely restricted to such instances of excessive hours of work, there

is little chance of measuring such effects with these data. Work among tertiary students is more common, but again very few individuals report working relatively long workweeks.

In-school work is not uniformly distributed across our sample. Students are more likely to work between the ages of 13 and 16 if they had lower grade point averages and poorer scholastic aptitude test scores, and their parents had fewer qualifications and lower employment propensities. In this sense, it would be fair to say that in-school in relatively more common among students from more disadvantaged backgrounds.

The importance of controlling for these background differences is apparent in our regression analysis. Without controlling for many of the background measures, mean hours of work between the ages of 13 and 16 are estimated to negatively and significantly influence performance on School Certificate exams. Once we control for these background factors, however, any statistical relationship between in-school work and academic performance disappears. This basic finding is robust to different ways of measuring these early work histories.

Similar qualitative results are obtained on the probability of receiving University Bursary. Once we control observed heterogeneity in our regressions, in-school work histories have no measurable effect on this outcome. We find that mean hours of work while in school between the ages of 13 and 16 significantly reduce the probabilities of obtaining a post-school qualification and university degree by age 25 only when other background measures are excluded from these regressions. Any statistical significance of early work histories in these regressions is eliminated by the inclusion of detailed background measures. Thus, there is little evidence in this study to support the proposition that the typical market work performed by students harms either their immediate academic achievement or eventual educational attainment.

Some weak statistical evidence is found that in-school and in-tertiary work increases the probability of being employed and raises potential wages at age 21 even after the full set of background characteristics have been included in our regressions. However, any association between in-school work over ages of 13 and 16 and the probability of work and hourly earnings no longer exists under this long specification by age 25. On balance, the positive link between early work histories and subsequent labour market outcomes is tenuous.

Overall, this study paints a fairly benign picture for the work performed by students in New Zealand. Once appropriate controls have been included in our analysis, these early work histories do not appear to harm academic achievement or educational attainment, nor do they appear to facilitate labour market transitions or enhance later employment and wage opportunities.

1. Introduction

This report is a part of a two-year research programme commissioned by the Department of Labour and Ministry of Youth Affairs to improve our overall understanding of the youth labour market in New Zealand.

This particular study has two broad objectives:

- To describe the characteristics of school-to-work transition patterns, and provide a comprehensive description of the nature and characteristics of the employment histories of youth while enrolled in full-time study in either school or tertiary institutions. This includes an extensive analysis of the personal and family background factors that are related to these early work histories for youth.

- To present econometric analyses of the possible effects of in-school or in-tertiary employment for both academic achievement, and subsequent labour market transitions.

Data from the Christchurch Health and Development Study (CHDS) are used for this purpose. The CHDS is on-going longitudinal study that follows the progress of a cohort of children born in Canterbury area hospitals in 1977. At present, information is available on programme participants and their families from birth through age 25.

There has been a recent resurgence in interest in the 'school-to-work transitions' of youth.[1] Ryan (2001, p.35) defines this as the *" ... period between the end of compulsory schooling and the start of full-time, stable employment"*. Concerns have been raised about an increasingly complex and prolonged school-to-work transition process, and an associated rise in a wide range of undesirable outcomes for many groups in society. The fear is that youth labour market problems may be getting worse over time.

As a result, governments have been asked to allocate larger proportions of their budgets to a wide array of policies designed to smooth this labour market transition process. Proponents of these programmes point to the malleability of human capital and long amortisation period for youth that make such interventions both efficacious and cost-effective. The argument is that these interventions do work and that a failure to take actions to prepare young people for labour market transitions may impose substantial costs on society for many years to come.

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1 Yet, concerns over school-to-work transitions are nothing new. Osterman (1980) reminds us that at the turn of the last century public policies and institutions were put in place to deal with problems often attributed to the industrial revolution and its impact on the declining labour demand for unskilled, inexperienced workers. Child labour and compulsory education laws were implemented and strengthened during this period. High school enrolments increased dramatically in the U.S. between 1900 and 1920. Youth organisations like the YMCA and Boy Scouts were founded around this time to help young people deal with a changing social and economic environment.

Yet, the vast majority of empirical studies provide fairly discouraging findings on the effectiveness of active labour market policies for the subsequent earnings and employment opportunities faced by programme participants.[2]

The purpose of this report is to empirically examine both the extent and consequences of the employment of full-time students in terms of their eventual academic achievement and subsequent labour market transitions. The motivation for this analysis is quite simple. On the one hand, in-school (or in-tertiary) employment might have positive effects on these outcomes. Work experience could increase future wage rates or employment opportunities by helping to develop good work habits, a sense of personal responsibility and positive attitudes toward school and the world of work. Income generated from these activities could be used to pay for the acquisition of human capital or other productive activities. Thus, in-school employment could both indirectly and directly smooth labour market transitions.

On the other hand, in-school (or in-tertiary) employment might have negative effects on many of these same outcomes. Income generated from this work could be used for consumption activities that would interfere and compete with time that would otherwise be devoted to education. Hours spent in work might 'crowd out' studying time and degrade the quality of educational investments. Work experience at such a young age, and scheduled to fit around educational timetables, may not lead to better wage rates or employment opportunities in the long term. In fact, poor employment experiences at a young age might damage labour market transitions by creating bad work habits and misguided impressions about the nature of work for young people who are prematurely exposed to the adult world.

This suggests that many of the issues surrounding the work outcomes of full-time students are ultimately empirical questions. How much work do students actually perform while engaged in full-time study? How is this work experience distributed across students? Is there evidence of that in-school work might be 'excessive'? Is there a great deal of 'persistence' in this behaviour? In other words, is in-school work concentrated among a small group of students who work consistently? How does all of this relate to the personal attributes and family backgrounds of youth? For example, is in-school work concentrated among the most disadvantaged groups, where student earnings might be used to supplement low household income?

In addition to the aforementioned (descriptive) analysis, regression models will be estimated to examine the consequences of in-school employment for both educational and subsequent labour market outcomes. Once other relevant factors are held constant, does this work experience hinder school performance or the acquisition of school qualifications? Finally, do in-school and in-tertiary work histories have any impact on wage rates or unemployment incidence for those who have completed their education?

Data from the CHDS should provide valuable insights into these issues. In many ways, it is an ideal data set for this proposed analysis. The longitudinal structure of the study means that we

2 See Section 2 of the earlier scoping report for this project (Maloney 2002) for an overview and analysis of the economic literature on school-to-work transitions and associated labour market policies.

can follow the same individuals from early childhood through to age 25, when nearly all of these subjects will have completed their formal education. The CHDS contains a wealth of information on individual abilities, academic achievements and family circumstances *before* the age when children are allowed to start working in the labour market. It also contains a wealth of information on educational attainment and early labour market histories *after* this in-school or in-tertiary employment.

The empirical findings of this study paint a very 'neutral' picture for the role of in-school employment in lives of our young people. Specifically we find that:

- Work among full-time students is quite common.
- Students with weaker scholastic abilities and from more disadvantaged backgrounds are slightly more likely to work or to work longer hours per week.
- There is little empirical evidence to suggest that the amounts of work performed by students are generally excessive by international standards.
- Our regression analyses find no statistical evidence to support the claims that in-school work experience hinders academic achievement, or smoothes eventual labour market transitions for the youth in this country.

The remainder of this report is organised in the following way. Section 2 provides a brief overview of the relevant overseas literature in this area. Section 3 describes the general characteristics of the Christchurch Health and Development Study. Section 4 examines the nature of in-school employment experiences between the ages of 13 and 16, and their effects on School Certificate exam performance at the end of this period. Section 5 looks at the nature of student work histories between the ages of 13 and 18, and their effects on the probability of obtaining a University Bursary qualification. Section 6 examines in-school and in-tertiary employment experiences between the ages of 13 and 25, and their effects on both the probability being unemployed or on a benefit, and the wage rates among workers at age 25. Finally, Section 7 draws some broad conclusions from this analysis.

2. The Literature on the Consequences of In-School Employment

2.1 Academic Achievement and Educational Attainment

Studies have been published in the disciplines of economics, sociology, psychology and education that examine the effects of in-school employment on academic achievement (the quality dimension) and educational attainment (the quantity dimension). Most of this research has focused on the work of students in US high schools. Yet, some disagreement exists over both the direction and magnitude of these effects. This can be at least partly attributed to differences in methodology and data used in these studies.

D'Amico (1984) used data from the National Longitudinal Survey of Youth (NLSY), and found no evidence of any substantial detrimental effects from high school employment on class rank. In fact, he found that in-school work actually increased the class standing of white males. Only

relatively large amounts of in-school work (usually over 20 hours per week) could be linked to even a modest reduction in class rank.

In contrast to these generally positive findings, Steinberg and Dornbusch (1991) reported either negative or insignificant effects of in-school work on the academic achievement of California high school students.

Mortimer et al. (1993), using data on in-school work experience for students from their first two years of high school in St. Paul, Minnesota, found no statistical evidence of any association between work and either school grades or other aspects of academic achievement. This study is of particular interest in this current project, because we also have data on early in-school work experience. The work histories of youth in the CHDS start at age 13, while the work histories of youth in Mortimer et al.'s study started at age 14.

Carr et al. (1996) also used data from the NLSY. Unlike D'Amico, the authors concentrated on the long-term effects of in-school work on academic achievement. They followed youth, who were in school at ages 16 to 19 in 1979, until they were between the ages of 28 and 31 in 1991. The authors regressed years of completed education by 1991 against the hours that these youth worked while enrolled in school in 1978 along with a set of control variables. Unlike the present study, the authors had a relatively limited range of control variables (ethnicity, gender, parental education, a single score from an ability test administered in 1979, the family's poverty status in 1978 and the youth's educational aspirations measured in 1979).

Carr et al. found that in-school work was significantly associated with reduced educational attainment of males. This estimated effect of in-school employment, while statistically different from zero, was relatively small in magnitude. Moreover, the authors found that this effect was associated with the decision of whether or not to enrol in tertiary study, rather than the decision of whether or not to complete a high school education.

Oettinger (1999) used the change in the Grade Point Average (GPA) among high school students between their junior and senior years in the NLSY to estimate the effects of in-school employment on classroom performance. This 'valued-added' approach was designed to eliminate the influence of any person-specific, time-invariant factors. Oettinger found that any negative effects from in-school work on GPA were concentrated among black and Hispanic students who work more than 20 hours per week. The author concluded that his evidence was consistent with the belief that only substantial amounts of work during high school 'crowded out' studying time and reduced academic achievement.

Lerman (2000), in his study of more than 2,600 high school students from the National Survey of America's Families, found no evidence of any detrimental effects on school performance from even large amounts of work by students. As a result, he suggested that *"... a law prohibiting working 20 or more hours per week is unlikely to improve school outcomes for low-income teens"* (p.6). Lerman concluded that it would be far better for public policies to improve the quality of instruction, the relevance of coursework and the linkages between school and careers. The problem is *not* that children from low-income and welfare families work too much to get

something useful out of school. The main problem is that they are much more likely to drop out of school early, and to perform poorly in the classroom when they remain in school.

Several studies outside the US have also examined the impact of in-school employment on various aspects of academic progress. Dustmann et al. (1997) used the National Child Development Study (NCDS) to estimate the relationship between work and school truancy behaviour among youth in Great Britain. The NCDS is in many ways similar to the CHDS. It follows a single birth cohort over time, and the authors of this particular study restrict their sample to youth still enrolled in full-time education at age 16. The authors note that in-school work is common in the UK, with around 60% of students aged between 16 and 18 working part-time. Yet, sample size in the NCDS is substantially larger than in the CHDS, and the cohort in the NCDS was born 19 years earlier than the cohort in the CHDS.

Dustmann et al found that the probability of truancy increased slightly with the number of hours worked at age 16. This effect increased in magnitude, but fell substantially in significance, when the work and truancy regressions were estimated simultaneously. Local labour market conditions were used as instruments in the work regression. It should be noted that no attempts were made in this study to estimate the effects of in-school work on other aspects of academic achievement or educational attainment.

The main criticism of the study by Dustmann et al. is that the issue of the causality between in-school work and truancy was never adequately addressed. It was simply assumed that work might influence truancy, but not vice versa. Yet, individuals who are predisposed to truancy (because they have already decided to curtail their educational pursuits) might choose to work more hours in anticipation of an imminent labour market transition. Although this more extensive simultaneous relationship is more difficult to resolve econometrically, it is clearly an issue worth exploring in this context where both in-school work and truancy are taken from a single point in time.

Bowlby and McMullen (2002) have recently produced a working paper on school-to-work transitions among Canadian youth. They used data from the Youth in Transitions Survey (YITS) on 18 to 20 year-olds. No regression analysis was included in this study. Surprisingly, the authors found that high school graduates were *more likely* than dropouts to work for pay in their last year in school. Among those who worked while in school, dropout rates were the lowest for those who worked moderate numbers of hours per week, and highest for those who worked the equivalent of full-time hours. Since regression analysis was not used in this study, it is impossible to know whether those who worked a large number of hours per week were more 'at risk' of dropping out of high school because of other factors (e.g., poor family backgrounds and low academic achievement to date).

Furthermore, the comparison of work outcomes in the last year in school in Bowlby and McMullen's study is problematic for two reasons. Firstly, the last year in school for those who drop out generally comes at a younger age compared to those who graduate from high school. We know that in-school employment increases, on average, with age. For this reason, in-school work among 18 year-olds (who graduate) would generally be more prevalent than among 16 and

17 year-olds (who drop out). Secondly, the direction of causality may be reversed when concentrating on the period immediately prior to dropping out of school. Rather than excessive work causing the termination of schooling, those who are about to terminate their education may secure work immediately before making this labour market transition.

Descriptive statistics used in the study by Bowlby and McMullen suggest potentially important 'peer influences' on the decision of whether or not to complete a high school education that will be considered in the present study. Having friends who plan on acquiring post-school education or training is positively associated with an individual's likelihood of graduating from high school. On the other hand, deviant behaviour by peers (those engaging in disruptive behaviour or alcohol use) is negatively related to the probability of graduating from high school.

Maani (2000) also found that peer variables influence educational outcomes for youth in New Zealand. The author used data from the CHDS to estimate various regression models on the probability of leaving school at age 16, the probability of continuing with study at age 18 and the probabilities of various combinations of tertiary education and work outcomes after age 18. Information on in-school work was *not* included in this analysis. Maani found, for example, that youth are more likely to drop out of school by age 16 if they are in schools with higher overall dropout rates or they associate with peers displaying deviant behaviour, once personal characteristics are held constant.

Some of the regression results in Maani's study are difficult to interpret. For example, the regression on the probability of dropping out of school by age 16 includes an explanatory variable on the grade point average computed from school certificate exams. This regressor is equal to zero if the individual did not pass *or* sit these exams. Since those dropping out of school by age 16 would be unlikely to sit these exams, it is difficult to disentangle the causality in this regression or interpret the negative and highly significant coefficient on 'school certificate performance' for those who did not sit these exams.

Another regression on the probability of attending tertiary education beyond age 18 includes explanatory variables on the expressed 'intention' to attend either a university or polytechnic at age 18. Although these dummy variables are found to be highly significant predictors of actual tertiary study, they are difficult to interpret since they are also endogenous outcomes and reflect both family backgrounds and academic achievement through age 18.

On balance, the evidence from the overseas literature suggests that in-school work has at most small and inconsistent detrimental effects on academic achievement and educational attainment. If these negative effects exist, they are largely relegated to students who work excessively long hours and come from relatively disadvantaged backgrounds. It is important to note that almost all these studies come from data on US high school students. There has been little empirical analysis of this kind from other countries, and a lack of attention to the consequences of work of students enrolled in tertiary study.

One of the key methodological issues in this empirical analysis is the ability of researchers to control either directly or indirectly for the heterogeneity in the population. The literature

consistently reveals that the propensity to engage in work while enrolled in school varies substantially by measured characteristics (e.g., see the review in Schoenhals 1998). Male, white and middle-class students, and those with lower measured academic abilities and grades are more likely to work while in school. If only some of this heterogeneity can be accounted for by measured characteristics commonly available in these data sets, then the unobserved heterogeneity relegated to the error term can bias the coefficient estimates on the effects of in-school work experience. Even if in-school work doesn't harm school performance, it may appear to do so in our regressions because those who work while in school are predisposed to have lower levels of academic achievement. Unless these work decisions can be modelled directly, the best hope for mitigating this bias is to use a longitudinal data set with better control variables. This is the primary advantage of the CHDS. It contains a rich and diverse set of measures on youth ability, early school performance and family and other background characteristics that are unavailable in most other data sources.

2.2 Early Labour Market Experiences

Overseas evidence is somewhat more consistent in finding positive effects from in-school work in terms of both employment opportunities and wage rates later in life. Griliches (1980) found that employment experiences before the age of 16 increase the wage rates that individuals face many years later. Meyer and Wise (1982, p.3) pointed to evidence suggesting that *"... youth who work in high school work much longer per year when they enter the labour force full time than teenagers who do not work in high school, and they earn more per hour as well"*.

Carr et al. (1996) isolated the effects of high school employment in 1978 on the probabilities of being in the labour force and unemployed in 1991. Holding other covariates constant, the authors found that in-school work significantly increases the likelihood of participating in the labour force, and significantly decreases the probability of being unemployed once in the labour force. Furthermore, the authors concluded that in-school employment in 1978 substantially and significantly increased hourly earnings in 1990.[3]

There are at least two important shortcomings in the analysis by Carr et al. The first, as discussed earlier with the respect to academic achievement outcomes, is that relatively few covariates were included on personal attributes and family backgrounds in this regression analysis. This is particularly relevant in the equation on labour force participation. Students who engage in work may have a predisposition to active labour force participation. In-school work may capture some of this unobserved heterogeneity. The second criticism of this study is that the earnings regression may have been misspecified. Nothing was done to control for work experience accumulated between 1978 and 1990. If in-school work experience and work experience between 1978 and 1990 are positively correlated, and the latter leads to higher wage rates, then this omitted variable would have biased upward the estimated coefficient on the 1978 work experience variable.

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3 Although labour force states were taken at the time of the survey in 1991, hourly earnings were recorded for those who worked in the previous year (1990).

Ruhm (1997) cleared up some of the deficiencies in the Carr et al.'s analysis, and still found that part-time work during a student's senior year in high school significantly increased their annual hours of work and hourly earnings at least six to nine years after the completion of high school.[4] Ruhm attempted to control for selectivity bias in terms of high school employment. Geographic characteristics (local unemployment rates and region of residence) were used as 'instrumental variables' to identify the term that corrects for sample selection bias. Although the precision of the coefficient estimates fell substantially under these estimation procedures, the author concluded that previous reduced-form models were more likely to *" ... understate than overestimate the beneficial effect of student job-holding"* on future hours of work and hourly earnings.

Hotz et al. (1999), using the same NLSY data, found that the previously estimated returns to in-school work by Ruhm and others may be entirely attributed to unobserved heterogeneity and sample selection bias. The authors found no evidence of any positive effects from in-school work on the future wages of young men. Ruhm used a standard approach in dealing with sample selection issues. Hotz et al. employed a dynamic selection procedure. Thus, discrepancies in their findings can be largely attributed to differences in their methodological approaches. It should be noted, however, that Hotz et al. do not examine the possible returns to in-school work in the form of expanded employment opportunities.

In summary, the balance of evidence from this literature suggests that in-school work generally has positive effects on future wages and employment opportunities. The key issues relate to heterogeneity and sample selection effects. Although individuals who tend to work while in high school are more likely to work in the future and receive higher wage rates, this does not necessarily imply a causal relationship. Different approaches in dealing with these issues appear to result in different conclusions from this analysis. The approach taken in the present study is to again concentrate on a longitudinal data set that offers the opportunity to account for heterogeneity more directly with a fairly extensive list of individual abilities, early scholastic achievement and family and other background variables.

3. The Christchurch Health and Development Study

The CHDS is administered by the Christchurch Health Development Study Unit within the Christchurch School of Medicine, under the direction of the Executive Director, Professor David Fergusson. This longitudinal study follows the progress of over 1,200 children born in hospitals in the Canterbury region between April and August in 1977. Parents or custodial adults in the households in which these children resided were interviewed at the time of the birth of these children, and every subsequent year until their 16th birthdays. Youth were also interviewed every year between the ages of 13 and 16. The most recent interviews focused entirely on youth around the time of their birthdays at ages 18 (1995), 21 (1998) and 25 (2002).

4 These results suggest that these positive returns reach a peak at around 20 hours of work per week while in school. Higher amounts of work (which are unusual in the NLSY) may result in slightly lower returns.

It is important to recognise that the child is the relevant 'unit of observation' in the CHDS. The nature of the family unit can change over time because of the death, separation, divorce or marriage of parents or custodial adults. The study only consistently follows the child over this sample period.

The primary advantage of the CHDS for this study is the wide range of information available on personal and family background characteristics, and the education and work histories of youth. Its strength is the 'quality' of the data available on both the dependent and independent variables that will be used in this analysis.

The primary disadvantages of the CHDS are small sample size and a potential lack of national 'representativeness' of study participants and their families. The original design of this study (following children born in Canterbury hospitals over a five-month period in 1977) means that study participants are unlikely to be representative of cohorts of children born elsewhere in New Zealand (especially in terms of ethnic composition) and at other times.

Due to attrition in this panel, approximately four-fifths of the children originally participating in this study (n=1,265) were interviewed at ages 21 (n=1,011) and 25 (n=1,003). Because of incomplete records and missing data on key variables, the number of valid of observations for any analysis on these youth often falls below 1,000 observations.[5] Previous work with the CHDS data on family income dynamics (Maloney 2001) has shown little evidence of attrition bias in this panel. However, the issue of attrition bias should be revisited in the context of the data used for any specific research purpose.

It is worth noting that the compulsory schooling age in New Zealand was raised from 15 to 16 in 1993. The CHDS children were 15 years old when this policy change was being implemented. Thus, they represent the first cohort of youth facing this higher school-leaving age. Yet, it would difficult to estimate how this higher school-leaving age may have influenced educational attainment with data from a single birth cohort.

5 See Maloney and Barker (1998) for more extensive discussion on the nature and consequences of attrition from the CHDS.

4. In-School Work and School Certificate Performance

4.1 Descriptive Analysis on In-School Work Histories

Parents in the CHDS were asked to provide information on the weekly hours of work and weekly take-home earnings for their child at ages 13 and 14. Children were asked to provide similar information at ages 15 and 16. The footnotes at the bottom of Table 1 provide the exact wording of the questions asked of parents and children in these separate interviews. The results on reported in-school work experiences may be difficult to compare over time because of differences in both the data source and wording of the questions across the four surveys. In particular, parents were asked whether of not their child had a *"... paid job after school"*, while youth were asked whether or not they had a *"... a (regular) job after school or at the weekend"* at age 15 and *"... a (regular) job"* at age 16.

It is difficult to know what effects these differences in the data sources and the wording of questions might have on the results obtained. I suspect, given the very young ages of the children when parental information was solicited, that there would be few discrepancies between the reports of parents and what might have been received from children at that time. In addition, differences in the wording of the questions regarding work in terms of "fitting around school" and being "regular" in nature probably has little impact on the results. This is because all of this information was solicited from parents and youth during the academic year (surveys were conducted generally between April and September of each year). Thus, we avoid problems of parents or youth reporting employment outcomes from the summer holiday period. More importantly, the sample is restricted to youth who were enrolled in school during all four surveys. Thus, we avoid the problem of picking up work histories outside of school. Although these data may not be strictly comparable over time, they all relate to in-school employment. The biggest limitation on the employment data is that respondents were never asked about the number of weeks they worked over the academic year. We get only a single 'snapshot' of in-school employment in each year.

Table 1 displays the data available on the earliest reported labour market experiences of children in the CHDS. The sample consists of the 774 children who were enrolled in school during the interviews at ages 13 through 16. The sample is further restricted to include those children and their families who remained in the study from birth through age 21, and provided the essential data on personal attributes, family backgrounds and educational outcomes that will be used in this study.

Across all four surveys, 29.3% of the children were working at the time of the interviews (see the bottom row in Table 1). They worked an average of 5.26 hours per week, and received hourly earnings of $5.65 in current dollars.[6] Other evidence in this table suggests that in-school employment propensities, average weekly hours of work and real wage rates increase

6 All dollar amounts contained in this report are measured in constant December 2001 dollars. The Consumer Price Index was used convert all hourly earnings to real values.

substantially with age. Just over one-fifth (21.8%) of children were working at age 13. Slightly less than two-fifths (39.1%) of the same children were working at age 16. For those working, average weekly hours worked increased by nearly 50% from 4.52 to 6.74 hours over the four years. There was a similar increase in mean real hourly earnings for those working from $4.43 to $6.38 over the period. This implies that mean real weekly earnings for working students more than doubled between the ages 13 and 16.

The literature on the effects of in-school employment suggests that only relatively high amounts of work may have detrimental impacts on academic achievement. No information is available on the number of weeks worked over the school year. However, we do have information on the numbers of hours worked per week at the time of each interview. Relatively low mean values for this variable could mask the fact that some youth in our sample work excessively long hours per week while in school. Yet, there is little evidence to support this hypothesis. The last three columns of Table 1 show the proportions of those employed who were working more than 10, 15 and 20 hours per week, respectively. At age 13, less than 5% of employed students worked more than 10 hours per week, and no one worked more than 20 hours per week. Even by age 16, only 16.2% of employed students worked more than 10 hours per week, and 2.3% (only 7 of 303 working children) worked more than 20 hours per week.

Previous studies in this literature seem to regard work of more than 20 hours per week as being 'excessive'. If this is the case, we have relatively few observations on which to gauge the detrimental effects of relatively large amounts of work on academic achievement. From ages 13 through 16, there were only 9 instances where a student was observed to be working more than 20 hours per week. This represents 0.9% of the observations on working students, and 0.3% of all observations on students over this period. Even if this critical threshold is lowered to more than 15 hours per week, we have only 23 instances of this behaviour (2.5% of working students, and 0.7% of all students over this period). Thus, if only excessive hours of work per week at these levels harm academic achievement, it will be difficult to isolate this effect statistically with these data.[7]

One of the chief advantages of panel data is that we are able to follow the same individuals over several periods. This allows us to say something about any 'persistence' associated with in-school work histories, and whether or not employment experience has any obvious cumulative effects on both the length of the workweek and hourly earnings.

Figure 1 displays a 'tree diagram', where we follow the employment outcomes for students conditional on their previous work histories. The first column divides the sample of 774 students into those who were and were *not* working at age 13. We already know from the first row of Table 1 that 21.8% of these individuals (n = 169) were working, and we know their average

7 The possibility remains that excessive work behaviour for students aged between 13 and 16 is more common in other geographic regions of New Zealand or in other time periods. Again, our data are restricted to a single birth cohort that remains living largely in the Canterbury region. The time period covered by this age range is 1990 through 1994. At least the early part of this period corresponds to a severe recession in this country. If excessive hours of work by students are pro-cyclical, then we may be less likely to observe these types of outcomes with the CHDS data.

weekly hours of work (h = 4.52) and average real hourly earnings (w = $4.43).

Students who worked at age 13 were much more likely to work at age 14 (60.9%) relative to those who hadn't worked in the previous year (16.5%). This persistence in employment histories continues into subsequent years. For example, students who had worked in the two previous years were much more likely to work at age 15 (71.8%) relative to those who hadn't worked in the two previous years (19.2%).

Yet, evidence of a substantial increase in student employment propensities with age is also clear in Figure 1. For those with no previous work experience, the employment propensity increases from 16.5% at age 14, to 19.2% at age 15 and to 23.3% at age 16. Even among students who hadn't worked at the time of the three previous interviews, nearly one-quarter of these individuals were working at age 16.

One of the most surprising results from this figure is the lack of any positive relationships between work experience and both the length of the workweek and hourly earnings. We might expect that individuals who work consistently over time would tend to steadily increase their weekly hours of work. This doesn't appear to be the case. For example, the average weekly hours of work by students at age 16 who were employed at ages 13, 14 and 15 is 7.59. This is only slightly higher than the average weekly hours of work of 6.43 by students working at age 16 who had not been working at the time of the three previous interviews. The results in this last column show very little evidence of any relationship between past employment propensities and the length of current workweek. There is little evidence in this figure to support the concern that students who work persistently at earlier ages are inclined to work excessive hours in high school.

This last column of Figure 1 also shows that the average hourly earnings of workers who hadn't worked at the time of the previous three interviews ($6.60) *exceeds* the average hourly earnings of workers who had worked at all four ages ($6.25). Of course, this descriptive analysis does not hold constant other proxies for productivity, like innate ability and academic achievement, which might overturn this negative relationship between work experience and hourly earnings among students aged 16 and younger. Yet, there is no evidence here of positive returns, in the form of higher hourly earnings, to early labour market experience.

One of the consistent findings in the overseas literature on in-school work is that this behaviour varies by the personal, family and other characteristics of students. Tables 2, 3 and 4 report some simple measures of how the employment outcomes for the 774 students between the ages of 13 and 16 vary by a variety of background characteristics. One of the motivations for examining these descriptive statistics is to highlight the relatively large number and variety of personal, family and school variables available in the CHDS. The extensive nature of these observable characteristics is one of the key advantages of this longitudinal dataset. We have measures of personal and family circumstances of children prior to start of the observation period on in-school employment that are generally not available to other researchers (e.g., multiple observations on test scores related to IQ, reading and scholastic abilities, and multiple indicators of classroom performance). We also have access to potentially more accurate

indicators of family backgrounds (e.g., family income averaged for a period of up to 12 years).

Tables 2 displays four measures of employment outcomes over the surveys from ages 13 to 16 (proportion working in at least one year, proportion working in any year, and average hours of work per week and real hourly earnings for those working). These measures are broken down by variables on personal and family circumstances prior to age 13. We find, for example, that children of parents who had no school or post-school qualifications were slightly more likely to work at some point over this period (62.4%) compared to children from parents who had some school or post-school qualifications (58.7%). These means are *not* significantly different from one another using a simple *t* test at conventional test levels. Similarly, the proportions of students working at any time during this period are also *not* statistically different from one another for those whose parents had no qualifications (30.1%) and those whose parents had some qualifications (29.0%). Yet, students with parents who had no qualifications tended to work significantly longer average workweeks (5.82 hours) than students with parents who had some qualifications (5.06 hours). These means are statistically different from another at better than a 10% level (indicated by a single asterisk).

Children tended to work significantly longer workweeks if they were raised in families with a single parent at some point between birth and age 12. They also worked longer hours if they were raised in families that received social welfare benefits at some point before age 12. When these students did work, however, they received significantly lower hourly earnings if they were raised in families with a benefit history ($5.27) compared to those whose families never received a benefit ($5.81). Students who were the only child in the family received significantly higher hourly earnings ($6.15) relative to those with at least one sibling ($5.52).

The next three variables in Table 2 relate to more-or-less continuous measures of family backgrounds. For convenience of interpretation, these variables are divided into three groups with relatively equal sizes. We report whether or not these mean labour market outcomes are statistically different between those in the 'top' and 'bottom' groups.

The CHDS contains information of the mother's depressive symptoms over period when the child was between the ages of 6 and 12.[8] These variables measure the mother's number of symptoms of depression at the time of each interview. High scores indicate evidence of maternal depression, while low scores indicate an absence of depression. Perhaps surprisingly, students with the highest in-school work incidence, hours of work and hourly earnings come from families with the highest maternal depression scores. Yet, the differences in employment behaviour of students between those in the top and bottom groups are not statistically significant in all four outcomes.

At each survey between ages of 1 and 12 of the child, parents were asked to report their current weekly labour and benefit income. This information was used to estimate their annual income in each year.[9] As mentioned earlier, the literature on in-school employment is the US has shown

8 See Horwood and Fergusson (1986) additional information on the nature of the maternal depression scores.
9 Valid information on family income is not available in every year for the 774 children in this sample. To avoid losing observations on the nearly 20% of children with incomplete family income measures, the reported mean

fairly consistent evidence of an inverted 'U-shaped' relationship between family income and the propensity of children to work while enrolled in high school (e.g., see Schoenhals 1998). This basic finding is replicated here. Children from families in the middle of the income distribution have higher propensities for in-school work compared to those from the lower and upper regions of this income distribution. Students from middle-income families are significantly more likely to work at some time between the ages of 13 and 16, and significantly more likely to work at any of these ages, compared to children from the top income families (not indicated with asterisks in this table). Yet, these differences do not carry over to the number of hours worked per week, and their hourly earnings. In fact, working students from the highest income families earn nearly 22% more per hour, on average, than working students from the lowest income families. The difference in these means is statistically significant at better than a 1% level.

Measured income may be a poor proxy for the overall living standards of the family. The CHDS contains reports from interviewers when the children were between the ages of 1 and 12 on the family's overall 'standard of living'. A five-point scale was used.[10] These scores were converted into means over the years, and the sample was divided into three groups. It is possible that substantial measurement error exists in these summary statistics on family living standards. Even though efforts were made by the administrators in the CHDS to insure that these categories were comparable across time and interviewers, the possibility exists that errors-in-variable problems may pervade these subjective observations. However, our contention is that this standard of living variable offers another potentially valuable dimension to the overall family backgrounds of children. For example, one of the problems with the income variable is that it captures only labour market and benefit income for the family. Incomes from other sources (e.g., rental, trust and interest income) would most likely be underreported by these income variables. The living standard variable might be a better overall proxy of family wealth. In the analysis that follows, the combination of both variables on family income and living standards is believed to provide a more comprehensive picture of the overall financial position of the youth's household.

There are no statistically significant differences in employment propensities for students among the three groups demarcated by family living standards. However, working students from families with the highest living standards tend to work fewer hours per week and receive higher hourly earnings than working students from families with the lowest living standards. These differences in means are statistically significant at 1% and 10% levels, respectively.

Table 3 provides similar cross-tabulations of in-school labour market outcomes between ages 13 and 16 by the personal attributes and circumstances of youth. Males (32.8%) are more likely than females (25.9%) to work in any of these four years. These mean proportions are

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incomes used here are averaged over only those years in which income is reported. To capture the family's long-term 'relative position' in the income distribution, these income figures were standardised to have a zero mean and unit variance within the sample in each year. All children in this sample had at least three annual income observations over this period.

10 These categories are: 5 = family obviously affluent; 4 = family has a good standard of living; 3 = family has an average standard of living; 2 = family has a below average standard of living; and 1 = family obviously poor or very poor.

significantly different from one another at better than a 1% level.

Maori and Pacific Island students are less likely to work compared to students of other ethnicities, but these differences are not statistically significant. However, when Maori and Pacific Island students work, they tend to work nearly two hours more per week than students of other ethnicities. These means are statistically different from one another at better than a 1% level.

Test results are available from the Revised Wechsler Intelligence Scale for Children. These tests were administered by the CHDS to children at ages 8 and 9. Only those children present in the Canterbury region were tested at these ages. To avoid losing valuable observations on children who were not tested for subsequent analyses, we include a residual category in this table where these IQ scores are 'Not Available' (*NA*). The remaining sample is divided into categories for those with mean IQ scores in the top, middle and bottom one-third of the distribution. The statistically significant differences are that working students with the highest IQ tend to work fewer hours per week, on average, than those with the lowest IQ.

The Burt Word Reading Test was administered to children resident in the Canterbury region at ages 8 through 12. Again, to avoid losing valuable information, we include a 'Not Available' category for those without any test scores over these five years. The remaining sample with a valid Burt score from at least one year, are divided into three categories based on the mean test score over the relevant years. It should be noted that these test scores were adjusted each year to have a zero mean and unit variance within the available sample. Thus the adjusted scores capture only the 'relative' performance of the child within the cohort in each year. Students with the highest reading abilities are less likely to work, tend to work fewer hours per week and receive higher wages than those with the lowest relative reading abilities. Only the difference in hourly earnings is statistically insignificant.

A single test of scholastic ability was also administered to children resident in the Canterbury region at age 13. The Test of Scholastic Abilities (TOSCA) is designed to measure the aptitudes considered necessary for academic success in high school. It contains 70 test items, and has scores that range from zero to 69 in this sample. Those with the highest scholastic abilities are less likely to work in school and tend to work fewer hours per week when they do work. However, these same youth receive higher wages when they work compared to those with lower scholastic abilities.

It is worth noting that the highest wages received by working students occur among those who were *not* tested (IQ, Burt and TOSCA). These are individuals in the 'Not Available' categories. Presumably, this reflects differences in local labour market that result in higher wage rates for young people in places like Wellington and Auckland.[11]

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11 The numbers of children for whom test score data are unavailable varies from 156 for TOSCA to 221 for the Burt Word Reading Test. This can occur for a variety of reasons. The child may have been living outside of the Canterbury region when the tests were administered. The child may have been living in the area, but the test was never administered for some reason (e.g., non-compliance). We do know that the vast majority of children in the 'not available' category were not tested because they lived outside of the Canterbury region at the relevant age. To

Between the ages of 7 and 12, teachers in the schools attended by the CHDS children were asked to rate the child's performance in the areas of reading, writing, spelling and mathematics. These were converted into 'Grade Point Averages' (GPA) across these years and subject areas.[12] Across all four measures of in-school work histories, significant differences were found between students in the top and bottom categories. Students with the lowest GPA before age 13 were more likely to work while in school after age 13. They also tended to work more hours per week and receive lower hourly earnings than working students with the highest GPA. This result is potentially important for estimating the effects of in-school work on academic achievement. Unless we hold constant school performance before age 13, we might mistakenly attribute poor academic outcomes at later ages to this in-school work. The key is whether in-school work is associated with poorer academic outcomes at age 16 and beyond, once we hold constant academic ability and performance at age 13 and earlier.

The CHDS contains conduct problem scores for children at ages 7, 9 and 11. These measures are based on a combination of parental and teacher reports on disruptive, destructive and aggressive behaviours displayed at each age. These checklists include things like lying, stealing and cheating. The recorded scores are the number of items ticked each year. The means are divided into three categories, where the top scores include children with the greatest conduct problems. Although students with more conduct problems are more likely to work between ages 13 and 16, only their longer hours of work per week are significantly different from those of working students with the fewest conduct problems.

Table 4 reports the breakdowns of in-school employment outcomes over the ages of 13 to 16 by contemporaneous school and peer characteristics. We know the identities of the secondary schools attended by these youth for slightly more than three-quarters of our sample. This information was only recorded for those resident in the Canterbury region at these ages. Youth attending either a church-affiliated or private secondary school were less likely to work and tended to work fewer hours than their counterparts who were always in public schools. Yet, these differences are not statistically significant. However, working students attending church or private schools did receive significantly higher hourly earnings.

Working students enrolled in single-sex secondary schools worked significantly fewer hours per week, but received significantly higher hourly earnings. Again, those outside the Canterbury region during this period were more likely to work and tended to receive higher hourly earnings if they did work compared to those living in this region.
At age 15, youth in the CHDS were asked about their association with peers displaying various forms of deviant behaviour. A checklist was created with a minimum score of zero (no deviant behaviour among friends) and a maximum score of 10 (substantial deviant behaviour among

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allow for systematic differences in the behaviour of children based on the area of residence, a dummy variable on respondents whose secondary school could not be identified at both ages 14 and 15 will be included in all subsequent regressions. This variable is closely related to unavailability of test score information at earlier ages. However, it must be recognised that any area of residence information can vary with the mobility of the family. Including a complete set of residence dummies by the age of the child would result in excessive multicollinearity.

12 A five-point scale was used, running from 5 for very good to 1 for very poor.

friends). Youth associating with more deviant peers were more likely to work and tended to work longer hours per week. Yet, the direction of casuality in this relationship is not obvious. It may be the case that working youth are exposed to more deviant peers. This has been one allegation raised in the overseas literature for the detrimental effects of labour market experience among young people.

The last three variables in Table 4 were constructed from the CHDS data specifically for the purposes of this study. No direct information is available on the characteristics of the peers of the CHDS youth other than the previously discussed variable on deviant behaviour. Both domestic and overseas studies suggest that other peer characteristics may influence individual employment and educational outcomes. Since we know the identities of the secondary schools attended by the youth in the CHDS who lived in the Canterbury region, we can aggregate information on the other participants in the CHDS who attended that same school and attach these mean characteristics to the person's own file. This was done for all youth at ages 14 and 15 enrolled in schools with at least 10 study participants other than the individual in question.

There were a total of 26 separate Canterbury area secondary schools identified by this procedure. Information was collected on the proportion of classmates who subsequently received their School Certificate qualification, their mean TOSCA scores at age 13 (indicating aptitudes for academic success) and their mean standardised family incomes. Our hypothesis is that all three variables on school peers may influence both individual work and educational outcomes. The means of the three measures at ages 14 and 15 are reported for three-quarters of our sample resident in the Canterbury region in at least one of these years.

Again, youth living outside the Canterbury region were the most likely to work while in school, and receive higher hourly earnings when they did work. Within the Canterbury region, youth from schools with the lowest school certificate pass rates and family income tended to work longer hours per week and receive lower hourly earnings. Teenagers with peers who had the lowest TOSCA scores also received significantly lower hourly earnings.

In summary, these descriptive statistics suggest that in-school work histories for children in the CHDS between the ages of 13 and 16 vary by several personal, family and school-related characteristics. Students from more disadvantaged backgrounds tend to work longer hours per week at lower wage rates than other students. Those with indicators of lower cognitive ability and academic performance have higher propensities to work while in school, and tend to work longer hours per week at lower wage rates. Youth associating with deviant peers and those enrolled in secondary schools with classmates who are less likely to receive their School Certificate qualification and more likely to come from low income families, tend to work longer hours per week. Since it is expected that these same background characteristics may directly influence academic achievement, it is important that these variables be held constant in any attempt to isolate the effects of in-school work histories on subsequent educational outcomes.

4.2 Regression Analysis on In-School Work Histories

Table 5 reports the results from multivariate regression analysis on a single measure of the in-

school work histories of children in the CHDS between the ages of 13 and 16. The dependent variable chosen is the average number of hours worked per week over all four surveys. This includes situations where youth were not working at the time of these interviews. We consider this to be the best single measure of the overall in-school work experience. It captures both the propensity to work and the amount of labour supplied at any point in time. Previous descriptive analysis suggests that both factors often vary by personal, family and school-related characteristics. Regression analysis allows us to measure the 'partial' relationships between in-school work histories and these various background factors.

When average weekly hours of work over ages 13 to 16 is regressed against two dummy variables on gender and ethnicity, less than 1% of the variation in this dependent variable can be explained by these two covariates (R^2 statistic of 0.006). This is an example of the restricted background information that would be available in conventional cross-sectional datasets. When this same dependent variable is regressed against the full set of explanatory variables on personal, family, school and peer characteristics, the explanatory power of this regression model increases substantially. The R^2 statistic is 0.095. Yet, this means that less than 10% of the variation in average weekly hours of work by students aged between 13 and 16 can be explained by the full set of covariates.

In particular, student work histories between the ages 13 and 16 are positively related to the maternal depression scores and the part-time and full-time work propensities of parents between the ages of 1 and 14. There is no evidence of any statistical relationship between the weekly hours of work by students and their earlier family incomes.[13] Students also tend to work more while in school if they have *higher* IQ scores at ages 8 and 9 and *lower* scholastic abilities at age 13. Both estimated coefficients are statistically significant at better than a 5% level. Although the child's own conduct problems are negatively related to in-school work, the deviant behaviour of peers has no measurable impact on this behaviour. Among the other peer variables, only the average family income of classmates in secondary school tends to influence (negatively) average weekly hours of work.

13 This raises the interesting issue on the relative contributions of student earnings to overall family income. Age 14 of the children was the last year in which weekly income from parents and weekly earnings from students were observed at the same time. The mean weekly earnings received by children in this sample ($3.59) represented only 0.3% of the mean weekly income of parents ($924.70). For those children working at age 14, their mean weekly earnings ($13.90) still represented only 1.5% of the mean weekly income of their parents ($926.65). Even the maximum weekly earnings by a student at this age ($53) was a tiny fraction (5.7%) of the mean weekly income among parents ($924.70).

4.3 Regression Analysis on School Certificate Outcomes

We want to know the extent to which in-school work histories between the ages of 13 and 16 influence subsequent academic achievement. We need to choose appropriate measures for this educational attainment that capture not only qualitative outcomes (e.g., whether or not a qualification was obtained), but also quantitative outcomes (e.g., how well the subject did in achieving this qualification). To accurately measure these effects, the educational outcomes should occur as close as possible to the end of the observed period on in-school employment.

Unfortunately, the CHDS does not provide anything like the earlier reports from teachers between the ages of 7 and 12 that would allow grade point averages to be computed at age 16. If these data were available, we could regress the 'change' in GPA between ages 12 and 16 against observed in-school employment over this time interval and other personal and family characteristics.[14] Yet, the CHDS contains a substantial amount of early information on the innate abilities, classroom performances, scholastic aptitudes and conduct problems that can be held constant in this regression analysis. We achieve something akin to this 'first-differencing' approach by including these various factors as explanatory variables in our regressions. In fact, it could be argued that the vast amount and diversity of information on academic ability and achievement by age 13 mitigates some of the problems that confront other analysts who have single 'before' and 'after' observations on educational outcomes that may be measured with considerable noise.

Our dependent variables for this regression analysis focus on the results from the national School Certificate exams administered to students around age 16. The youth interview at age 18 asked respondents to report the number of School Certificate subjects sat, and the letter grade received from each of these exams. These letter grades are converted into an overall grade point average for this analysis.[15]

Suppose we have the following regression model in mind.

$$\overline{H}_i = \alpha + X_i'\beta + u_i \tag{1}$$

$$SC_i = \delta + Z_i'\gamma + \eta\overline{H}_i + \varepsilon_i \tag{2}$$

The dependent variable in equation (1) is the average weekly hours of work of a student at the time of the surveys at ages 13 through 16. It is assumed to be a linear function of a set of personal, family, school and peer characteristics already discussed in previous descriptive statistics and the regression analysis reported in Table 5. These explanatory variables are included in vector X_i. The effects of these background factors on in-school work behaviour is

14 See the earlier discussion on Oettinger (1999) for an example of this kind of regression analysis designed to control for unobserved, permanent person-specific effects.

15 The possible grades are A, B, C and D. To convert these results to a grade point average, the letter grades were assigned values of 4, 3, 2 and 1, respectively.

summarised by the coefficient vector β. The disturbance term in this equation is u_i. It captures the effects of all unobserved factors on this in-school employment outcome.

The dependent variable in equation (2) is an outcome associated with the School Certificate exams. This could be either a dichotomous variable of whether or not the individual sat these exams, or the mean GPA conditional on sitting these exams. In either case, these School Certificate results are assumed to be a linear function of a set of background characteristics in vector Z_i and mean weekly hours of work over the previous four surveys.

The key coefficient in this second equation is η. This parameter captures the average impact on School Certificate performance from an increase of one hour in mean weekly hours of work, while holding constant all of other measured factors that might influence this academic achievement. Again, the variables in the Z_i vector include measures of earlier academic ability (e.g., IQ, reading ability, scholastic aptitudes and teacher reports on classroom performance).

There are a few points to make about the specification of this particular two-equation regression model. Firstly, this is a 'triangular system'. This implies that the dependent variable in the first equation appears as an explanatory variable in the second equation, and not vice versa. In-school work histories may be expected to influence subsequent academic achievement. Yet, School Certificate performance should have no direct impact on *past* work experience. The most important justification for this triangular specification is the normal 'time sequence' of these respective events.

Secondly, single-equation estimation techniques (Ordinary Least-Squares (OLS) when the dependent variable is quantitative and continuous, or maximum likelihood probit when the dependent variable is discrete and qualitative) will be used initially to estimate the parameters in the two equations. Simultaneous-equation estimation (Two-Stage Least-Squares (2SLS)) will then be used to test the robustness of these earlier findings. The results from this 2SLS estimation are summarised at the end of this section.

Simultaneous-equation bias occurs if there are omitted variables in equations (1) and (2) that result in a correlation between the disturbance terms (u_i and ε_i). This would cause the explanatory variable $\overline{H}_i$ and the disturbance term in this second equation to be correlated. This violates an assumption of single-equation estimation techniques, and results in biased estimates of η. The direction of this simultaneous-equation bias would be difficult to sign a priori. If children with more motivation and self-discipline were both more likely to work while in school *and* to perform better on their School Certificate exams, η would be biased toward zero (i.e., understating the detrimental effects of in-school work on academic achievement). On the other hand, if children with little desire for higher education were both more likely to work while in school *and* to perform poorly on their School Certificate exams, η would be biased away from zero (i.e., overstating the detrimental effects of in-school work on academic achievement).

Our hope is that the inclusion of a larger number of personal and family background characteristics available in the CHDS, especially early indicators of innate ability, cognitive achievement, scholastic aptitudes and classroom performance, will mitigate this potential bias.

The alternative is to find at least one instrumental variable for this estimation. A valid instrument would have to influence the work behaviour of the child without affecting academic achievement. This is a variable included in the vector X_i that is properly excluded from vector Z_i.

There are no obvious candidates for this instrumental variable in this panel data set. Overseas studies in this area have used variation in local labour market conditions (e.g., female labour force participation and general unemployment rates) as instruments. This approach would be difficult to implement in the present study, since approximately three-quarters of youth in the CHDS lived in the Canterbury region between ages of 13 and 16. As a result, we have little variation in these local labour market conditions.

One possible source for instrumental variables is the extensive information on the work histories of parents. Working parents might serve as 'role models' and provide labour market 'information and contacts' for their children, which would increase both the likelihood and amount of in-school work by their child.[16] Yet, we would have to assume a priori that the work histories of parents had no direct influence over the academic achievement of children, once other background factors are held constant (e.g., family structure and income).

Our plan is to first estimate equation (2) separately by single-equation estimation techniques. We then report the parameter estimates from this regression estimated using simultaneous-equation estimation techniques, where parental work histories are used as instruments (included in the vector X_i, but excluded from the Z_i). These 2SLS results are summarised at the end of this section.[17]

The first two columns of Table 6 report the results from regressions on the probability of sitting School Certificate exams for the 774 individuals in the CHDS who were still enrolled in school at age 16. Note that information on School Certificate outcomes generally comes from the interview at age 18. By that date, 91.6% of our sample had sat School Certificate exams. Maximum likelihood probit is used to estimate the determinants of the probability of sitting these exams. The reported parameter estimates are the partial derivatives of this probability with respect to each of the explanatory variables (evaluated at the means of the other variables in the equation), and their associated standard errors. In other words, the estimated parameters in this table show the average change in the probability of sitting School Certificate exams for a one-unit change in each explanatory variable, holding other measurable factors constant.

We first ignore most of the background characteristics available for this analysis, and regress this

16 Note that three of the four variables on the part-time and full-time work propensities of parents over the ages of 1 through 14 of their children were significantly different from zero at better than a 5% level in equation (1). See the second column of Table 5 for these estimated parameters.

17 The following steps are used under 2SLS. Firstly, equation (1) is estimated, including the four instruments on the work histories of the parents (i.e., the long specification reported in Table (5). Secondly, the fitted values from this regression are retained and included as an explanatory variable, replacing $\overline{H}_i$ in equation (2). Finally, the standard errors on the estimated parameters are corrected for this 2SLS procedure in the regression on academic achievement.

dummy dependent variable on gender, ethnicity and mean weekly hour of work from ages 13 through 16. We next include all of the available covariates for this analysis. Results from these 'short' and 'long' specifications should suggest whether or not it is important to control for the observed heterogeneity in this sample in isolating the effects of in-school work on academic achievement.

The results in the first column of Table 6 show that mean weekly hours of work have a negative impact on the probability of sitting School Certificate exams, but this estimated effect is not statistically significant. The second column shows the impact of including the full set of background variables in this regression. Firstly, the additional independent variables substantially increase the overall explanatory power of the model. The short specification has a 'pseudo R^2 statistic' of 0.036, while the long specification has a pseudo R^2 statistic of 0.344. This means that factors other than gender, ethnicity and work history are largely responsible for capturing the observed variation in the probability of sitting School Certificate exams.

Variables that are individually significant in the long specification are the youth's own IQ and conduct problems, and the deviant behaviour of his or her peers.[18] Youth with higher IQ scores at ages 8 and 9 are more likely to sit School Certificate exams around age 16. Youth who exhibit their own conduct problems or associate with peers engaging in deviant behaviour are less likely to sit these exams.

Mean weekly hours of work have a negative effect on the probability of sitting School Certificate exams, but this effect is again not statistically different from zero. The point estimate for this partial derivative has decreased in absolute value from –0.005 to –0.001 with the inclusion of the additional personal and family background characteristics. This second result says that an increase in one hour of work per week lowers the probability of sitting School Certificate by an average of one-tenth of a percentage point. Yet, there is no statistical evidence of any relationship between in-school work and the probability of sitting School Certificate exams for those who remain in school through age 16.

The last two columns of Table 6 display the results from OLS regressions on the Grade Point Average of School Certificate results for the 709 of the 774 youth who sat these exams. The mean of this dependent variable is 2.21, which is equivalent to a GPA of approximately a C+ on these exams. Again, both the short and long specifications were estimated. Without personal, family and other background characteristics, weekly hours of work over ages 13 to 16 have a negative and significant effect on School Certificate performance. The coefficient estimate on this variable is –0.049, with a standard error of 0.015. This estimated effect is statistically different from zero at better than a 1% level. This says that, once we hold gender and ethnicity constant, an increase in the average workweek by one hour lowers the mean School Certificate mark by nearly one-twentieth of a letter grade. Or to put it differently, an increase from zero to twenty in mean hours of work per week leads to a reduction in School Certificate performance by approximately one full letter grade.

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18 Unlike the earlier descriptive analysis, these and all other background variables are included as continuous measures in these regressions.

With the inclusion of the full set of personal, family and other background factors, the statistical significance on the youth's work history disappears in the regression on School Certificate GPA. The estimated coefficient is –0.006, and it is no longer statistically different from zero. Once we control for measurable differences in the characteristics of this sample, average weekly hours of work no longer appear to influence School Certificate performance. Observationally equivalent youth who engage in work while enrolled in school are just as likely to sit *and* to perform just as well on these School Certificate exams.

The last column of this table shows how important it is to have information on personal, family and other background characteristics in estimating the effect of work histories on School Certificate performance. Without these background data, we would generate misleading conclusions on the effects of in-school work on academic achievement. The R^2 statistic increases substantially from 0.038 under the short specification to 0.580 under the long specification. The explanatory power of the regression model increases more than 15-fold with the inclusion of these additional background measures.

Students tend to receive higher marks on their School Certificate exams when their parents have post-school qualifications, and when they were raised in families with higher income levels. More importantly, exam performance is positively related to earlier IQ test scores, indicators of scholastic abilities, teacher assessments of classroom performance and an absence of behavioural problems.[19] Association with deviant peers is negatively related to School Certificate GPA. Among the peer variables, only the average family income of peers appears to influence School Certificate performance.

Of course, the results obtained thus far do *not* rule out the possibility that only 'excessive' levels of in-school work might have detrimental effects on School Certificate performance. It was noted earlier that there is a scarcity of relatively high levels of weekly hours of work among students in the CHDS through age 16. Yet, it is possible that we might be able to pick up 'nonlinearities' in this relationship even for the relatively moderate levels of in-school work in this sample.

The following procedure was used. The long specifications of the probit and OLS regressions on School Certificate performance were re-estimated. Two sets of changes were made. Firstly, the continuous measure of average weekly hours of work was replaced by a single dummy variable indicating that average weekly hours of work exceeded some arbitrary threshold. This threshold was raised steadily in one-hour increments from three to nine hours per week. The estimated derivatives on these dummy variables (and their standard errors) from seven separate probit regressions on the probability of sitting School Certificate exams are reported in the upper panel of Table 7. The estimated coefficients (and their standard errors) on the same dummy variables in seven separate OLS regressions on the GPA for those who sat these exams are reported in the

19 Note that the estimated coefficient on the Burt Word Reading Test Score over ages 8 through 12 is negative and statistically different from zero at better than a 1% level. This counterintuitive result might be the result of the inclusion of many other measures of innate, cognitive and academic abilities that are probably closely associated with reading levels.

upper panel of Table 8. In both cases, the means of each dummy variable (i.e., the proportion of the sample exceeding each threshold of weekly hours) are reported just below the regression results.

Secondly, to test for the separate effects on School Certificate performance of work experience at each of the four ages, this single dummy variable was replaced by four dummy variables capturing arbitrary thresholds on excessive weekly hours of work at ages 13 through 16. This threshold was raised steadily in increments ranging from three to twenty hours per week. The estimated derivatives (and their standard errors) on these four dummy variables from seven separate probit regressions on the probability of sitting School Certificate exams are reported in the lower panel of Table 7. The estimated coefficients (and their standard errors) on the same dummy variables in seven separate OLS regressions on the GPA for those who sat these exams are reported in the lower panel of Table 8. In both cases, the means of these dummy variables (i.e., the proportions of the sample exceeding each threshold of weekly hours at each age) are reported just below the regression results.

When excessive in-school work is defined in terms of average hours worked per week over ages 13 through 16, there is no statistical evidence that it has any influence over the probability of sitting School Certificate exams. Once all of the personal, family and other characteristics in the long specification reported in Table 6 are held constant, the estimated coefficients on the different dummy variables reported in the upper panel of Table 7 are all insignificantly different from zero at conventional test levels. These arbitrary thresholds for defining excessive weekly hours of work span a considerable range in terms of the proportions of the sample included. At the low end, slightly more than 17% of youth averaged more than three hours of work per week over the four surveys. At the high end, less than 1% of these youth (6 out of 774) average more than nine hours of work per week over the four surveys.

The upper panel of Table 8 shows that working above these average workweek thresholds have no measurable effects on the GPA for those who sit School Certificate exams, once other background factors are held constant. None of these estimated coefficients are significantly different from zero. When excessive hours of work are defined in terms of the average workweeks over the ages of 13 through 16, there is no evidence from youth in the CHDS that in-school work has any detrimental effects on School Certificate performance.

The possibility still exists that work behaviour at each particular age might influence academic achievement in different ways. For example, excessive hours of work at later ages might be more closely linked to poor outcomes on School Certificate exams. For this reason, the regressions reported in the bottom panels of Tables 7 and 8 contain parameter estimates on four dummy variables for excessive hours of work at each age. At the low end, nearly 28% of the youth at age 16 worked more than three hours per week. At the high end, none of the youth at ages 13 and 14 worked more than 20 and 15 hours per week, respectively (these dummy variables were therefore excluded from the regressions due to an absence of variation within the sample).

There is little evidence of a consistently negative effect on excessive hours of work at any age on

the probability of sitting School Certificate exams. Eight of the 25 estimated parameters are statistically significant at conventional test levels, but these are equally split between being significantly positive and significantly negative. Only hours of work exceeding 12, 15 or 20 per week at age 16 appear to reduce the probability of sitting School Certificate (by around 4.2 to 4.5 percentage points). Yet, even these marginal effects are imprecisely estimated (with statistical significance ranging from 5% to nearly 20%).

The lower panel of Table 8 shows that working above these workweek thresholds at each age have no measurable effects on the GPA for those who sit School Certificate exams, once other background factors have been held constant. None of the 24 estimated coefficients are statistically significant at a 10% level. Thus, when excessive hours of work are defined in terms of workweeks at each age, there is little evidence in the CHDS that in-school work has any detrimental effects on School Certificate performance.

One final issue to explore is the possibility that our estimates on the effects of in-school work are tainted by simultaneous-equation bias. Again, the problem in controlling for the endogeneity of work experience is the lack of obvious candidates for instrumental variables. We need at least one variable which influences work outcomes at ages 13 through 16, but not academic achievement. It was mentioned earlier that the work histories of parents could be used in this capacity. They significantly influence the average hours worked by youth (Table 5), but have little measurable impact on School Certificate performance (Table 6).

It is easy to characterise the results from this Two-Stage Least-Squares (2SLS) estimation. There is no statistical evidence of any detrimental effects from average hours of work between ages 13 and 16 on either the probability of sitting School Certificate exams or the GPA for those who sat these exams. All of the estimated coefficients on work histories were statistically insignificant in this 2SLS estimation.[20] We have to conclude that the balance of evidence from this study suggests that the early work histories of students in the CHDS have no measurable effects (either negative or positive) on their later academic achievement.

5. In-School Work and University Bursary Qualifications

5.1 Descriptive Analysis on In-School and In-Tertiary Work Histories

The work histories of the 774 youth, who were enrolled in school until age 16, can be updated through age 18. Of course, some of these individuals will have discontinued their education by this later date. Since our interests are on the effects of in-school work on subsequent academic achievement and labour market transitions, we restrict our attention to the 464 individuals who were enrolled in school or tertiary study full-time over this entire period. Thus, slightly less than 60% of those continuously in school through age 16 were still enrolled full-time in education up

20 It should be noted that these 2SLS results were quite volatile, with large standard errors on the coefficient estimates related to the average hours worked per week over ages 13 to 16. This is probably due to the fact that the work histories of parents are dubious instruments for the work outcomes of their children.

through their 18th birthdays.

Annual surveys on study participants ended at age 16. The interview at age 18 asked youth about their educational and work histories over the two previous years. However, information on past work experiences over this two-year period was relatively limited. We know the number of jobs held between their 16th and 18th birthdays. For those currently working at the interview at age 18, we know the number of months that they held their primary job, their usual weekly hours of work and their hourly earnings at the time of the survey.[21]

The in-school or in-tertiary work information gathered from students by age 18 is displayed in the first two rows of Table 9. We know from the reports on both current work experience and the number of jobs held over the previous two years, the proportion of students who had some work experience between the interviews at ages 16 and 18. Approximately nine out of ten students (90.5%) had worked *at some point* over this two-year interval. However, from these data we cannot distinguish between work that takes place during the weeks in which these individuals were studying, and work that takes place during school or summer holidays. All we know is that nearly all of these students had some work experience between the ages of 16 and 18. On average, these full-time students held 1.89 jobs over this two-year period.

Data on weekly hours of work, job tenure and hourly earnings for students working at age 18 are displayed in the second row of Table 9. More than one-half of these individuals (58.2%) were working at this age. Almost all of these working students were in part-time work (defined as fewer than 30 hours per week). Employed students worked an average of 11.57 hours per week. There is a positive relationship between age and the work behaviour of full-time students. At age 13, only 21.8% of students were working for an average of 4.52 hours per week. At age 16, 39.1% of these same students were working for an average of 6.74 hours per week. At age 18, 58.2% of students were working, with an average workweek of 11.57 hours. The estimated mean of real hourly earnings among working students at age 18 is $7.97. This figure is nearly 25% higher than average real hourly earnings at age 16 ($6.38), and nearly 80% higher than average real hourly earnings at age 13.

5.2 Regression Analysis on Obtaining a University Bursary Qualification

Table 10 reports the regression results on the probability of obtaining a University Bursary qualification. The sample is restricted to the 301 individuals who were still enrolled in secondary school at the time of the interview at age 18. In this way, we know that all reported work experience occurred before the completion of a secondary education. The dependent variable equals one if a student received University Bursary by age 21; zero otherwise. The mean of the dependent variables is 0.439. Among full-time secondary students at age 18, less than one-half eventually received their University Bursary qualification.

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21 Only categorical information is available on hourly earnings. Ten categories exist, with the lowest of less than $3.00 per hour and the highest of $12.00 per hour or greater. In computing hourly earnings, mid-points of the other categories were used. Values of $2.00 and $13.00 were assigned to the lowest and highest categories, respectively.

The first column reports the parameter estimates from the maximum likelihood probit estimation of the probability of obtaining University Bursary using a 'short' specification which includes gender, ethnicity and four variables on in-school work experience (mean weekly hours of work between the ages 13 and 16, number of jobs held between ages 16 and 18, number of months in job at age 18 (tenure) and weekly hours worked at age 18). The latter four explanatory variables are taken directly from the CHDS and should provide a comprehensive picture of the in-school work histories of students.

Both of the estimated effects associated with weekly hours of work are negative under this short specification. Only the length of the workweek at age 18 significantly reduces the probability of obtaining University Bursary. This partial derivative is significantly different from zero at better than a 5% level. It is easy to interpret the magnitude of this estimated effect. An increase of one hour of work per week at age 18 lowers the probability of receiving University Bursary by an average of 1.1 percentage points. The other two measures of the work histories (number of jobs held and tenure) are both individually insignificant. A Wald test was used on the joint restrictions that all four coefficients on the work history variables are simultaneously equal to zero. This null hypothesis can be rejected at a 9.7% level. There is at least some weak statistical evidence that work histories through age 18 affect the probability of obtaining University Bursary under this short specification.

Yet, the explanatory power of the regression model increases substantially when the additional personal, family and other background characteristics are included in this estimation. The results from this 'long' specification are reported in the second column of Table 10. The pseudo R^2 statistic increases from 0.042 to 0.328. Individuals with mothers displaying symptoms of depression are more likely to obtain this school qualification. Family income is also positively and significantly related to this educational outcome. Youth with higher IQ and scholastic ability test scores and lower conduct problem scores are more likely to obtain this qualification.

The inclusion of these additional background measures eliminates any statistical significance of in-school work histories on the probability of obtaining University Bursary. Both estimated partial derivatives on weekly hours of work remain negative, but the inclusion of the other covariates reduces the estimated magnitudes of these effects and increases their standard errors, making them both individually statistically insignificant at a 10% level. A Wald test on the null hypothesis of that all four coefficients are simultaneously equal to zero can be rejected at a 46.0% level. There is no statistical evidence that in-school work experience lowers the probability of observationally equivalent secondary students eventually obtaining University Bursary. This is also true of auxiliary regressions that replace the continuous measures of weekly hours of work with dummy variables for different thresholds of 'excessive' weekly hours of work at age 18. Once the full set of background characteristics were included, none of the effects on these excessive workweeks variables at age 18 were statistically significant at even a 10% level.

6. *In-School and In-Tertiary Work and Labour Market Transitions by Age 21*

6.1 Descriptive Analysis on In-Tertiary Work Histories by Age 21

Retrospective date were taken from the CHDS interview at age 21 on the education and work histories of respondents over the preceding three years. Youth were asked whether they had engaged in part-time or full-time education during each of the 12 quarters between the surveys at ages 18 and 21. They were also asked whether they had worked part-time (less than 30 hours per week) or full-time (30 or more hours per week) in each quarter.[22]

The third, fourth and fifth rows of Table 9 display the evidence on the employment outcomes for full-time students during each of the three years. The sample size declines from 445 students between their 18th and 19th birthdays to 298 students between their 20th and 21st birthdays as these individuals leave full-time school or tertiary study. The proportion with some work experience in the same quarter in which they were enrolled in full-time education rises from 59.8% to 72.1% over the three years. The proportions working full-time are 6.2%, 8.4% and 8.1% over the three age ranges, respectively. These data probably overstate the proportions of full-time students who work 30 hours or more per week while they are studying. We have much more accurate measures of this behaviour at the time of the interviews. Only 1.5% of full-time students at age 18 (7 of 464 individuals) and 0.8% of full-time students at age 21 (2 of 249 individuals) report working 30 or more hours per week at the time of each survey. There is little evidence from this sample of a large proportion of full-time students working excessively long hours per week.

Contemporaneous data suggest that the increase with age in the amount of work performed by full-time students probably levels off with tertiary study. Slightly more than one-fifth of students were working at age 13. The proportion working increased to nearly two-fifths at age 16, but remains at slightly less than three-fifths of full-time students at ages 18 through 21. Average weekly hours of work for employed students at age 18 (11.57) increased slightly by age 21 (12.18).

Discrepancies between the contemporaneous and retrospective data on the employment propensities of full-time students can probably be attributed to two factors. Firstly, older students are more likely to engage in work during the longer break periods associated with tertiary study. Secondly, some of this work may be occurring after the termination of education, but is reported as coming from the same quarter in which the youth was a full-time student. Both

22 These data do not provide an ideal description of these outcomes, since they most likely indicate whether or not the individual occupied a given educational and employment state *at some point* during the quarter. The problem is that a full-time student who wasn't working while studying, for example, might have been employed full-time for a few weeks between semesters. This individual could indicate both full-time study and full-time work in the relevant quarter. Unfortunately, no information is available from these retrospective data on the 'timing' of work histories around full-time study. We cannot distinguish the aforementioned situation from one where a student simultaneously studied and worked full-time over the entire quarter.

of these factors would tend in increase measured employment propensities in the retrospective data, but not in the contemporaneous data.

At age 18, 47.8%, 25.2% and 10.7% of employed full-time students were working more than 10, 15 and 20 hours per week, respectively. There is a slight 'rightward shift' in this workweek distribution by age 21. At the time of the latest survey, 51.7%, 26.6% and 11.2% of employed full-time students were working more than 10, 15 and 20 hours per week, respectively.

Real hourly earnings received by working full-time students continue to rise with age. The mean hourly earnings of employed full-time students was $11.59 at age 21. This represents increases of 45.4% and 82.7% over the real hourly earnings of employed students at ages 18 and 16, respectively.

Again, one of the primary advantages of panel data is that we can follow the same individuals over time. This allows us to say something about the persistence associated with in-school and in-tertiary employment for the same individual, and whether or not these work histories have any obvious effects on the length of the workweek or hourly earnings. There is another dimension to these outcomes that wasn't present in Figure 1. We also observe the relationship between previous work histories and the probability of leaving education by a given age.

Figure 2 displays another 'tree diagram', where we can follow the employment outcomes for students conditional on their work histories. The first column divides the original sample of 774 students into three general categories: those who worked in either 3 or 4 years between ages 13 and 16 (n=134); those who worked in either 1 or 2 years over these same interviews (n=327); and those who never worked over the four surveys (n=313). All data between interviews at ages 16, 18 and 21 are ignored. Instead, we concentrate on the more consistent and accurate information taken from the time of these surveys.

Several interesting relationships can be deduced from the statistics in Figure 2. Firstly, the propensity to remain in tertiary education through age 21 varies inversely with work experience through age 16. For youth with 3 or 4 years of early work experience, 20.9% were enrolled in full-time study at age 21 (28 of 134). For those working either 1 or 2 years before age 16, 24.8% were full-time students at age 21 (81 of 327). For youth with no early work history, 34.8% were enrolled in full-time study at age 21 (109 of 313).

Secondly, there is clear evidence of persistence among individuals in their employment participation over time. Among students with 3 or 4 years of work experience before age 16 who remain in education, 72.1% were working at age 18 and 78.6% were working at age 21. On the other hand, among students with no work experience before age 16, 46.0% were working at age 18 and 46.8% were working at age 21. Yet, there is also evidence that even individuals without earlier work experience may enter the workforce at a later age. For example, 41.7% of full-time students were working at age 21 even though they had no work history before age 16 and were not working at the time of the interview at age 18.

One of the more surprising results from Figure 1 was the apparent lack of any relationship

between work histories and either the length of the subsequent workweeks or hourly earnings. We might expect that individuals who consistently work over time would tend to steadily increase their weekly hours of work. There is only weak evidence of this in Figure 2. For example, the average workweek for the 15 students who worked at ages 13 through 16, 18 and 21 was 13.47 hours. The average workweek for the 26 students working at age 21 who had never worked at the time of the earlier surveys was 9.40 hours. The results in the rest of this column show at best a weak, positive relationship between past employment propensities and the length of current workweek.

This last column of Figure 2 shows that the average hourly earnings of working full-time students at age 21 were slightly higher for those who hadn't worked at the time of all previous interviews ($11.38) compared to those who had been working at the time of at least three surveys through age 16 and at age 18 ($11.11). Of course, this analysis does not attempt to hold constant other proxies for productivity, like innate ability and academic achievement, which might overturn this finding. Yet, there is little evidence from these descriptive statistics that accumulating work experience while studying raises the potential hourly earnings facing full-time students.

6.2 Regression Analysis on Labour Market Transitions by Age 21

Two sets of regression results examine the effects of in-school and in-tertiary work histories on labour market transitions by age 21. Overseas literature in this area has reported mixed results on the effects of early work experience for subsequent wage rates and employment opportunities.

We concentrate on the circumstances of the 489 youth in the CHDS who had terminated their education by the time of the 21-year interview. We first examine the 'undesirable' outcomes of being either unemployed or in receipt of social welfare benefits at the time of this survey. The dependent variable takes on a value of one if the individual at age 21 was without a job and either actively seeking work or receiving weekly income from the Unemployment or Domestic Purposes Benefit programmes, and was zero otherwise. The mean of this dependent variable is 0.223. More than one-fifth of our sample of individuals who had terminated their education were without a job and 'economically inactive' at age 21.

In-school and in-tertiary employment would be expected to reduce the probability of being unemployed or on a benefit if this work experience smoothes the transition into the labour market. The first column of Table 11 shows the results from the regression without the full set of personal, family and other background characteristics. There are three sets of regressors that capture the work histories of CHDS youth when they were enrolled in school or tertiary study. Mean weekly hours of work between ages 13 and 16 can be included for everyone, since the original sample was restricted to youth who continued in school through age 16. A dummy variable is included for those who remained in education until age 18. This dummy is interacted with three variables that capture the available information on work experience between ages 16 and 18 (number of jobs held, number of months in this job and weekly hours of at age 18). A dummy variable is included for those who experienced some full-time education between ages

18 and 21. This dummy is interacted with two variables that capture the available information on work experience during this education (proportion of time working part-time and full-time).

As expected, all of the estimated effects on in-school and in-tertiary work experience are negative. Yet, only the estimated impact of tenure in the job at age 18 is individually significantly different from zero at a 10% level. A Wald test was used on the hypothesis that all six coefficients on the work history variables are simultaneously equal to zero. This null hypothesis can be rejected at a 21.5% level. There is little statistical evidence of any direct link between in-school or in-tertiary work and the probability of being without a job and economically inactive at age 21 within this short specification.

The second column of Table 11 shows the results from the regression with the full set of personal, family and other background characteristics. In moving from the short to long specification, the explanatory power of the model increases moderately from a pseudo R^2 statistic of 0.082 to 0.148. This suggests that individual background factors become increasingly less important in explaining labour market outcomes later if life.[23] Five of the six estimated parameters have the expected negative signs, but only job tenure at age 18 is individually significantly different from zero at a 10% level. A Wald test on the null hypothesis that all six coefficients are equal to zero is rejected only at a 24.8% level. Again, these regressions provide little consistent statistical evidence of any effects from in-school or in-tertiary work histories on the probability of being without a job and economically inactive at age 21.

Table 12 reports the regression results on the natural logarithm of hourly earnings for those working and reporting both weekly earnings and weekly hours of work at age 21. This restriction reduces the sample size to 376 individuals. In both the short and long specifications, female workers receive lower hourly earnings than their male counterparts. These estimated coefficients are significantly different from zero at better than a 1% level. The gender gap in wages increases slightly when we hold constant the detailed personal and family background factors in the long specification. Ethnicity has no measurable effect on hourly earnings in either specification.

Acquiring a school qualification by age 21 (School Certificate, Higher School or Bursary Qualification) significantly increases the hourly earnings received by workers not enrolled in education at age 21. On average, a school qualification raises hourly earnings by 16.6 percentage points when only gender, ethnicity, and work experience are held constant.[24] This estimated effect is significant at better than a 1% level. When the full set of background factors are included in the regression the estimated impact of a school qualification falls slightly to 13.3 percentage points, and is significant at better than a 5% level.

Post-school qualifications are estimated to have negative and, in some cases, significant effects on hourly earnings. This is not that surprising. Many of these individuals will have just recently

23 See the earlier increases in the R^2 statistics in going from the short to long regression specifications in previous tables.

24 In a semi-logarithmic regression, this predicted effect from a dummy independent variable is determined by plugging this estimated coefficient (b) into the following expression $e^b - 1$ (e.g., see Halvorsen and Palmquist 1980).

started their labour market transitions. We know from overseas studies that the earnings of individuals with post-school qualifications may be initially below those in their cohort with school qualifications and more post-education experience. Yet, the earnings profiles of workers with higher educational attainment tend to be much steeper, and the relative positions of these two groups will likely change over the next few years. In other words, these early results should not be interpreted as evidence of zero or negative returns to post-school qualifications.

In the long specification, we find that the part-time work experience of mothers is positively and significantly associated with the hourly earnings of her children at age 21. Yet, part-time work by the father is negatively and significantly related to these same hourly earnings of youth. None of the other background factors have significant individual effects on the hourly earnings of youth. These covariates include measures of IQ, scholastic abilities, teacher ratings of classroom performance, conduct problems, family income and various school and peer characteristics.

Our primary interest in these hourly earnings regression relates to the estimated coefficients on the six measures of in-school and in-tertiary work experience. Under the short specification, only the proportion of time in full-time work while enrolled in tertiary education has a positive and significant effect on hourly earnings. This estimated effect is substantial in size. Youth working continuously in full-time jobs while in tertiary study are expected to face wage rates are 30.6% higher than other observationally equivalent individuals at age 21. We can reject the null hypothesis that all coefficients on in-school and in-tertiary work histories are equal to zero at 5.9% in this short specification. Thus, there is some statistical evidence here of a positive link between work while enrolled in education and hourly earnings at age 21.

However, we should be sceptical of any conclusions on a causal relationship between in-tertiary work and subsequent hourly earnings. Firstly, there are the aforementioned data problems with this retrospective information on educational and work histories. Some of this full-time work may have actually occurred *after* the completion of education. Secondly, when the full set of background factors are included the in this hourly earnings regression, the statistical relationship between earlier work experience and current wage rates weakens considerably.[25] The estimated coefficient on the propensity of full-time work while in tertiary study declines in magnitude, and is individually statistically significant at only 10% level. We can reject the null hypothesis that all coefficients on in-school and in-tertiary work are equal to zero at 11.9% in this long specification. Thus, there is, at best, weak statistical evidence here of any positive impact from work while enrolled in education and hourly earnings at age 21.

7. In-School Work and Education and Labour Market Outcomes by Age 25

After the completion of the empirical analysis presented in the previous sections of this report, data from the CHDS interviews at age 25 became available. These data have a particular

25 Note that the R^2 statistic more than doubles in magnitude from 0.086 to 0.176 when these other background factors are included in this estimation.

advantage for this project, because they allow us to measure the longer-term effects of early work experience on both the eventual educational attainment and labour market outcomes for these subjects. The emphasis in this section will be on the link between in-school work experience between the ages of 13 and 16 and either the attainment of some form of post-school qualification or the employment status for CHDS respondents at age 25. This allows for at least a nine-year gap between teenage work experience and subsequent adult outcomes in these two areas.

By focusing our attention on in-school work experience, we can return to the original 774 respondents in the CHDS who remained in school over the ages of 13 through 16 and provided valid information on the key variables for this analysis. Unfortunately, 19 of these individuals were either not interviewed or did not provide the data necessary at age 25 for this regression analysis. Thus, our updated sample declines from 774 to 755 individuals at age 25. This is an attrition rate of slightly less than 2.5% between the surveys at ages 21 and 25.

The dependent variable in the regressions reported in Table 13 is dichotomous. It takes on a value of one if the respondent obtained a formal post-school qualification by age 25; zero otherwise. A post-school qualification is interpreted quite broadly in this situation. It could involve a degree or diploma obtained from a university or polytechnic, a nursing or teaching certificate or diploma, or a trade or technical certificate. The mean of this dependent variable is 0.465. Slightly less than one-half of our sample had obtained at least one of these post-school qualifications by age 25.

When we control only for ethnicity and gender, the estimated coefficient on mean weekly hours of work between the ages of 13 and 16 is negative and statistically significant at better than a 1% level (Column 1 of Table 13). This estimated partial derivative says that one additional hour of work per week averaged over these four years reduces the probability of receiving a post-school qualification by age 25 by an average of 3 percentage points. This is a relatively large effect. Working 10 additional hours per week over this four-year period would reduce the probability of eventually obtaining a post-school qualification by 30 percentage points.

However, once we control for other measured background characteristics, the estimated effect of early work experience declines substantially in magnitude and is no longer statistically significant (Column 2 of Table 13). The inclusion of other personal, family and school characteristics in this regression eliminates any measurable effect on educational attainment from early work experience. Like many previous findings in this report, these results demonstrate the importance of controlling for observed heterogeneity in this situation.[26]

Table 14 reports the regression results using a much narrower definition of a post-school qualification. This dummy variable takes on a value of one if the respondent obtained a

26 Two of the most significant effects in this long specification are associated with the dummy variables on whether the subject had a Sixth Form Certificate and Bursary Qualification. We should be concerned that early work experience might have an *indirect* effect on the probability of obtaining a post-school qualification through these school qualifications. However, we have shown previously in this report that once other background factors are held constant, in-school work experience has no measurable impact on the probability of obtaining a school qualification.

university degree (either undergraduate or postgraduate) by age 25; zero otherwise. More than one-quarter of the subjects in our sample (28.1%) had completed a university degree by age 25. Yet, similar qualitative results are found for both the narrower and broader definitions of post-school qualifications. When only ethnicity and gender are held constant, the estimated coefficient on mean weekly hours of work between the ages of 13 and 16 is negative and statistically significant at a 1% level. A one-hour increase in the average workweek during these teenage years is estimated to reduce the probability by 3.5 percentage points of receiving a university degree by age 25. This effect continues to be negative, but declines substantially in magnitude and statistical significance when other background variables are included in the estimation. It appears that in the short specification early work experience initially proxies for background variables that would otherwise lead to lower educational attainment. Having detailed information on personal, family and school backgrounds is critical in isolating the true effects of early work experience on later educational attainment.

Table 15 reports the parameter estimates on the probability of working at age 25. Respondents are excluded from this analysis is they were either enrolled in education or a training programme at the time of the survey. This eliminated 259 of the 755 individuals in our sample (slightly more than one-third). Of the remaining 496 individuals, 83.9% were working at the time of the survey. With or without background factors, the estimated coefficients on mean weekly hours of work between the ages 13 and 16 are negative, but statistically insignificant. Thus, there is no statistical evidence of any measurable effects from early work experience on the probability of working for subjects not enrolled in education or training at age 25.

Finally, Table 16 estimates the determinants of log hourly earnings for working subjects not enrolled in education or training at age 25. When only ethnicity and gender are held constant, the estimated coefficient on mean weekly hours of work from ages 13 through 16 is negative and statistically significant at a 10% level. It implies that, on average, every additional hour work over these for years reduces hourly earnings at age 25 by 1.6%. Like the previous regressions on the probability of obtaining a post-school qualification, this effect essentially disappears when we control for other background characteristics. The second regression in this table shows that the estimated coefficient on this variable declines by 75% and is no longer statistically significant. From these two regressions we would have to conclude that early in-school work experience does *not* improve labour market outcomes through age 25.

8. Conclusions

This study has examined the extent, nature and possible consequences of employment by students using longitudinal data taken from the Christchurch Health and Development Study. Our primary goals were to isolate the effects of early work histories on both the later educational attainment and labour market outcomes for young people in this panel. The CHDS provides detailed information on the personal, family, school and peer characteristics of these subjects, as well as their work and education histories from ages 13 through 25.

Overseas literature on the effects of in-school work has produced mixed results. On the one

hand, there is at least some empirical evidence that relatively large amounts of work by students have detrimental effects on academic achievement and educational attainment. On the other hand, there is other empirical evidence that student work experience smoothes labour market transitions by generating employment opportunities and raising wage rates. Yet, the balance of evidence from these studies suggests that both these negative and positive effects from the labour market attachment of students are quite fragile and, in some cases, nonexistent.

The tentative results from this present study are consistent with the view that the work experience by students has few, if any, effects on both academic achievement and labour market transitions. The following specific results have been found:

- Work among young people enrolled in full-time education is quite common in the CHDS. Nearly 60% of students were working at that the time of at least one survey between ages 13 and 16. Over 90% of students had some work experience between the ages of 16 and 18. At least 60% of full-time students were working after age 18.

- Most studies in the US find that only high levels of in-school work appear to hinder academic achievement. Yet, there is little evidence of excessively high levels of weekly hours of work among students in the CHDS at any age. There are only a few observations on students working more than 15 hours per week up to age 16. At ages 18 and 21, only 1.5% and 0.8% of full-time students reported that they were working 30 or more hours per week, respectively. Thus, if the detrimental effects of in-school work experience on academic achievement are relegated to excessively long workweeks, the CHDS may not provide the data necessary to measure these harmful effects.

- Simple descriptive statistics show that employment outcomes for students vary substantially across our sample. In general, students from more disadvantaged backgrounds are no more likely to work while in school, but when they tend to work more hours per week and receive lower hourly earnings when they do work. This same result seems to hold for Maori and Pacific Island students. Individuals with low levels of cognitive ability and poor academic performance indicators by age 12 are more likely to be employed, work longer hours per week and receive lower wage rates while enrolled in school. Youth with their own conduct problems and those who associate with deviant peers tend to work more hours per week Students from the Canterbury region enrolled in secondary schools with lower School Certificate completion rates, poorer scholastic aptitude scores and lower family incomes tend to work longer workweeks and receive lower hourly earnings.

- These longitudinal data show some evidence of persistence in employment propensities across individuals. Full-time students with extensive work histories are much more likely to work at later ages. Yet, there is very little evidence that this accumulated work experience in school or tertiary study increases either the length of the workweek over time or the hourly compensation received by students. In other words, these is no evidence in the CHDS that in-school work as early as age 13 leads to excessively workweeks for students at later ages.

- Personal, family and other background characteristics are important determinants of the in-school employment histories. However, no more than 10% of the variation in average hours worked per week by students at ages 13 through 16 can be explained by the full set of covariates.

- These same background factors are critical in isolating the effects of in-school employment on academic achievement. Once these other factors are held constant, work histories have no statistically measurable impact on either the attainment of school qualifications or the performance on School Certificate exams.

- There is also no statistical evidence that in-school and in-tertiary work experience reduces the probability that individuals who have terminated their education will be without a job and either actively seeking employment or in receipt of a social welfare benefit at age 21. Furthermore, this same work experience has no measurable impact on the hourly earnings for those working at age 21.

- The most recently available data from the CHDS indicates an absence of any long-term consequences from early in-school work. Information from interviews at age 25 reinforce the finding that unless personal, family, school and other background characteristics are held constant, we might erroneously conclude that early in-school work reduces eventual educational attainment. Without controlling for this observed heterogeneity, we estimate that mean hours of work for students between the ages of 13 and 16 negatively and significantly lower their probabilities of receiving a post-school qualification and university degree by age 25. Once control variables are included in these regressions, however, there is no evidence of any negative effects from early in-school work on later educational attainment. We also find no statistical evidence of any positive effects from in-school work between the ages of 13 and 16 on either the probability of being employed or the hourly earnings of those working at age 25.

Overall, this study suggests that the substantial amount of work performed by full-time students in New Zealand has few obvious ramifications for public policy. Although in-school work is more common among youth with lower measured abilities and from potentially disadvantaged backgrounds, the amount of work performed by students does not appear to be ‘excessive’ in general. There is no statistical evidence from this rich longitudinal dataset that this work experience has any detrimental effects on academic achievement. There is also no statistical evidence that this same work experience helps smooth transitions into the labour market once education has been completed.

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Table 1

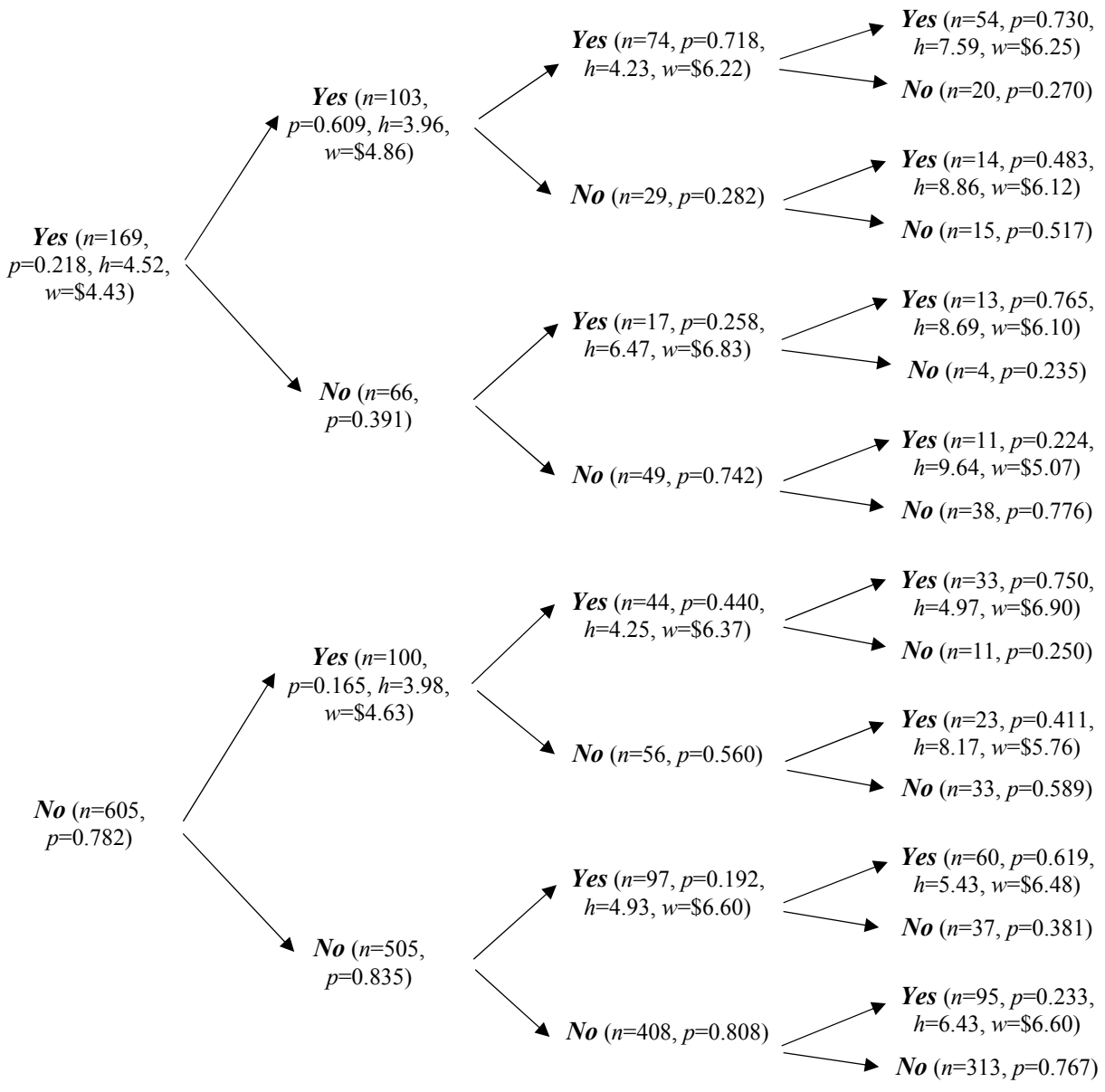
Data on In-School Work Histories – Ages 13 to 16

I. **II.** Age at Interview	*Proportion Working*	*For Students Working:* *Mean Weekly Hours Worked*	*Mean Real Hourly Earnings*	*Proportion Working >10 Hours Per Week*	*Proportion Working >15 Hours Per Week*	*Proportion Working >20 Hours Per Week*
13	0.218	4.52	$4.43	0.047	0.012	0.000
14	0.262	3.97	$4.74	0.015	0.000	0.000
15	0.300	4.69	$6.45	0.069	0.017	0.009
16	0.391	6.74	$6.38	0.162	0.056	0.023
Ages 13 to 16	0.293	5.26	$5.65	0.084	0.025	0.008

Notes: These data are taken from the Christchurch Health and Development Study. All youth in this sample *(n = 774)* were enrolled in school from age 13 through 16, and provided the necessary information on personal attributes and family backgrounds required for subsequent regression analysis. Employment data was solicited from parents when the youth were aged 13 or 14. The questions in the parents' schedule at these interviews were: *"Does your child have a paid job after school?"* (questions D1 in the 13-year schedule and B1 in the 14-year schedule); *"How many hours per week does your child work at this job?"* (questions D3 in the 13-year schedule and B3 in the 14-year schedule); and *"What is the weekly take-home pay your child earns from this job?"* (questions D4 in the 13-year schedule and B4 in the 14-year schedule). Employment data was solicited from youth when they were aged 15 or 16. The questions in the youth schedule at these interviews were: *"Do you have a (regular) job after school or at the weekend?"* (question B1(a) in the 15-year schedule); *"Do you have a (regular) job?"* (question A15(a) in the 16-year schedule); *"How many hours per week do you work?"* (questions B1(b) in the 15-year schedule and A15(b) in the 16-year schedule); and *"How much do you get paid a week?"* (questions B1(c) in the 15-year schedule and A15(c) in the 16-year schedule). Thus, several differences exist between both the source and structure of questions on labour market histories from ages 13 through 16. Real hourly earnings are expressed in December 2001 dollars using the Consumer Price Index.

Figure 1

Conditional Outcomes for In-School Work Histories – Ages 13 to 16



Notes: See the notes at the bottom of Table 1 for the sources for this early labour market information in the CHDS. The current labour market outcomes in each column are conditional on the work history for this individual in the preceding column or columns (n = number of observations, p = proportion working, h = average weekly hours of work, w =average real hourly earnings). For example, conditional on working at ages 13, 14 and 15, 73.0% of these youth worked at age 16 (the top group in the last column). Those working in all four years (54 individuals) worked an average of 7.59 hours per week and received average real hourly earnings of $6.25 (December 2001 dollars).

Conditional on *not* working at ages 13, 14 and 15, 23.3% of these youth worked at age 16 (the bottom group in the last column). Those working in only the last year (95 individuals) worked an average of 6.43 hours per week and received average real hourly earnings of $6.60.

Table 2

Relationships between In-School Work Histories and Family Circumstances Prior to Age 13

	III. Work Behaviour – Ages 13 to 16			
	Proportion Working at Least One of the Four Years	*Proportion Working Any Year*	*Average Weekly Hours in Years Worked*	*Average Real Hourly Earnings in Years Worked*
Entire Sample (*n=774*)	0.596	0.293	5.26	$5.65
Parents Had No Qualification (*n=186*)	0.624	0.301	5.82*	$5.36
Parents Had Some Qualification (*n=588*)	0.587	0.290	5.06*	$5.75
Sometime Lived in Solo-Parent Family (*n=194*)	0.624	0.291	5.97*	$5.54
Always Lived in Two-Parent Family (*n=580*)	0.586	0.294	5.00*	$5.69
Family was Sometime on Benefit (*n=238*)	0.580	0.275	5.73*	$5.27*
Family was Never on Benefit (*n=536*)	0.603	0.301	5.05*	$5.81*
Only Child in the Family (*n=165*)	0.558	0.261	5.33	$6.15*
At Least One Sibling in the Family (*n=609*)	0.606	0.302	5.24	$5.52*
Maternal Depression Index – Top ⅓ (*n=264*)	0.617	0.309	5.63	$5.93
Maternal Depression Index – Middle ⅓ (*n=254*)	0.606	0.287	5.09	$5.50
Maternal Depression Index – Bottom ⅓ (*n=256*)	0.563	0.282	5.01	$5.50
Real Family Income – Bottom ⅓ (*n=258*)	0.609	0.301	5.55	$5.27**
Real Family Income – Middle ⅓ (*n=258*)	0.628	0.317	5.18	$5.36
Real Family Income – Top ⅓ (*n=258*)	0.550	0.261	5.01	$6.41**
Family Living Standards – Bottom ⅓ (*n=169*)	0.592	0.293	6.19**	$5.28*
Family Living Standards – Middle ⅓ (*n=374*)	0.612	0.308	5.33	$5.40
Family Living Standards – Top ⅓ (*n=231*)	0.571	0.268	4.42**	$6.38*

Notes: See the notes at the bottom of Table 1 for the sources of this early labour market information in the CHDS. See the text of this report for the definitions of these variables.

** Category means significantly different from one another at a 1% level.
* Category means significantly different from one another at a 10% level.

Table 3

Relationships between In-School Work Histories and Personal Circumstances by Age 13

	IV. Work Behaviour – Ages 13 to 16			
	Proportion Working at Least One of the Four Years	*Proportion Working Any Year*	*Average Weekly Hours in Years Worked*	*Average Real Hourly Earnings in Years Worked*
Entire Sample (*n=774*)	0.596	0.293	5.26	$5.65
Female (*n=394*)	0.574	0.259**	5.37	$5.44
Male (*n=380*)	0.618	0.328**	5.14	$5.85
Maori or Pacific Islander (*n=92*)	0.543	0.250	6.95**	$5.00
Other Ethnicity (*n=682*)	0.603	0.299	5.05**	$5.73
IQ Test Score – Bottom ⅓ (*n=124*)	0.606	0.294	5.68*	$5.37
IQ Test Score – Middle ⅓ (*n=216*)	0.578	0.284	5.21	$5.28
IQ Test Score – Top ⅓ (*n=218*)	0.588	0.297	4.90*	$5.61
IQ Test Score – *NA* (*n=216*)	0.621	0.298	5.20	$6.80
Burt Word Reading Test Score – Bottom ⅓ (*n=113*)	0.612*	0.315*	5.99*	$5.15
Burt Word Reading Test Score – Middle ⅓ (*n=219*)	0.629	0.304	4.80	$5.53
Burt Word Reading Test Score – Top ⅓ (*n=221*)	0.516*	0.248*	5.08*	$5.65
Burt Word Reading Test Score – *NA* (*n=221*)	0.655	0.316	5.04	$6.78
Scholastic Ability Test Score – Bottom ⅓ (*n=214*)	0.598	0.307	5.96*	$5.08*
Scholastic Ability Test Score – Middle ⅓ (*n=189*)	0.603	0.296	4.97	$5.24
Scholastic Ability Test Score – Top ⅓ (*n=215*)	0.540	0.259	4.88*	$5.89*
Scholastic Ability Test Score – *NA* (*n=156*)	0.660	0.316	5.12	$6.54
Grade Point Average – Bottom ⅓ (*n=266*)	0.628*	0.334**	5.87*	$5.43*
Grade Point Average – Middle ⅓ (*n=264*)	0.610	0.286	4.86	$5.47
Grade Point Average – Top ⅓ (*n=244*)	0.545*	0.256**	4.96*	$6.15*
Conduct Problem Score – Bottom ⅓ (*n=260*)	0.546	0.276	4.75*	$5.57
Conduct Problem Score – Middle ⅓ (*n=255*)	0.627	0.311	5.37	$5.59
Conduct Problem Score – Top ⅓ (*n=259*)	0.614	0.292	5.59*	$5.78

Notes: See the notes at the bottom of Table 1 for the sources of this early labour market information in the CHDS. See the text of this report for the definitions of these variables.

** Category means significantly different from one another at a 1% level.
* Category means significantly different from one another at a 10% level.

Table 4

Relationships between In-School Work Histories and Contemporaneous School and Peer Characteristics

	V. Work Behaviour – Ages 13 to 16			
	Proportion Working at Least One of the Four Years	*Proportion Working Any Year*	*Average Weekly Hours in Years Worked*	*Average Real Hourly Earnings in Years Worked*
Entire Sample (*n=774*)	0.596	0.293	5.26	$5.65
Some Church or Private Secondary School (*n=151*)	0.523	0.258	4.84	$5.94*
No Church or Private Secondary School (*n=436*)	0.583	0.291	5.46	$5.22*
Identity of Secondary School *NA* (*n=187*)	0.684	0.325	5.11	$6.32
Some Single-Sex Secondary School (*n=249*)	0.558	0.271	4.90*	$6.01**
No Single-Sex Secondary School (*n=338*)	0.574	0.291	5.61*	$4.96**
Identity of Secondary School *NA* (*n=187*)	0.684	0.325	5.11	$6.32
Few Deviant Peers (*n=376*)	0.582	0.295	4.73*	$5.53
Some Deviant Peers (*n=206*)	0.592	0.277	5.81	$6.08
Many Deviant Peers (*n=192*)	0.625	0.306	5.64*	$5.44
SC Completion Rate Peers – Bottom ⅓ (*n=215*)	0.567	0.295	5.74*	$5.05*
SC Completion Rate Peers – Middle ⅓ (*n=154*)	0.545	0.265	5.00	$5.18
SC Completion Rate Peers – Top ⅓ (*n=201*)	0.587	0.285	4.89*	$5.93*
Data on Peers *NA* (*n=204*)	0.672	0.320	5.30	$6.23
Scholastic Abilities Peers – Bottom ⅓ (*n=215*)	0.558	0.268	5.56	$4.94**
Scholastic Abilities Peers – Middle ⅓ (*n=154*)	0.607	0.325	5.29	$5.20
Scholastic Abilities Peers – Top ⅓ (*n=201*)	0.540	0.257	4.85	$6.13**
Data on Peers *NA* (*n=204*)	0.672	0.320	5.30	$6.23
Family Income Peers – Bottom ⅓ (*n=189*)	0.577	0.280	5.51*	$4.92*
Family Income Peers – Middle ⅓ (*n=189*)	0.561	0.275	5.61	$5.61
Family Income Peers – Top ⅓ (*n=191*)	0.571	0.296	4.61*	$5.70*
Data on Peers *NA* (*n=205*)	0.668	0.318	5.30	$6.23

Notes: See the notes at the bottom of Table 1 for the sources of this early labour market information in the CHDS. See the text of this report for the definitions of these variables.

** Category means significantly different from one another at a 1% level.
* Category means significantly different from one another at a 10% level.

Table 5

OLS Regression Results on Average Weekly Hours of Work – Ages 13 to 16
Without and With Personal and Family Background Circumstances

Independent Variables	Parameter Estimates	
Constant	1.669*** (0.107)	-0.509 (1.331)
Female	-0.314** (0.145)	-0.222 (0.155)
Maori or Pacific Islander	0.075 (0.224)	-0.251 (0.232)
Mother Highest Qualification – School	---	0.140 (0.175)
Mother Highest Qualification – Post-School	---	-0.270 (0.210)
Father Highest Qualification – School	---	-0.083 (0.173)
Father Highest Qualification – Post-School	---	-0.414* (0.217)
Number of Younger Siblings	---	0.140 (0.086)
Number of Older Siblings	---	0.119 (0.084)
Proportion of Years Lived with Single Parent – Ages 1 to 12	---	1.249 (0.825)
Proportion of Years Family Received Benefit – Ages 1 to 12	---	0.533 (0.591)
Index on Mean Maternal Depression – Ages 6 to 12	---	0.054*** (0.019)
Index on Mean Real Family Income – Ages 1 to 12	---	-0.100 (0.161)
Index on Mean Standard of Living – Ages 1 to 12	---	-0.034 (0.258)
Proportion of Years Mother Worked Part-Time – Ages 1 to 14	---	0.623** (0.310)
Proportion of Years Mother Worked Full-Time – Ages 1 to 14	---	1.321*** (0.411)
Proportion of Years Father Worked Part-Time – Ages 1 to 14	---	1.922 (1.691)
Proportion of Years Father Worked Full-Time – Ages 1 to 14	---	1.904** (0.777)

Table 5 Continued

Index on Mean IQ Test Score – Ages 8 and 9	---	0.334** (0.134)
Index on Mean Burt Word Reading Test Score – Ages 8 to 12	---	0.029 (0.146)
Index on Scholastic Ability Test Score – Age 13	---	-0.320** (0.163)
Mean GPA Reported by Teachers – Ages 7 to 12	---	-0.205 (0.158)
Mean Class Size – Ages 7 to 12	---	0.014 (0.018)
Index on Mean Conduct Problem Scores – Ages 7, 9 and 11	---	-0.181* (0.107)
No Secondary School Data: Youth Outside Canterbury Region	---	0.272 (0.184)
Proportion of Time in Church or Private Secondary School	---	-0.229 (0.233)
Proportion of Time in Single-Sex Secondary School	---	0.050 (0.217)
Index on Deviant Peers	---	0.060 (0.077)
Index on School Certificate Completion Rate of Peers	---	0.219 (0.180)
Index on Scholastic Ability of Peers	---	0.082 (0.171)
Index on Family Income of Peers	---	-0.346* (0.200)
Sample Size	774	774
Mean of Dependent Variable	1.518	1.518
R^2	0.006	0.095

Notes: See the notes at the bottom of Table 1 for the sources of this early labour market information in the CHDS. See the text for the definitions of these explanatory variables. Estimated standard errors are in parentheses. The dependent variable in these two regressions is the mean weakly hours worked per week by students at the time of the annual CHDS surveys at ages 13 through 16.

*** Significantly different from zero at a 1% level, two-tailed test.
** Significantly different from zero at a 5% level, two-tailed test.
* Significantly different from zero at a 10% level, two-tailed test.

Table 6

Regression Results on School Certificate Performance
Without and With Personal and Family Background Circumstances

Independent Variables	*Probit Estimation on Probability of Sitting School Certificate Exams*		***OLS Estimation on** School Certificate GPA Conditional on Sitting Exams*	
Constant	0.192***	-0.032	2.264***	-0.008
	(0.016)	(0.079)	(0.051)	(0.390)
Female	0.057***	0.019*	0.108*	0.004
	(0.019)	(0.011)	(0.060)	(0.045)
Maori or Pacific Islander	-0.056**	0.000	-0.346***	-0.058
	(0.026)	(0.013)	(0.096)	(0.069)
Mean Weekly Hours of Work – Ages 13 to 16	**-0.005**	**-0.001**	**-0.049*** **	**-0.006**
	(0.004)	**(0.002)**	**(0.015)**	**(0.011)**
Mother Highest Qualification – School	---	0.006	---	0.081
		(0.011)		(0.050)
Mother Highest Qualification – Post-School	---	-0.014	---	0.128**
		(0.015)		(0.060)
Father Highest Qualification – School	---	0.014	---	-0.014
		(0.011)		(0.050)
Father Highest Qualification – Post-School	---	0.008	---	0.159**
		(0.016)		(0.062)
Number of Younger Siblings	---	0.001	---	0.032
		(0.005)		(0.025)
Number of Older Siblings	---	0.006	---	0.008
		(0.006)		(0.024)
Proportion of Years Lived with Single Parent – Ages 1 to 12	---	-0.015	---	-0.102
		(0.044)		(0.250)
Proportion of Years Family Received Benefit – Ages 1 to 12	---	-0.032	---	-0.079
		(0.034)		(0.173)
Index on Mean Maternal Depression – Ages 6 to 12	---	-0.000	---	0.010*
		(0.001)		(0.006)
Index on Mean Real Family Income – Ages 1 to 12	---	0.011	---	0.100**
		(0.011)		(0.047)
Index on Mean Standard of Living – Ages 1 to 12	---	0.026	---	0.112
		(0.019)		(0.075)
Proportion of Years Mother Worked Part-Time – Ages 1 to 14	---	-0.008	---	0.015
		(0.022)		(0.089)
Proportion of Years Mother Worked Full-Time – Ages 1 to 14	---	-0.005	---	-0.234*
		(0.026)		(0.120)
Proportion of Years Father Worked Part-Time – Ages 1 to 14	---	0.011	---	0.023
		(0.101)		(0.483)

Proportion of Years Father Worked Full-Time – Ages 1 to 14	---	-0.047 (0.045)	---	-0.058 (0.231)

Table 6 Continued

Index on Mean IQ Test Score – Ages 8 and 9	---	0.021** (0.010)	---	0.157*** (0.040)
Index on Mean Burt Word Reading Test Score – Ages 8 to 12	---	0.006 (0.010)	---	-0.159*** (0.041)
Index on Scholastic Ability Test Score – Age 13	---	0.002 (0.011)	---	0.213*** (0.048)
Mean GPA Reported by Teachers – Ages 7 to 12	---	0.014 (0.011)	---	0.424*** (0.045)
Mean Class Size – Ages 7 to 12	---	0.001 (0.001)	---	0.008 (0.005)
Index on Mean Conduct Problem Scores – Ages 7, 9 and 11	---	-0.011* (0.006)	---	-0.085** (0.033)
No Secondary School Data: Youth Outside Canterbury Region	---	0.004 (0.013)	---	0.059 (0.053)
Proportion of Time in Church or Private Secondary School	---	-0.027 (0.016)	---	-0.028 (0.066)
Proportion of Time in Single-Sex Secondary School	---	0.005 (0.016)	---	0.034 (0.061)
Index on Deviant Peers	---	-0.016*** (0.005)	---	-0.105*** (0.023)
Index on School Certificate Completion Rate of Peers	---	0.006 (0.011)	---	0.003 (0.055)
Index on Scholastic Ability of Peers	---	0.001 (0.011)	---	-0.056 (0.050)
Index on Family Income of Peers	---	0.007 (0.015)	---	0.098* (0.058)
Sample Size	774	774	709	709
Mean of Dependent Variable	0.916	0.916	2.210	2.210
'Pseudo' R^2 (Probit) or R^2 (OLS)	0.036	0.344	0.038	0.580

Notes: See the notes at the bottom of Table 1 for the sources of this early labour market information in the CHDS. See the text for the definitions of these explanatory variables. Estimated standard errors are in parentheses. The dependent variable in the regressions reported in the first two columns is dichotomous. It equals one if the individual sat and reported results from School Certificate exams; zero otherwise. Maximum likelihood probit is used to estimate the determinants of the probability of this event. The reported parameters (and their standard errors) are partial derivatives of this probability with respect to each of the independent variables, evaluated at the means of the vector of covariates. The pseudo R^2 statistic is one minus the ratio of the restricted log-likelihood function with only a constant term relative to the log-likelihood function from the reported regression. The dependent variable in the regressions reported in the last two columns is the Grade Point Average (GPA) of all reported School Certificate results, where an A, B, C and D/E are worth four, three, two and one point, respectively. Estimation is restricted to those who sat and reported these exam results (91.6% of the sample). Ordinary Least-Squares (OLS) is used to estimate these parameters.

*** Significantly different from zero at a 1% level, two-tailed test.

** Significantly different from zero at a 5% level, two-tailed test.
* Significantly different from zero at a 10% level, two-tailed test.

Table 7

VI. Probit Estimation on Probability of Sitting School Certificate Exams
VII. Using Various Definitions of 'Excessive' Amounts of In-School Work

VIII. Dummy Variable ($D_{Age13–16}$) Equals One if Mean Weekly Hours of Work *Between the Ages 13 and 16 Exceed the Following Thresholds; Zero Otherwise:*

	3	***4***	***5***	***6***	***7***	***8***	***9***
Parameter Estimates	**-0.002 (0.011)**	**0.002 (0.013)**	**-0.019 (0.015)**	**0.014 (0.023)**	**0.012 (0.031)**	**-0.018 (0.036)**	**-0.025 (0.040)**
$\overline{D}_{Age13–16}$	0.171	0.111	0.069	0.038	0.022	0.013	0.008

IX. Dummy Variables (D_{Age13}, D_{Age14}, D_{Age15} and D_{Age16}) Equal One if Weekly Hours of Work *At Each Age Exceed the Following Thresholds; Zero Otherwise:*

	3	***5***	***7***	***9***	***12***	***15***	***20***
X. Parameter Estimates	**0.016 (0.014)**	**0.046**** **(0.023)**	**0.057*** **(0.030)**	**0.053*** **(0.032)**	**0.004 (0.036)**	**0.002 (0.052)**	---
$\overline{D}_{Age13}$	0.114	0.066	0.031	0.018	0.008	0.003	0.000
XI. Parameter Estimates	**0.034**** **(0.016)**	**0.013 (0.020)**	**-0.035 (0.024)**	**-0.053*** **(0.029)**	**0.088 (2.119)**	---	---
$\overline{D}_{Age14}$	0.127	0.063	0.021	0.010	0.001	0.000	0.000
XII. Parameter Estimates	**-0.002 (0.012)**	**0.008 (0.016)**	**0.009 (0.018)**	**0.004 (0.019)**	**-0.024 (0.033)**	**-0.055 (0.043)**	**-0.282 (3.200)**
$\overline{D}_{Age15}$	0.153	0.084	0.053	0.034	0.010	0.005	0.003
XIII. Parameter Estimates	**-0.015 (0.010)**	**-0.019*** **(0.011)**	**-0.017 (0.012)**	**-0.019 (0.013)**	**-0.044**** **(0.020)**	**-0.042*** **(0.024)**	**-0.045 (0.037)**
$\overline{D}_{Age16}$	0.275	0.191	0.142	0.097	0.036	0.022	0.009

XIV. Notes: See the notes at the bottom of Table 1 for the sources of this early labour market information in the CHDS. Estimated standard errors are in parentheses. The dependent variable in these regressions is dichotomous. It equals one if the individual sat and reported results from School Certificate exams; zero otherwise. Maximum likelihood probit is used to estimate the determinants of the probability of this event. The estimated parameters are partial derivative and their standard errors. These results are obtained from 14 separate regressions using different thresholds for excessive amounts of work, either averaged over ages 13 through 16 or for each of these four years separately. The top panel reports the results on single dummy variables for seven different cutoff points for average weekly hours worked this four-year period. The bottom panel reports the results on four dummy variables for seven different cutoff points for weekly hours worked at each of the four ages. All regressions include the complete set of personal and family background circumstances used in the long specification reported in the Table 6. However, these other estimated parameters are not reported.

*** Significantly different from zero at a 1% level, two-tailed test.
** Significantly different from zero at a 5% level, two-tailed test.
* Significantly different from zero at a 10% level, two-tailed test.

Table 8

XV. OLS Estimation on School Certificate GPA Conditional on Sitting Exams
XVI. Using Various Definitions of 'Excessive' Amounts of In-School Work

XVII. Dummy Variable ($D_{Age13–16}$) Equals One if Mean Weekly Hours of Work *Between the Ages 13 and 16 Exceed the Following Thresholds; Zero Otherwise:*

	3	***4***	***5***	***6***	***7***	***8***	***9***
Parameter Estimates	**0.001 (0.057)**	**-0.095 (0.068)**	**-0.086 (0.088)**	**-0.022 (0.111)**	**0.058 (0.144)**	**-0.023 (0.196)**	**-0.298 (0.275)**
$\overline{D}_{Age13–16}$	0.166	0.107	0.061	0.037	0.021	0.011	0.006

XVIII. Dummy Variables (D_{Age13}, D_{Age14}, D_{Age15} and D_{Age16}) Equal One if Weekly Hours of Work *At Each Age Exceed the Following Thresholds; Zero Otherwise:*

	3	***5***	***7***	***9***	***12***	***15***	***20***
XIX. Parameter Estimates	**0.055 (0.069)**	**0.023 (0.089)**	**-0.064 (0.122)**	**0.057 (0.164)**	**0.080 (0.277)**	**-0.167 (0.558)**	---
$\overline{D}_{Age13}$	0.113	0.068	0.031	0.017	0.006	0.001	0.000
XX. Parameter Estimates	**-0.011 (0.066)**	**-0.046 (0.089)**	**-0.149 (0.155)**	**-0.244 (0.241)**	**-0.467 (0.559)**	---	---
$\overline{D}_{Age14}$	0.131	0.066	0.020	0.008	0.001	0.000	0.000
XXI. Parameter Estimates	**-0.129*** **(0.062)**	**-0.081 (0.079)**	**-0.068 (0.098)**	**-0.128 (0.130)**	**-0.011 (0.230)**	**0.096 (0.392)**	---
$\overline{D}_{Age15}$	0.150	0.083	0.052	0.031	0.008	0.003	0.000
XXII. Parameter Estimates	**0.063 (0.049)**	**0.027 (0.057)**	**0.017 (0.064)**	**0.040 (0.076)**	**-0.001 (0.120)**	**-0.013 (0.154)**	**-0.223 (0.277)**
$\overline{D}_{Age16}$	0.274	0.189	0.140	0.093	0.031	0.018	0.006

XXIII. Notes: See the notes at the bottom of Table 1 for the sources of this early labour market information in the CHDS. Estimated standard errors are in parentheses. The dependent variable in these regressions is the Grade Point Average (GPA) of all reported School Certificate results, where an A, B, C and D/E are worth four, three, two and one point, respectively. Estimation is restricted to those who sat and reported these exam results (91.6% of the sample). Ordinary Least-Squares (OLS) is used to estimate these parameters. These results are obtained from 14 separate regressions using different thresholds for excessive amounts of work, either averaged over ages 13 through 16 or for each of these four ages separately. The top panel reports the results on single dummy variables for seven different cutoff points for average weekly hours worked over this four-year period. The bottom panel reports the results on four dummy variables for seven different cutoff points for weekly hours worked at each of the four ages. All regressions include the complete set of personal and family background circumstances used in the long specification reported in the Table 6. However, these other estimated parameters are not reported.

*** Significantly different from zero at a 1% level, two-tailed test.
** Significantly different from zero at a 5% level, two-tailed test.
* Significantly different from zero at a 10% level, two-tailed test.

Table 9

Data Available on In-School and In-Tertiary Work Histories – Ages 16 to 21

XXIV. Ages	*Proportion With Some Work*	*Proportion Working Part Time*	*Proportion Working Full Time*	*Mean Number of Jobs Held*	***Mean Number of Months in Current Job***	*For Students Working:*	
						Mean Weekly Hours Worked	*Mean Real Hourly Earnings*
16 to 18 *(n=464)*	0.905	*NA*	*NA*	1.89	***NA***	*NA*	*NA*
18 *(n=464)*	0.582	0.567	0.015	*NA*	8.455	11.57	$7.97
18 to 19 *(n=445)*	0.598	0.393	0.062	*NA*	*NA*	*NA*	*NA*
19 to 20 *(n=331)*	0.704	0.485	0.084	*NA*	*NA*	*NA*	*NA*
20 to 21 *(n=298)*	0.721	0.509	0.081	*NA*	*NA*	*NA*	*NA*
21 *(n=249)*	0.578	0.566	0.008	*NA*	*NA*	12.18	$11.59

Notes: These data are taken from the Christchurch Health and Development Study. Statistics in the first two rows of this table come from youth who reported that they were full-time school or tertiary students at the year-18 interview, and were also enrolled in school from at least age 13 through 17. The next three rows of this table come from quarters between the indicated birthdays for youth who were full-time students. Statistics in the last row come from youth who reported that they were full-time students at the interview at age 21. Part-time work is defined as working fewer than 30 hours per week. Full-time work is defined as working 30 or more hours per week. Between the 18th and 19th, 19th and 20th, 20th and 21st birthdays, data is taken from reports on quarterly education and employment histories from the interview at age 21. All we know from this retrospective information is whether these individuals were not working, working less than 30 hours per week or 30 or more hours per week in quarters in which they reported to be full-time students. Only at the interviews at ages 18 and 21 is information available on weekly hours of work and gross hourly earnings. Real wages are expressed in December 2001 dollars, using the Consumer Price Index.

Table 10

Probit Estimation on the Probability of Obtaining University Bursary For Youth Enrolled in Secondary School at Age 18

Independent Variables	*Without Background Factors*	*With Background Factors*
Constant	-0.004 (0.063)	-1.563** (0.776)
Female	0.066 (0.058)	0.043 (0.078)
Maori or Pacific Islander	-0.287*** (0.102)	-0.211* (0.124)
Mean Weekly Hours of Work – Ages 13 to 16	**-0.013** **(0.020)**	**-0.010** **(0.024)**
Number of Jobs Held – Ages 16 to 18	**0.001** **(0.026)**	**-0.017** **(0.032)**
Number of Months in Job at Age 18	**0.002** **(0.002)**	**0.001** **(0.003)**
Weekly Hours of Work at Age 18	**-0.011**** **(0.004)**	**-0.008** **(0.005)**
Mother Highest Qualification – School	---	0.077 (0.092)
Mother Highest Qualification – Post-School	---	-0.003 (0.099)
Father Highest Qualification – School	---	0.056 (0.087)
Father Highest Qualification – Post-School	---	0.045 (0.100)
Number of Younger Siblings	---	0.054 (0.047)
Number of Older Siblings	---	-0.005 (0.043)
Proportion of Years Lived with Single Parent – Ages 1 to 12	---	-0.347 (0.617)
Proportion of Years Family Received Benefit – Ages 1 to 12	---	0.263 (0.389)
Index on Mean Maternal Depression – Ages 6 to 12	---	0.022** (0.010)
Index on Mean Real Family Income – Ages 1 to 12	---	0.156* (0.086)
Index on Mean Standard of Living – Ages 1 to 12	---	0.039 (0.142)
Proportion of Years Mother Worked Part-Time – Ages 1 to 14	---	0.003

		(0.155)
Proportion of Years Mother Worked Full-Time – Ages 1 to 14	---	0.201 (0.197)

Table 10 Continued

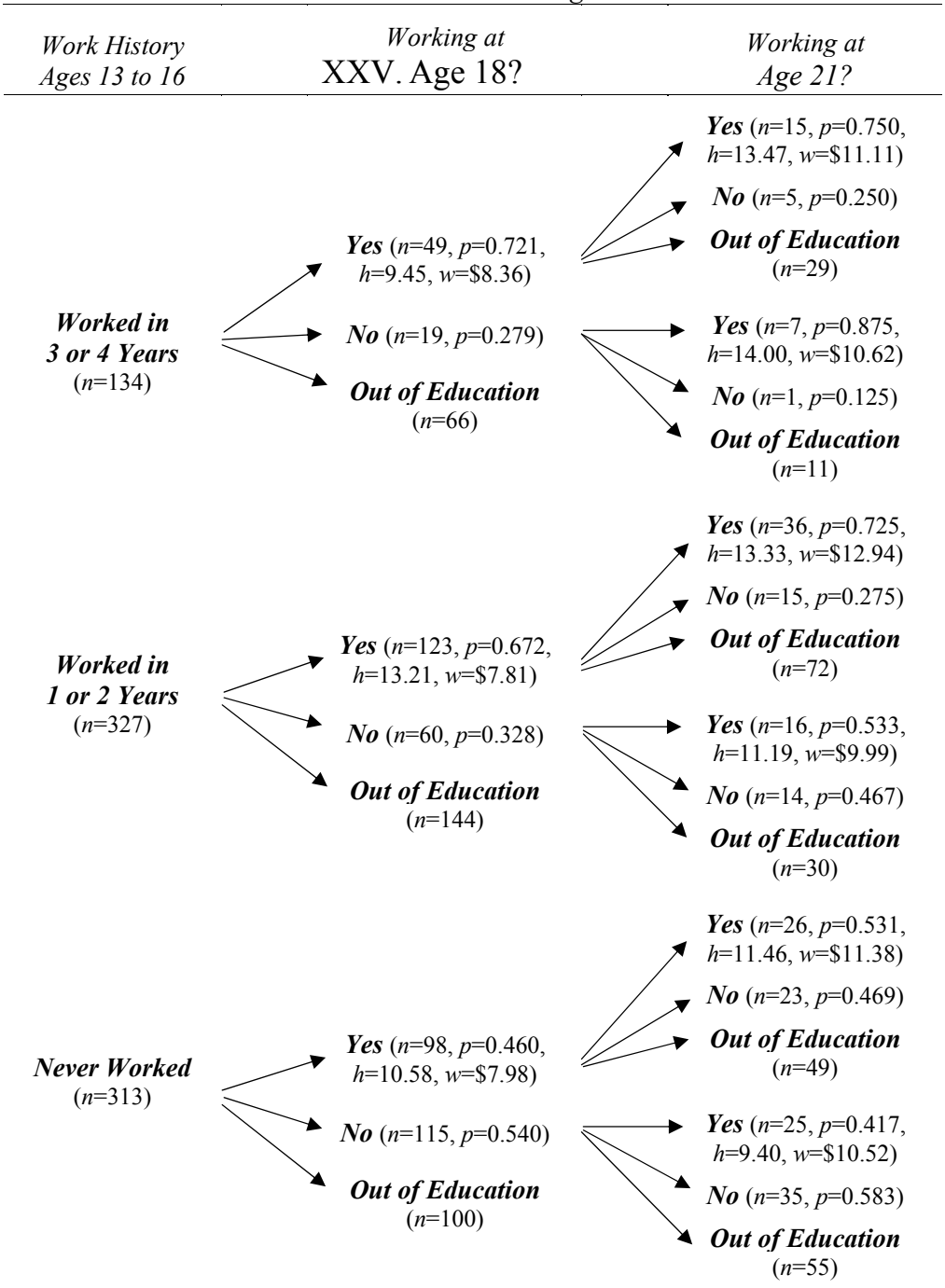
Proportion of Years Father Worked Part-Time – Ages 1 to 14	---	-0.197 (1.236)
Proportion of Years Father Worked Full-Time – Ages 1 to 14	---	0.301 (0.544)
Index on Mean IQ Test Score – Ages 8 and 9	---	0.215*** (0.074)
Index on Mean Burt Word Reading Test Score – Ages 8 to 12	---	-0.109 (0.074)
Index on Scholastic Ability Test Score – Age 13	---	0.167** (0.084)
Mean GPA Reported by Teachers – Ages 7 to 12	---	0.123 (0.079)
Mean Class Size – Ages 7 to 12	---	0.013 (0.009)
Index on Mean Conduct Problem Scores – Ages 7, 9 and 11	---	-0.152** (0.071)
No Secondary School Data: Youth Outside Canterbury Region	---	0.085 (0.096)
Proportion of Time in Church or Private Secondary School	---	-0.023 (0.097)
Proportion of Time in Single-Sex Secondary School	---	0.091 (0.094)
Index on Deviant Peers	---	-0.027 (0.045)
Index on School Certificate Completion Rate of Peers	---	-0.023 (0.108)
Index on Scholastic Ability of Peers	---	-0.059 (0.088)
Index on Family Income of Peers	---	0.115 (0.093)
Sample Size	301	301
Mean of Dependent Variable	0.439	0.439
'Pseudo' R^2	0.042	0.328

Notes: See the notes at the bottom of Table 1 for the sources of this early labour market information in the CHDS. See the text for the definitions of these explanatory variables. Estimated standard errors are in parentheses. The sample for these regressions is restricted to youth who were still enrolled in school full-time at the time of the interview at age 18. The dependent variable is dichotomous. It equals one if the individual received University Bursary (self-reported during the interview at age 21); zero otherwise. Maximum likelihood probit is used to estimate the determinants of the probability of obtaining this qualification. The reported parameters (and their standard errors) are partial derivatives of this probability with respect to each of the independent variables, evaluated at the means of this vector of covariates. Pseudo R^2 is one minus the ratio of the restricted log-likelihood function with only a constant term relative to the log-likelihood function from the reported regression.

*** Significantly different from zero at a 1% level, two-tailed test.
** Significantly different from zero at a 5% level, two-tailed test.
* Significantly different from zero at a 10% level, two-tailed test.

Figure 2

Conditional Outcomes for In-School or In-Tertiary Labour Market Histories – Ages 16 to 21



Notes: See the notes at the bottom of Table 1 for the sources of this early labour market information in the CHDS, and at the bottom of Figure 1 for the definitions of the variables used here. The first column divides the original sample of 774 individuals into three groups depending on the number of year worked from age 13 through 16. The

second column provides the outcomes at age 18 conditional on this earlier work history (working and enrolled full-time in education, not working and enrolled full-time in education, or out of full-time education) conditional on work history between ages 13 and 16. The last column provides similar information at age 21 conditional work histories between ages 13 and 18, and again age 18.

Table 11

Probit Estimation on the Probability of Being Either Unemployed or in Receipt of a Social Welfare Benefit for Youth Not Enrolled in Education at Age 21

Independent Variables	*Without Background Factors*	*With Background Factors*
Constant	-0.094* (0.052)	0.687* (0.352)
Female	0.137*** (0.039)	0.178*** (0.042)
Maori or Pacific Islander	-0.006 (0.053)	-0.026 (0.057)
Mean Weekly Hours of Work – Ages 13 to 16	**-0.004 (0.009)**	**-0.002 (0.009)**
Enrolled in Full-Time Education to Age 18	0.128* (0.078)	0.130* (0.079)
• **Number of Jobs Held – Ages 16 to 18**	**-0.009 (0.036)**	**-0.002 (0.037)**
• **Number of Months in Job at Age 18**	**-0.008* (0.005)**	**-0.008* (0.005)**
• **Weekly Hours of Work at Age 18**	**-0.006 (0.005)**	**-0.007 (0.006)**
Enrolled in Full-Time Education to Age 21	0.020 (0.065)	0.022 (0.067)
• **Proportion of Quarters in Part-Time Work**	**-0.018 (0.094)**	**0.012 (0.096)**
• **Proportion of Quarters in Full-Time Work**	**-0.149 (0.188)**	**-0.136 (0.192)**
School Qualification by Age 21	-0.213*** (0.049)	-0.174*** (0.053)
Post-School Qualification by Age 21 (Other Than University)	-0.046 (0.040)	-0.064 (0.041)
Partial or Full University Qualification by Age 21	0.026 (0.055)	0.018 (0.057)
Mother Highest Qualification – School	---	0.034 (0.046)
Mother Highest Qualification – Post-School	---	0.112* (0.059)
Father Highest Qualification – School	---	0.021 (0.043)
Father Highest Qualification – Post-School	---	0.033 (0.064)
Number of Younger Siblings	---	-0.000

		(0.021)
Number of Older Siblings	---	-0.056**
		(0.022)

Table 11 Continued

Proportion of Years Lived with Single Parent – Ages 1 to 12	---	-0.151 (0.197)
Proportion of Years Family Received Benefit – Ages 1 to 12	---	0.138 (0.141)
Index on Mean Maternal Depression – Ages 6 to 12	---	0.004 (0.005)
Index on Mean Real Family Income – Ages 1 to 12	---	-0.003 (0.042)
Index on Mean Standard of Living – Ages 1 to 12	---	-0.140* (0.073)
Proportion of Years Mother Worked Part-Time – Ages 1 to 14	---	0.062 (0.087)
Proportion of Years Mother Worked Full-Time – Ages 1 to 14	---	0.009 (0.110)
Proportion of Years Father Worked Part-Time – Ages 1 to 14	---	0.054 (0.390)
Proportion of Years Father Worked Full-Time – Ages 1 to 14	---	-0.069 (0.192)
Index on Mean IQ Test Score – Ages 8 and 9	---	0.010 (0.035)
Index on Mean Burt Word Reading Test Score – Ages 8 to 12	---	0.051 (0.041)
Index on Scholastic Ability Test Score – Age 13	---	0.009 (0.043)
Mean GPA Reported by Teachers – Ages 7 to 12	---	-0.079* (0.045)
Mean Class Size – Ages 7 to 12	---	-0.004 (0.005)
Index on Mean Conduct Problem Scores – Ages 7, 9 and 11	---	0.020 (0.027)
No Secondary School Data: Youth Outside Canterbury Region	---	-0.053 (0.051)
Proportion of Time in Church or Private Secondary School	---	-0.063 (0.072)
Proportion of Time in Single-Sex Secondary School	---	0.104* (0.060)
Index on Deviant Peers	---	0.028 (0.020)
Index on School Certificate Completion Rate of Peers	---	0.012 (0.046)
Index on Scholastic Ability of Peers	---	-0.003 (0.044)

Index on Family Income of Peers	---	-0.033 (0.057)

Table 11 Continued

Sample Size	489	489
Mean of Dependent Variable	0.223	0.223
'Pseudo' R^2	0.082	0.148

Notes: See the notes at the bottom of Table 1 for the sources of this early labour market information in the CHDS. See the text for the definitions of these explanatory variables. Estimated standard errors are in parentheses. The sample for these regressions is restricted to youth *not* enrolled in education at the time of the interview at age 21. The dependent variable is dichotomous. It equals one if the individual was without a job and either actively seeking work *or* receiving weekly income from the Unemployment or Domestic Purposes Benefit programmes at the time of the interview; zero otherwise. Maximum likelihood probit is used to estimate the determinants of this probability of being unemployed or on the benefit. The reported parameters (and their standard errors) are partial derivatives of this probability with respect to each of the independent variables, evaluated at the means of the other covariates. Pseudo R^2 is one minus the ratio of the restricted log-likelihood function with only a constant term relative to the log-likelihood function from the reported regression.

*** Significantly different from zero at a 1% level, two-tailed test.
** Significantly different from zero at a 5% level, two-tailed test.
* Significantly different from zero at a 10% level, two-tailed test.

Table 12

OLS Estimation of Log Hourly Earnings for Youth Not Enrolled in Education and Working at Age 21

Independent Variables	*Without Background Factors*	*With Background Factors*
Constant	2.280*** (0.051)	2.012*** (0.314)
Female	-0.087*** (0.032)	-0.108*** (0.035)
Maori or Pacific Islander	0.048 (0.044)	0.025 (0.048)
Mean Weekly Hours of Work – Ages 13 to 16	**-0.010 (0.008)**	**-0.011 (0.008)**
Enrolled in Full-Time Education to Age 18	-0.162** (0.063)	-0.196*** (0.066)
• **Number of Jobs Held – Ages 16 to 18**	**0.036 (0.027)**	**0.042 (0.028)**
• **Number of Months in Job at Age 18**	**0.004 (0.002)**	**0.004 (0.003)**
• **Weekly Hours of Work at Age 18**	**-0.003 (0.003)**	**-0.002 (0.003)**
Enrolled in Full-Time Education to Age 21	-0.061 (0.051)	-0.062 (0.052)
• **Proportion of Quarters in Part-Time Work**	**0.118 (0.074)**	**0.099 (0.077)**
• **Proportion of Quarters in Full-Time Work**	**0.267** (0.122)**	**0.211* (0.124)**
School Qualification by Age 21	0.154*** (0.048)	0.125** (0.052)
Post-School Qualification by Age 21 (Other Than University)	-0.060* (0.033)	-0.045 (0.034)
Partial or Full University Qualification by Age 21	-0.090** (0.042)	-0.107** (0.044)
Mother Highest Qualification – School	---	-0.024 (0.038)
Mother Highest Qualification – Post-School	---	0.065 (0.047)
Father Highest Qualification – School	---	-0.047 (0.037)
Father Highest Qualification – Post-School	---	-0.066 (0.051)
Number of Younger Siblings	---	0.009

		(0.019)
Number of Older Siblings	---	0.007 (0.018)

Table 12 Continued

Proportion of Years Lived with Single Parent – Ages 1 to 12	---	-0.233 (0.179)
Proportion of Years Family Received Benefit – Ages 1 to 12	---	0.103 (0.139)
Index on Mean Maternal Depression – Ages 6 to 12	---	0.003 (0.005)
Index on Mean Real Family Income – Ages 1 to 12	---	-0.020 (0.036)
Index on Mean Standard of Living – Ages 1 to 12	---	0.056 (0.065)
Proportion of Years Mother Worked Part-Time – Ages 1 to 14	---	0.145** (0.071)
Proportion of Years Mother Worked Full-Time – Ages 1 to 14	---	0.100 (0.092)
Proportion of Years Father Worked Part-Time – Ages 1 to 14	---	-0.769** (0.344)
Proportion of Years Father Worked Full-Time – Ages 1 to 14	---	-0.201 (0.177)
Index on Mean IQ Test Score – Ages 8 and 9	---	0.001 (0.030)
Index on Mean Burt Word Reading Test Score – Ages 8 to 12	---	0.012 (0.033)
Index on Scholastic Ability Test Score – Age 13	---	0.000 (0.037)
Mean GPA Reported by Teachers – Ages 7 to 12	---	0.051 (0.037)
Mean Class Size – Ages 7 to 12	---	0.002 (0.004)
Index on Mean Conduct Problem Scores – Ages 7, 9 and 11	---	-0.015 (0.024)
No Secondary School Data: Youth Outside Canterbury Region	---	0.057 (0.041)
Proportion of Time in Church or Private Secondary School	---	0.060 (0.057)
Proportion of Time in Single-Sex Secondary School	---	0.002 (0.051)
Index on Deviant Peers	---	-0.001 (0.017)
Index on School Certificate Completion Rate of Peers	---	0.008 (0.042)
Index on Scholastic Ability of Peers	---	-0.038 (0.034)

Index on Family Income of Peers	---	0.036 (0.051)

Table 12 Continued

Sample Size	376	376
Mean of Dependent Variable	2.284	2.284
R^2	0.086	0.176

Notes: See the notes at the bottom of Table 1 for the sources of this early labour market information in the CHDS. See the text for the definitions of these explanatory variables. Estimated standard errors are in parentheses. The sample for these regressions is restricted to youth *not* enrolled in education, and working and reporting weekly earnings and hours of work at the time of the interview at age 21. The dependent variable is the natural logarithm of the computed hourly earnings for working youth.

*** Significantly different from zero at a 1% level, two-tailed test.
** Significantly different from zero at a 5% level, two-tailed test.
* Significantly different from zero at a 10% level, two-tailed test.

Table 13

Probit Estimation on the Probability of Obtaining a Post-School Qualification by Age 25 for Youth Enrolled in School at Age 16

Independent Variables	*Without Background Factors*	*With Background Factors*
Constant	-0.026 (0.031)	-0.633** (0.317)
Female	0.118*** (0.037)	0.087* (0.044)
Maori or Pacific Islander	-0.210*** (0.051)	-0.056 (0.066)
Mean Weekly Hours of Work – Ages 13 to 16	**-0.030***** **(0.009)**	**-0.006** **(0.011)**
School Qualification Mother	---	0.009 (0.051)
Post-School Qualification Mother	---	0.079 (0.060)
School Qualification Father	---	0.022 (0.050)
Post-School Qualification Father	---	0.176*** (0.061)
Number of Younger Siblings	---	-0.013 (0.025)
Number of Older Siblings	---	-0.022 (0.024)
Proportion of Years Lived with Single Parent – Ages 1 to 12	---	-0.313 (0.250)
Proportion of Years Family Received Benefit – Ages 1 to 12	---	-0.081 (0.181)
Index on Mean Maternal Depression – Ages 6 to 12	---	-0.047** (0.023)
Index on Mean Real Family Income – Ages 1 to 12	---	-0.004 (0.030)
Proportion of Years Mother Worked Part`-Time – Ages 1 to 14	---	0.049 (0.089)
Proportion of Years Mother Worked Full-Time – Ages 1 to 14	---	-0.175 (0.123)
Proportion of Years Father Worked Part-Time – Ages 1 to 14	---	-0.288 (0.533)
Proportion of Years Father Worked Full-Time – Ages 1 to 14	---	-0.194 (0.239)

Table 13 Continued

Index on Mean IQ Test Score – Ages 8 and 9	---	-0.025 (0.040)
Index on Mean Burt Word Reading Test Score – Ages 8 to 12	---	-0.069 (0.042)
Index on Scholastic Ability Test Score – Age 13	---	0.072 (0.049)
Mean GPA Reported by Teachers – Ages 7 to 12	---	0.087* (0.048)
Mean Class Size – Ages 7 to 12	---	0.008 (0.005)
Index on Mean Conduct Problem Scores – Ages 7, 9 and 11	---	-0.006 (0.025)
Index on Deviant Peers	---	-0.010 (0.009)
School Certificate Qualification	---	-0.040 (0.081)
Sixth Form Certificate Qualification	---	0.190*** (0.056)
Bursary Qualification	---	0.326*** (0.049)
'Pseudo' R^2	0.063	0.324
Sample Size	755	
Mean of Dependent Variable	0.465	

*** Significantly different from zero at a 1% level, two-tailed test.
** Significantly different from zero at a 5% level, two-tailed test.
* Significantly different from zero at a 10% level, two-tailed test.

Notes: See the notes at the bottom of Table 1 for the sources of this early labour market information in the CHDS. See the text for the definitions of these explanatory variables. Estimated standard errors are in parentheses. The sample for these regressions is restricted to youth who were still enrolled in school full-time at the time of the interview at age 16. The dependent variable is dichotomous. It equals one if the individual received any formal post-school qualification by the interview at age 25; zero otherwise. Maximum likelihood probit is used to estimate the determinants of the probability of obtaining this qualification. The reported parameters (and their standard errors) are partial derivatives of this probability with respect to each of the independent variables, evaluated at the means of this vector of covariates.

Table 14

Probit Estimation on the Probability of Obtaining a University Degree by Age 25 for Youth Enrolled in School at Age 16

Independent Variables	*Without Background Factors*	*With Background Factors*
Constant	-0.129*** (0.026)	-0.850*** (0.244)
Female	0.031 (0.033)	-0.024 (0.032)
Maori or Pacific Islander	-0.242*** (0.031)	-0.118*** (0.034)
Mean Weekly Hours of Work – Ages 13 to 16	**-0.035*** (0.009)**	**-0.011 (0.008)**
School Qualification Mother	---	-0.022 (0.037)
Post-School Qualification Mother	---	0.030 (0.044)
School Qualification Father	---	-0.010 (0.037)
Post-School Qualification Father	---	0.108** (0.052)
Number of Younger Siblings	---	-0.005 (0.019)
Number of Older Siblings	---	-0.017 (0.018)
Proportion of Years Lived with Single Parent – Ages 1 to 12	---	0.025 (0.217)
Proportion of Years Family Received Benefit – Ages 1 to 12	---	-0.122 (0.145)
Index on Mean Maternal Depression – Ages 6 to 12	---	-0.014 (0.017)
Index on Mean Real Family Income – Ages 1 to 12	---	0.004 (0.021)
Proportion of Years Mother Worked Part`-Time – Ages 1 to 14	---	-0.026 (0.063)
Proportion of Years Mother Worked Full-Time – Ages 1 to 14	---	-0.069 (0.089)
Proportion of Years Father Worked Part-Time – Ages 1 to 14	---	0.139 (0.378)
Proportion of Years Father Worked Full-Time – Ages 1 to 14	---	0.022 (0.192)

Table 14 Continued

Index on Mean IQ Test Score – Ages 8 and 9	---	0.002 (0.029)
Index on Mean Burt Word Reading Test Score – Ages 8 to 12	---	-0.007 (0.030)
Index on Scholastic Ability Test Score – Age 13	---	0.009 (0.035)
Mean GPA Reported by Teachers – Ages 7 to 12	---	0.066** (0.032)
Mean Class Size – Ages 7 to 12	---	0.004 (0.004)
Index on Mean Conduct Problem Scores – Ages 7, 9 and 11	---	-0.006 (0.022)
Index on Deviant Peers	---	0.005 (0.007)
School Certificate Qualification	---	0.038 (0.092)
Sixth Form Certificate Qualification	---	0.169*** (0.040)
Bursary Qualification	---	0.433*** (0.053)
'Pseudo' R^2	0.050	0.526
Sample Size	755	
Mean of Dependent Variable	0.281	

*** Significantly different from zero at a 1% level, two-tailed test.
** Significantly different from zero at a 5% level, two-tailed test.
* Significantly different from zero at a 10% level, two-tailed test.

Notes: See the notes at the bottom of Table 1 for the sources of this early labour market information in the CHDS. See the text for the definitions of these explanatory variables. Estimated standard errors are in parentheses. The sample for these regressions is restricted to youth who were still enrolled in school full-time at the time of the interview at age 16. The dependent variable is dichotomous. It equals one if the individual received any formal post-school qualification by the interview at age 25; zero otherwise. Maximum likelihood probit is used to estimate the determinants of the probability of obtaining a diploma or degree. The reported parameters (and their standard errors) are partial derivatives of this probability with respect to each of the independent variables, evaluated at the means of this vector of covariates.

Table 15

Probit Estimation on the Probability of Working at Age 25
For Youth Enrolled in School at Age 16 and Not in Education or Training at Age 25

Independent Variables	*Without Background Factors*	*With Background Factors*
Constant	0.304*** (0.023)	0.167 (0.223)
Female	-0.100*** (0.033)	-0.086** (0.035)
Maori or Pacific Islander	-0.068 (0.054)	-0.063 (0.055)
Mean Weekly Hours of Work – Ages 13 to 16	**-0.002 (0.008)**	**-0.011 (0.008)**
School Qualification Mother	---	-0.027 (0.041)
Post-School Qualification Mother	---	-0.030 (0.050)
School Qualification Father	---	0.000 (0.038)
Post-School Qualification Father	---	-0.122* (0.065)
Number of Younger Siblings	---	-0.006 (0.017)
Number of Older Siblings	---	-0.034 (0.017)
Proportion of Years Lived with Single Parent – Ages 1 to 12	---	-0.020 (0.163)
Proportion of Years Family Received Benefit – Ages 1 to 12	---	-0.037 (0.128)
Index on Mean Maternal Depression – Ages 6 to 12	---	0.021 (0.018)
Index on Mean Real Family Income – Ages 1 to 12	---	-0.010 (0.024)
Proportion of Years Mother Worked Part`-Time – Ages 1 to 14	---	0.106 (0.067)
Proportion of Years Mother Worked Full-Time – Ages 1 to 14	---	0.086 (0.091)
Proportion of Years Father Worked Part-Time – Ages 1 to 14	---	1.274* (0.725)
Proportion of Years Father Worked Full-Time – Ages 1 to 14	---	0.060 (0.157)

Table 15 Continued

Index on Mean IQ Test Score – Ages 8 and 9	---	0.037 (0.030)
Index on Mean Burt Word Reading Test Score – Ages 8 to 12	---	0.014 (0.032)
Index on Scholastic Ability Test Score – Age 13	---	-0.015 (0.036)
Mean GPA Reported by Teachers – Ages 7 to 12	---	-0.031 (0.037)
Mean Class Size – Ages 7 to 12	---	0.002 (0.004)
Index on Mean Conduct Problem Scores – Ages 7, 9 and 11	---	0.022 (0.018)
Index on Deviant Peers	---	0.003 (0.007)
School Certificate Qualification	---	0.114 (0.069)
Sixth Form Certificate Qualification	---	0.094* (0.050)
Bursary Qualification	---	-0.030 (0.056)
Post-School Qualification	---	-0.044 (0.042)
Post-School Diploma or Degree	---	0.105** (0.042)
'Pseudo' R^2	0.021	0.101
Sample Size	496	
Mean of Dependent Variable	0.839	

*** Significantly different from zero at a 1% level, two-tailed test.
** Significantly different from zero at a 5% level, two-tailed test.
* Significantly different from zero at a 10% level, two-tailed test.

Notes: See the notes at the bottom of Table 1 for the sources of this early labour market information in the CHDS. See the text for the definitions of these explanatory variables. Estimated standard errors are in parentheses. The sample for these regressions is restricted to youth who were still enrolled in school full-time at the time of the interview at age 16, but were not enrolled in education or training programmes at age 25. The dependent variable is dichotomous. It equals one if the individual was working at the time of the interview at age 25; zero otherwise. Maximum likelihood probit is used to estimate the determinants of the probability of working. The reported parameters (and their standard errors) are partial derivatives of this probability with respect to each of the independent variables, evaluated at the means of this vector of covariates.

Table 16

OLS Estimation on the Log Hourly Earnings for Youth Enrolled in School at Age 16 and Working and Not in Education or Training at Age 25

Independent Variables	*Without Background Factors*	*With Background Factors*
Constant	2.760*** (0.030)	2.662*** (0.239)
Female	-0.079** (0.035)	-0.133*** (0.037)
Maori or Pacific Islander	0.002 (0.052)	0.080 (0.051)
Mean Weekly Hours of Work – Ages 13 to 16	**-0.016* (0.009)**	**-0.004 (0.008)**
School Qualification Mother	---	-0.012 (0.040)
Post-School Qualification Mother	---	0.011 (0.047)
School Qualification Father	---	-0.057 (0.039)
Post-School Qualification Father	---	-0.083 (0.053)
Number of Younger Siblings	---	0.019 (0.019)
Number of Older Siblings	---	-0.038** (0.019)
Proportion of Years Lived with Single Parent – Ages 1 to 12	---	-0.109 (0.184)
Proportion of Years Family Received Benefit – Ages 1 to 12	---	0.006 (0.141)
Index on Mean Maternal Depression – Ages 6 to 12	---	-0.014 (0.018)
Index on Mean Real Family Income – Ages 1 to 12	---	0.031 (0.024)
Proportion of Years Mother Worked Part`-Time – Ages 1 to 14	---	0.134* (0.072)
Proportion of Years Mother Worked Full-Time – Ages 1 to 14	---	-0.034 (0.091)
Proportion of Years Father Worked Part-Time – Ages 1 to 14	---	0.270 (0.515)
Proportion of Years Father Worked Full-Time – Ages 1 to 14	---	-0.156 (0.168)

Table 16 Continued

Index on Mean IQ Test Score – Ages 8 and 9	---	0.006 (0.031)
Index on Mean Burt Word Reading Test Score – Ages 8 to 12	---	-0.026 (0.034)
Index on Scholastic Ability Test Score – Age 13	---	0.031 (0.036)
Mean GPA Reported by Teachers – Ages 7 to 12	---	0.053 (0.039)
Mean Class Size – Ages 7 to 12	---	-0.003 (0.004)
Index on Mean Conduct Problem Scores – Ages 7, 9 and 11	---	-0.007 (0.019)
Index on Deviant Peers	---	-0.009 (0.007)
School Certificate Qualification	---	0.106* (0.060)
Sixth Form Certificate Qualification	---	0.032 (0.047)
Bursary Qualification	---	0.124** (0.055)
Post-School Qualification	---	0.006 (0.047)
Post-School Diploma or Degree	---	0.025 (0.061)
R^2	0.019	0.211
Sample Size	416	
Mean of Dependent Variable	2.695	

*** Significantly different from zero at a 1% level, two-tailed test.
** Significantly different from zero at a 5% level, two-tailed test.
* Significantly different from zero at a 10% level, two-tailed test.

Notes: See the notes at the bottom of Table 1 for the sources of this early labour market information in the CHDS. See the text for the definitions of these explanatory variables. Estimated standard errors are in parentheses. The sample for these regressions is restricted to youth who were still enrolled in school full-time at the time of the interview at age 16, not enrolled in education or training programmes, but working at age 25. The dependent variable is the natural logarithm of reported hourly earnings.