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## Family Income and Participation in Post-Secondary Education

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## I. Introduction

In no policy area is the interplay between the social goals of efficiency and equity as evident as in education. A highly skilled workforce has long been seen as important in promoting economic prosperity, with theorists and policy makers alike emphasizing the contribution of human capital to economic growth. Many observers, in fact, feel this is becoming increasingly so. At the same time it is very hard to abstract from social goals related to equality of opportunity and a more inclusive society, and for many an important goal of the education system is to promote citizenship and active participation in society. For example, the Federal Government's innovation strategy highlights both of these goals, emphasizing the importance of skills and learning in fostering innovation and growth in an era of the so-called "knowledge" economy, but in a way that encourages the full participation of all groups in society (Canada, 2002). This implicitly implies there are two possible directions for the future of the education system: one in which the concerns of the market place are traded off against those of citizenship and inclusion, and another in which trade-offs are somehow not made and both goals are pursued simultaneously. Access to post-secondary education is one area that offers the clearest reflection of these two options: do we want higher education to promote excellence in a way that focuses resources on the few; do we want it to be universal and offer everyone the opportunity to participate; or can we have both excellence and inclusion?

In fact, the federal government has pledged that among other things “one hundred percent of high school graduates have the opportunity to participate in some form of post-secondary education...” (Canada 2002, p.34). This milestone promises universal access to post-secondary education and as such speaks most directly to a growing worry that—at the very time its private and social returns are increasing—higher education will become the domain of those from more privileged backgrounds. On the one hand about 85% of Canadian parents hope that their children will pursue post-secondary studies. This aspiration is shared across the income distribution, with 80% of those parents with less than \$30,000 of income also holding this expectation (Statistics Canada 2001). On the other hand the climate surrounding the financing of post-secondary education has changed significantly, with the 1990s witnessing notably sharp increases in university tuition fees. In this climate lower income families may not be as well positioned as higher income families to realize their expectations. For example, Statistics Canada (2001) also reports that less than one-fifth of families with incomes of less than \$30,000 are saving for the post-secondary education of their children, but about two thirds of those with more than \$80,000 are doing so. For both these reasons—high expectations of participation and increases in the potential financial burden—“access” has become an important policy issue in understanding how higher education can promote growth and efficiency and at the same time equality of opportunity and social inclusion.

The objective of our research is to inform this understanding by examining the relationship between family background, particularly family income, and the participation

of the young in post-secondary education. What is the nature and strength of the relationship between post-secondary participation and family income, and how has it changed over the course of the last two decades or so? In other words, is higher education increasingly the purview of the well-to-do? This obvious and relevant question is surprisingly difficult to answer in large part because of data limitations. We use two complementary approaches in the hope of over-coming these limitations and offering an accurate estimate of the correlation between family income and post-secondary participation. In addition it should be noted that we use the term “access” to refer very broadly to participation in post-secondary education and at times more specifically to university. As such our analysis does not refer to the particular constraints that students may face in choosing their institution or field of study. The question as to whether the relationship between family background and entry into particular disciplines or institutions has changed would relate to a much narrower sense of the term “access” and is beyond the scope of our study.

In the next section we begin by documenting the extent of the changes in university tuition fees, and in a limited way some of the possible responses of students. As an example, average arts tuition started increasing significantly in 1990 and by the 2000/01 academic year was 86% higher. At the same time the 1990s also witnessed a significant variation in fees across provinces, across fields of study, and even between institutions. The most notable response by students has been to increase borrowing, particularly by those from parts of the country other than Quebec. This in part reflects an easing of borrowing limitations introduced to the Canada Student Loan program in 1994.

In section three we review of a number of Canadian studies that examine the relationship between family income and post-secondary participation. The major limitation of this work is that it all pertains to a period during the 1980s or early 1990s before the introduction of a higher tuition climate. It also does not make a distinction between participation in colleges and vocational schools on the one hand and universities on the other, nor does it distinguish the experience of young men from young women. Our analysis is intended to examine these three dimensions. In this section we also discuss the methods and data we employ. We use two alternative data sets and approaches, each with certain weaknesses, but which taken together may offer—we argue—an accurate estimate of the income-participation relationship and how it has changed from the 1980s up to 2000.

Section four offers the results of our estimations and attempts to address a number of concerns inherent in our definitions, data, and approach. Our principle findings are three in number. First, we document slight increases in the participation of individuals from lower income households in university. Individuals from higher income families are certainly much more likely to be engaged in university education. But this has been a longstanding tendency, and if anything the gap between high and low-income participation rates has narrowed slightly. In contrast, there are no significant differences in college/vocational participation rates across income classes. Second, the relationship between parental income and university participation did in fact become stronger, but only to about the early-mid 1990s just after tuition fees first experienced substantial increases. The strength of the relationship has weakened since then. During the mid

1980s every 10% increase in parental income was associated with a 2.7% increase in the probability of university attendance; in 1994 with a 4.3% increase; but in 2000 with only a 2.5% increase. Further, the results are more muted when the broader post-secondary system—including colleges and vocational institutions—is analysed. However, these results pertain to women, and our third major finding has to do with the fact that the patterns for young men are different. In particular, the run up in the correlation is not as great, and when colleges and vocational institutions are included there is a decrease in each period.

In sum, we find no evidence that the correlation between family income and post-secondary participation has increased during the latter half of the 1990s, indeed just the opposite. This may reflect the fact that students have responded in a number of different ways, most notably by borrowing more. If there was a period of a tighter link between family income and participation it was in the early 1990s when tuition fees began increasing but during which policy changes easing borrowing limits and offering increases in other forms of financial assistance had not yet been put into place. The latter part of the 1990s should not be characterized as a period in which the university system has become the domain of the relatively more privileged any more than it has been in the past, but rather a period in which the costs of higher education has shifted at least in part onto students. This is also a period in which the system has become more differentiated as the costs of programs varied more substantially between provinces, fields of study, and institutions. If there is a growing concern to be dealt with in terms of “access” future studies should examine the consequences of this differentiation. Even though globally all

Canadians have access to some form of post-secondary education, are particular institutions and particular fields of study—perhaps those more valued in the new economy—the domain of students with higher income backgrounds? Future research should also focus on the factors earlier in the lives of young people that place them in the fortunate circumstance during their late teens of having to choose whether or not to participate in post-secondary education, and in particular on how these factors play out for young men.

## II. The Evolution of University Financing

The main source of revenue for universities comes from provincial grants and contracts, and the two panels of Figure 1 illustrate that there have been three distinct periods in the evolution of this funding. The first is a period of steadily declining funding on a per student basis, reflecting stable funding in absolute terms during a period of rising enrolments. This began in the mid/late 1970s and continued to the 1985/86 academic year, when enrolments went from about 240,000 to 472,000. Throughout this period universities received in real terms about \$6.3 billion annually, but on a per student basis this reflected a decline from about \$20,000 to \$13,000. The second period is characterized by increases in funding levels and a resulting plateauing of per student funding. This period ends in 1992/93 when increases in absolute transfers peaked at about \$7.3 billion after seven consecutive annual increases. During this period the number of full-time equivalent university students increased from 472,000 to 575,000. The third period begins thereafter and is characterised by declines in both absolute and per student funding. By the end of

the 1990s per student funding, at just under \$11,000, is almost half of what it was 25 years earlier and reflects a return to absolute funding levels of the 1980s and late 1970s.

In this context universities have, among other things, increased the fees they charge students, the most important element of which is tuition for credit courses. As an example, Figure 2A charts developments in tuition fees for Arts programs, which fell in real terms during the 1970s, remained flat during the 1980s, and then began to increase sharply after the 1989/90 academic year to reach historic highs by the end of the 1990s. Average weighted Arts tuition fees for the entire country (expressed in \$2001) rose from \$1,866 in 1990/91 to a peak of \$3,456 in 1999/00, after which they remained relatively constant. These Canada-wide developments mask the fact that fees are significantly different between the provinces and have increased at different rates. They rose in all regions during the early 1990s but students in Nova Scotia have consistently paid the highest fees and have also faced the largest increases (Figure 2B). Particularly sharp increases also occurred in Ontario and Alberta. Students from Quebec experienced steadily declining fees (from \$2,215 in 1972/73 to a low of \$663 in 1989/90) followed by a near doubling between 1989/90 and 1990/91. But with an average arts tuition of just under \$2,000 in 2001/02, students in Quebec still pay the lowest tuition for Arts programs. Toward the end of the period average Arts tuition in British Columbia, Manitoba, and Newfoundland and Labrador all declined, but continued to increase elsewhere. These changes have led to a substantial increase in the dispersion of tuition fees between provinces. In 1978/79 the difference between the highest and lowest tuition was \$1,130; by 2001/02 it had grown to \$2,820.

A similar story can be told by field of study and even by institution. University tuition fees have increased for all fields but not uniformly, with some professional programs experiencing particularly sharp increases during the 1990s. Between 1995/96 and 2001/02 average fees in Dentistry more than doubled (increasing from \$3,389 to \$8,491), while those for Medicine went from an average of \$3,207 in 1995/96 to \$6,654 in 2001/02. During the 1990s increases in fees for Law and Graduate Studies closely mirrored increases in overall Arts tuition fees, and while those for Education increased during the 1990s they did so to a relatively much smaller degree from \$1,887 in 1990/91 to \$2,892 in 2001/02). Indeed, on average Education students paid the lowest tuition fees of any field of study between 1991/92 and 2001/02. At the same time it should be noted that not all institutions responded in the same way. For example, between 1994/95 and 2001/02 tuition fees for Dentistry at the University of Toronto quadrupled (increasing from \$3,235 in 1994/95 to \$13,230 in 2001/02), but at the other extreme fees charged by the University of British Columbia actually dropped (from \$4,300 in 1994/1995 to \$3,740 in 2001/02). Similarly, tuition for medicine at the University of Toronto more than tripled from \$3,484 in 1995/96 to \$11,550 in 2001/02, but at the University of British Columbia they fell over the same period from \$4,399 to \$3,740.<sup>1</sup>

How have students responded to these changes? Some of the possible responses include: choosing a different field of study or a different institution, borrowing more from public or private sources, working more during the summer or during studies, pursuing

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<sup>1</sup> The source for these data is Statistics Canada, Tuition Fees and Living Accommodations at Canadian Universities Survey. Detailed information on tuition fees are available from this source for a host of disciplines for each degree granting institution in Canada from 1979 to 2002.

part-time studies or otherwise taking longer to complete studies, saving on other aspects of education costs like living arrangements by for example living at home longer, deciding not to pursue university education and going instead to college, or finally not pursuing post-secondary education at all and entering the labour market sooner. It may well be that “access” to particular institutions or fields of study has changed and that the burden of adjustment has fallen more on students from some income groups than others. The result may be that the relationship between family income and participation is now different by field of study or institution. We do not use the term “access” in this narrow sense nor do we offer a full assessment of all the possible changes in student behaviour. Our focus is rather on “access” in the broadest sense of the term: has participation in higher education changed and how is this related to family income after all of these choices and adjustments have been made.

The final outcome of the decisions students have made in response to all of the factors—not just tuition fees—they consider when choosing their level of education is illustrated in Figure 3. Overall participation rates in post-secondary education for 18 to 24 year olds are plotted from 1979 to 2002. In this chart post-secondary participation refers to a combination of information on current school attendance and highest level of education attained. For example, University participation refers to those who have completed a university degree or certificate at some point between the ages of 18 to 24 or who are currently enrolled in university. The definition is similar for College (which refers more specifically to Community College, CEGEP or Trade-Vocational School participation), while Non-participants are those who never reported having attended post-

secondary education or report having some but who have not completed a degree or diploma and are not currently enrolled. Overall participation in higher education is at historic highs, but the rates of growth have slowed significantly during the 1990s. University participation rates increased steadily during the 1970s and 1980s and peaked in 1993 at 24%. There is a distinct drop of two percentage points between 1993 and 1994, and since that time participation rates have been flat at 22 to 23%. College rates also increased throughout the 1970s and 1980s, but display a slightly different pattern during the 1990s by continuing to grow (albeit at a much reduced rate). The non-participation rate has not changed much in the last two decades, perhaps even falling a bit during the 1990s. In short there is little evidence to suggest that drop-out and non-participation rates have increased, some evidence to suggest that college may have been chosen over university by a small fraction of post-secondary participants, and while the rate of growth of university participation has stalled there is no evidence to suggest declines below the levels experienced in the late 1980s and early 1990s before the sharp run up in tuition fees.

The strong majority of university students do not work while studying but this has changed slightly after about 1993 and particularly after 1997. Figure 4A illustrates that during the 1980s an average of 63% of university students did not work while studying, but that this fell from 65% in 1993 to 59% in 1995 reflecting an equivalent percentage point increase in the fraction working part-time. Things have not changed much since that time with the fraction not working at all standing at 58% in 2002 and those working part-time at 34%. There is a greater tendency for college students to be

working during their studies. In contrast to university students only 50 to 60% of college students do not work while studying. Like university students there has been a tendency for this to fall through time, but the decline has been a long-term trend. With the exception of a possible jump in the fraction working part-time between 1996 and 1997, this tendency does not seem any more pronounced during the 1990s than it did earlier. By 2002 43% of college students were working part-time, and less than 50% were not working at all during their studies. In contrast, the majority of university students do not work while at school, but there was a small discrete increase in part-time work among university students between 1993 and 1995.

The living arrangements of students have not changed very much during the last two decades and in particular there are no noticeable changes during the 1990s. Figures 5A and 5B offer respectively the proportions of university and college students living at home, on their own, as a married couple, or in other arrangements. The fraction at home has hovered between 70 and 80% since 1979, and is about the same for the two groups. A certain caution is needed, however, in interpreting these data. The “At Home” category refers, strictly speaking to those whose “usual place of residence” is stated as being that of their parents. “Usual place of residence” is a construct of the survey taking process and refers to “the dwelling in Canada where a person lives most of the time” (Statistics Canada 2001, p. 141-42). This does not necessarily imply that these students are living at their parents’ residence while studying. Some fraction may in fact be doing so, but another fraction may be attending an institution in another locale and returning to their parents’ home during the summer while continuing to refer to it as their usual place of

residence. Bowlby and McMullen (2002) find that approximately 43% of first year university students lived with their parents during the school year and 41% reported living in a university residence. It may well be that the relative shares in these two groups have changed through time. This implies that in spite of the information in Figures 6A and 6B it may be the case that students are choosing to attend institutions closer to home in order to save on moving and living expenses.

The most notable change in the decisions of those attending post-secondary schools has been with respect to borrowing. During the 1990s the average student loan increased considerably (Figure 6). More precisely between the 1992/93 academic year and the 1993/94 academic year the average amount borrowed through the provincial loans programs and the Canada Student Loan program went from about \$5,000—where it had been since the early 1980s—to over \$7,500. It increased a bit further thereafter ending the 1990s at \$7,680. This information, however, refers only to those students living in provinces other than Quebec.<sup>2</sup> In Quebec, there has been only a modest tendency for the amount of the average student loan to increase, and no discrete changes in this relationship during the 1990s. At the end of the decade this figure was \$3,360. The very sharp run up in student loan amounts between the 1992/93 and 1993/94 academic years reflects in part an administrative change that increased the limit on the maximum CLSP loan amount from \$105/week to \$165/week. Provinces which took part in the CSLP were obliged to match this increase according to a 60/40 ratio. This shift in policy led to an increase in the number of students receiving provincial student loans since participating

provinces previously only provided loans and grants to those whose need exceeded \$105/week (Junor and Usher 2002).

### III. An Overview

Our major objective is to offer an accurate estimate of the strength of the relationship between parental income and child post-secondary participation. The issue of family background and post-secondary participation is a longstanding concern in both academic and policy circles. For example, Bouchard and Zhao (2000), Knighton and Mirza (2002) {cite Heckman US studies, anything by Ross Finnie on this as well. Also relate to the literature on intergenerational income mobility. }

Our approach can be summarized as follows. Let  $Y_i$  represent the post-secondary status for a young individual labelled  $i$ , which we will consider to be those 18 to 24 years of age.  $Y$  takes on the value of 1 if the individual has a post-secondary degree or diploma or is attending a post-secondary institution, and 0 otherwise. In addition let  $X_i$  represent the permanent income of individual  $i$ 's parents. We wish to obtain accurate estimates of  $\beta_1$  in the following equation.

$$Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i \quad (1)$$

This is a linear probability model of post-secondary participation, and when parental income is expressed in natural logarithms the coefficient  $\beta_1$  indicates the change in the

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<sup>2</sup> Quebec, Nunavut and the North West Territories have opted out of the Canada Student Loan Program and administer similar programs on their own. Quebec's program functions in a manner similar to the Canada student Loans program but with different levels of support.

chances of post-secondary schooling for each percentage point change in income.<sup>3</sup> The greater this coefficient, the greater the impact changes in parental income will have on post-secondary participation. (The term  $\beta_0$  is a constant and  $\varepsilon_i$  is a random component.) Under certain assumptions  $\beta_1$  can be thought of as the correlation between post-secondary participation and parental income.

Only a limited number of studies have directly analyzed the correlation between family income and post-secondary participation. In part this may reflect data limitations. There are very few surveys that contain information on parental income and the post-secondary participation of children. One possibility is to use longitudinal surveys in which family income is collected while high school students still reside in the parental home and then observing these students through time as they leave and make their way either into post-secondary education or into the labour market. Zhao and de Broucker (2001, 2002) use the Survey of Labour and Income Dynamics in this way to document the relationship between family income and the post-secondary participation of 18 to 21 year olds between 1993 and 1998. They find that about 19% of youth from families with incomes in the lowest 25% of the income distribution attend university and that double that fraction do so for families in the top 25%. College attendance rates are just under 30% regardless of the position in the income distribution. Because of the need to observe

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<sup>3</sup> Moffitt (1999) offers an overview of the use empirical methods for binary dependent variables, and in particular highlights the limits and appropriate use of the linear probability model, stressing that traditional objections need not always apply. Following his analysis we use the linear probability model, as opposed to probit or logit models, since there is little possibility of predication outside of the 0-1 range, our concern is with an overall correlation and not with underlying structural parameters, and since non-linearities are less likely to be a problem given the probabilities of concern are likely in the lower tail of the distribution.

young people leaving the family home the sample size for any given year can be quite small. The authors are therefore forced to pool all 18 to 21 year olds over the entire six years of longitudinal data available to them in order to obtain reliable estimates. As such there is no scope to illustrate how the relationship between income and post-secondary participation has changed.

The starting point for our analysis is a study by Christofides, Cirello and Hoy (2001), which uses a different approach. The major issue they explore relates to the observation that between 1975 and 1993 the participation rate in post-secondary of children from families in the lower end of the income distribution has increased a lot more than those in the higher end. For example in 1975 children whose families were in the top fifth of the income distribution were almost three times as likely to be engaged in higher education than those from the bottom fifth, but in 1993 they were only 1.6 times as likely. The authors seek to examine the extent to which this reflects a disproportionately greater change in the demand for higher education among those in the bottom of the income distribution as their real income increases. They find that while income levels are certainly an important factor determining post-secondary participation, a disproportionate influence of income changes on the schooling choices of lower income groups does not explain the observed convergence in relative participation rates.

We pick up on and extend four aspects of their study. First, our interest has less to do with their specific hypothesis than with the nature of the relationship between absolute income levels and post-secondary participation and how this has changed. They document that higher income families are much more likely to have their children attend

post-secondary education, but that lower income groups have experienced relatively greater increases in participation over time. This finding, however, refers only to the period up to 1993 just as significant changes in post-secondary began.<sup>4</sup> We update these patterns into the late 1990s. Second, they make no distinction between university education and community college education. The relationship between family income and post-secondary participation could be very different across these levels and as alluded to in Figure 4 changes in enrolment and substitution between the two levels could be an important dimension of access. We employ a distinction between university and college in our analysis. Finally, the authors offer no distinction in participation by gender. It is now well documented that there are important differences in participation by gender, with women more are engaged in post secondary education than men. It may well be that access issues play themselves out differently by gender and to the extent possible we offer information along these lines.

Christofides et al (2001) use information on parental income for a series of cross-sectional surveys over a period of almost 20 years. Their information comes from the Survey of Consumer Finances (SCF) in which income information is obtained from the household head who also reports the educational status of all family members who continue to call the home their usual place of residence. In this way they obtain a reliable link between family income and post-secondary education of the young for a relatively large sample, but at the price of missing those students who are living independently

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<sup>4</sup> Indeed, in some of their modelling Christofides et al attempt to examine the role of tuition fees in explaining participation rates but find no significant role. They explain this by referring to the fact that during the period of their study tuition fees did not vary that much over time and across provinces.

either on their own, in a partnership with others, or in some other arrangement. We alluded to this issue in discussions of Figures 5A and B. This information suggests that between 70 and 80% of post-secondary students consider their parents' home as their usual place of residence and that this has not changed. If the likelihood of no longer living at home is the same across income levels the fact that parental income information is missing for 20 to 30% of students should not introduce a bias into their work. However if post-secondary students from high income backgrounds are more likely to leave home then the correlation between income and participation may be understated. It would be overstated if the opposite were the case. However given the fact that there have been no significant changes in this proportion over time suggests that the degree of the bias will not be changing.

This still leaves unaddressed the experiences of those who do not attend university or college. In fact, studies of the living arrangements of the young suggest that a slightly different pattern occurs for the entire population of young people (Meunier, Bernard, Boisjoly 1998, Boyd and Norris 1999). This is illustrated in Figure 7 for all 18 to 24 year olds. Between 50 and 60% of this group refer to their parents' home as the usual place of residence, with a tendency for this proportion to be increasing through time particularly after 1990. This suggests that parental income will not be as well reported for those who decide not to attend a post-secondary institution but that the extent of this bias is falling through time. It reflects substantial declines in the fraction of 18 to 24 year olds who live as a married couple. If children from lower income families are more likely to leave the parental home earlier then the sample of non-attendees will be over-represented

with higher income groups and the correlation between family income and post-secondary participation will be understated. This bias should be falling with time.

With this in mind we also make use of the SCF to estimate equation (1) since it is the only source of information that directly links parental income with educational status of the young over the time period of interest. However, one further important limitation of this information should also be noted. The income measure provided is annual income for only one year. Annual incomes may fluctuate from year to year and may not reflect at any point in time the true financial resources that parents may have at their disposal to support of their children's education. The use of annual income rather than a measure of permanent income will lead the correlation between family income and post-secondary participation to be understated. For example, if we actually observe  $\tilde{X}_i = X_i + v_i$ , where  $v_i$  represents a transitory shock to income, this results in an errors in variables problem leading the estimated coefficient ( $\tilde{\beta}_1$ ) to be less than the true coefficient according to a factor determined by the ratio of the variance of  $v_i$  to that of  $X_i$ , so that  $\tilde{\beta}_1(1 + \sigma_v^2 / \sigma_X^2) = \beta_1$  (Greene 1997, pp. 436-38). Further, if the variability of the transitory component of income is increasing through time this bias will become more important. Baker and Solon (1999) report that for 40 to 50 year old men the transitory component accounts for about two thirds of the total variance of income. There has been a tendency for the variability of income to increase through time, stepping up particularly after business cycle recessions, but the variance in the permanent and transitory component have pretty well increased by the same amount. Their study is based upon

data between 1976 and 1992. This would suggest that estimates of  $\beta_1$  resulting from annual income measures should be inflated by about 50%, but that the extent of the bias has not changed through time, or at least up to the early 1990s. On the whole we expect substantial understatement of the true value of  $\beta_1$  using the SCF—possibly in the order of 50%—but we do not expect the bias to be the major source of changes through time.

We use a complementary approach to work around these two difficulties with the SCF. Generally, students and young adults tend not to be questioned in cross sectional surveys on the income levels of their parents in large part because they may not be in a position to respond accurately to such questions. But information easier to recall is sometimes collected. In particular many surveys ask about parental education and occupation, variables that are often used to develop indicators of socio-economic status and which are strong predictors of income. Information on self-reported income, education and occupation can be made use of in combination with the parental background information. The methodology is related to a literature that estimates intergenerational income correlations, and is in turn related to instrumental variables (IV) and two-sample split IV methods (Angrist 199\_, Angrist and Krueger 199\_, Bjorklund and Janti 199\_, Fortin and Lefebvre 1998, Grawe forthcoming, Zimmerman 1992). The procedure involves two steps. The first is to estimate an income equation for a subset of survey respondents who because of their ages represent the cohort of parents of 18 to 24 year olds. This uses self-reported information on incomes, age, occupation and education. The second stage uses the estimated coefficients from this equation and parental

education and occupation information reported by each child to ascribe to each a predicated parental income.

To be more specific we use information from the General Social Surveys (GSS) of 1986, 1994, and 2001. This is a representative survey of the entire population in which all respondents are asked to report, among other things, their incomes, occupations, and education levels. In addition respondents are asked to recall the occupation and education levels of their parents when they, the respondents, were 15 years of age. For all those male respondents between the ages of 40 and 60—those who can roughly be taken to represent fathers of 18 to 24 year olds—we estimate equation (2), an earnings equation using self-reported information on occupation ( $Z_{1i}$ ) and education ( $Z_{2i}$ ).

$$X_i = \gamma_0 + \gamma_1 Z_{1i} + \gamma_2 Z_{2i} + \mu_i \quad (2)$$

The estimated coefficients  $\hat{\gamma}_0$ ,  $\hat{\gamma}_1$  and  $\hat{\gamma}_2$  can then be used to predict parental permanent incomes for the group of 18 to 24 year olds in the data using the information they provide on the occupation and education of their fathers. These predicted incomes,  $\hat{X}_i$ , are then used as the income measure in an estimation of equation (1).

In this way all young people are captured regardless of their current living arrangements and by offering a more accurate estimate of permanent income based upon its major determinants the bias associated with transitory income fluctuations is eliminated. At the same time, however, this two-stage approach introduces another sort of bias that will lead to an overstatement of  $\beta_1$ . This occurs because the influence of parental occupation and education on the post-secondary decisions of children is channelled

entirely through their relationship with income. If these factors play an independent role in determining higher schooling, as they most surely do, then the influence of income on those decisions will be overstated.

In sum, this implies that our first method using direct information on incomes from the SCF will understate the post-secondary participation – family income relationship, but that our second method using indirect income information from the GSS will overstate it. By relying on both approaches we put an upper and lower bound on the true value of  $\beta_1$  as well as assess the robustness of any changes observed through time.

#### IV. Results

Details of how we create our analytical data sets and the definitions of our key variables of interest are offered in Appendix 2. The descriptive statistics associated with the SCF are presented in Table 1. Total income is defined as income from all sources for the household head and the spouse of the household head. The sample sizes range from a low of 4,842 individuals aged 18 to 24 in 1983 to a high of 13,321 in 1982; the sample sizes for economic families range from 2,209 to 5,601 for these same years.<sup>5</sup> Figure 8A depicts the trends in university participation rates by broad groupings of family income. In the neighbourhood of 40% of 18 to 24 year olds from families with incomes of \$100,000 or more have a university degree or are enrolled in university. This percentage ebbs and flows a bit, but for the most part has not changed since the early to mid 1980s. This is a

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<sup>5</sup> There were changes in the implementation of the survey in 1980 and 1983 that significantly lowered the sample sizes in these years. Preliminary analysis found these data to not be reliable for our purposes and they are not used in the analysis that follows.

rate that is substantially and perennially higher than those for lower income groups. The participation rate for 18 to 24 year olds from families with more than \$75,000 to \$100,000 is also notably higher than for lower income groups, ranging between 20 to 30%, but the pattern of change does not vary too much once family income reaches \$25,000. Participation rates trended up throughout the 1980s and then stopped growing and even declined during the 1990s. The peak in participation rates seems to have occurred in 1993 or 1992. Only in the case of individuals from the lowest income families—\$25,000 or less—has there been a steady progress in participation rates throughout the period under study: starting at less than 10% during the early 1980s and rising to 19% by 1997. Young people with this income background are by 1997 as likely to be attending university as those whose parents had \$25 to \$50,000 in income, and not much less likely as those whose parents had up to \$100,000.

Figure 8B offers similar information for college/technical school participation. Here the patterns are very different. The participation rates are much more similar across family income groupings, differing only by about one to three percentage points. Further there has been steady growth in participation, starting at about 15 to 20% in the early 1980s and rising steadily to about 20 to 25%. While college participation is not at all as closely tied to family income as university participation, it is the case that the lowest income group has once again experienced the most consistent growth. In addition, for middle income groups there has been steady if slight increases through the 1990s.

Table 2 gives more precision to these patterns by offering the results from estimates of equation (1). As mentioned these estimates understate the true parameter

because they are based on annual income rather than permanent income. Also the extent of the bias may change through time if there are changes in the fraction of total income variance accounted for by transitory income. There could be other biases associated with changes in living arrangements but it is difficult to determine the direction of these. With this in mind the results reveal that the elasticity between family income and the probability of university participation is quite low, less than 0.1 for most years. Our best guess might be to inflate this value by 50% as a correction for the use of annual income. This would suggest that a 10% increase in parental income raises the chances of university attendance for an 18 to 24 year old by no more than 1.5%. However it is the pattern of change that is particularly relevant to us, and it would appear that the estimated elasticity hovered between 0.08 and 0.1 before 1990, peaked in 1990 and 1991 at almost 0.12, then fell substantially after 1995. Further, there is essentially no correlation between family income and college participation. The highest estimated value is only 0.03, and most coefficients are not statistically different from zero. (See Tables 2B and C.) That being said there is a clear drop off in the values in 1990 and after from the range of 0.02 to essentially zero. { summarize the gender analysis here }

Table 3 and Appendix 2 offer descriptive statistics from the GSS. The first stage regressions used to develop a measure of predicted income, are described in Appendix 2 and are based upon samples of men aged 40 to 60 years. These range from 1,144 in the 1986 data to 2,711 in 2001. There are a number of differences between the concepts used in this analysis and those based on the SCF. Most notably the analysis is based exclusively on father's income, rather than parental income. We are not able to

incorporate maternal information because a large number of young respondents do not report education and occupation information for mothers, likely reflecting their labour force participation decisions at the time the individual was 15 years of age. Further, for reasons of sample size we do not separately distinguish college participation, using rather university participation and a broader definition that incorporates both university and college and which we simply refer to as post-secondary participation. Details of the data construction are offered in the appendix. It should be noted that there are some differences between the three years of the GSS in the way in which occupations and incomes are coded and our corrections to make the data comparable are also discussed in the appendix. Table 3 presents the data used in estimating equation (1) and in particular the predicted incomes.

Table 4 offers the results from the second stage regressions of equation (1), based upon estimates of father's permanent income from equation (2). As expected, the coefficient estimates of father's income are all higher than those described in Table 2 based on annual income measures, by a magnitude of three to four. That being said the pattern of change is roughly similar. For 1986, every percentage point increase in paternal income implies a 0.3 percentage point increase in the probability of university attendance, rising to 0.4 percentage points in 1994, but falling to 0.26 in 2001. When college participation is also included in the definition of participation the magnitudes of the coefficients are muted but the same pattern persists. There are, however, some differences between men and women. Most notably when the broader definition of participation is used the coefficients for men display successive declines in the value of the estimated

elasticity. These are the only results that do not rise between the 1980s and early 1990s, and then fall afterward. In addition, the estimated elasticities tend to be lower for women, except during 1994, when they are substantially higher. The only estimate in Table 4 greater than 0.4 is that for university participation by women in 1994. This reflects a substantial increase from 0.27 in 1986 and is well above the 0.37 estimate for men. A similar pattern is observed when college participation is included.

We estimated a number of different formulations of equation (2) in an attempt to explore this pattern of change through time. Specifically we include just the occupation, or just the education, or both and their interaction when estimating permanent income.

{need to integrate these findings into a discussion of the possibility that post-secondary attendance of men switched from college to university in the early 1990s, something that did not happen for women. Perhaps revisit the participation rates in figure 3 by gender to fill out this story}

{need also to explore whether changes in the education-occupation relationship between child and parent is the source of the change in the IV estimates ... this is where John's additional analyses could be used using different specifications of the 1<sup>st</sup> stage regressions, and also the graphical analysis}

Table 1

## Descriptive Statistics, Survey of Consumer Finance 1979 to 1997

Year	Number of Households	Number of Individuals	University Participation	College Participation	Parental Income		
			(proportion of individuals)		Average	Minimum	Maximum
1979	5,216	7,055	0.13	0.13	50,117	173	390,199
1981	5,438	7,354	0.15	0.15	52,413	391	700,133
1982	5,601	7,695	0.15	0.15	51,920	512	1,259,628
1984	5,063	6,759	0.16	0.17	50,786	318	777,200
1985	4,801	6,213	0.16	0.19	52,932	137	1,524,354
1986	4,131	5,286	0.16	0.20	52,511	198	482,816
1987	5,405	6,919	0.17	0.20	52,035	206	642,653
1988	4,427	5,554	0.18	0.21	54,389	214	567,003
1989	4,819	5,992	0.21	0.22	58,002	452	1,621,834
1990	5,275	6,653	0.21	0.21	56,582	659	526,836
1991	4,846	6,025	0.22	0.24	57,529	322	1,312,647
1992	4,348	5,418	0.24	0.24	58,203	222	2,361,619
1993	4,412	5,524	0.25	0.24	58,098	534	1,164,599
1994	4,519	5,674	0.25	0.24	60,541	351	655,061
1995	3,882	4,817	0.23	0.25	60,411	221	689,595
1996	3,931	4,883	0.24	0.25	62,531	219	1,960,266
1997	3,868	4,828	0.23	0.24	59,825	53	687,023

Source: Tabulations by authors from Statistics Canada, Survey of Consumer Finances

Table 2

Least Squares Regression Results of the Elasticity between Post-secondary participation and Family Income for 18 to 24 year olds.

	University			College			Sample Size
	Intercept	<i>ln</i> (Parental Income)	R <sup>2</sup>	Intercept	<i>ln</i> (Parental Income)	R <sup>2</sup>	
1979	-0.515	0.062	0.020	-0.029	0.018	0.002	7,055
1981	-0.640	0.075	0.025	-0.009	0.018	0.001	7,354
1982	-0.683	0.079	0.026	-0.156	0.032	0.004	7,695
1984	-0.784	0.089	0.038	-0.118	0.029	0.004	6,759
1985	-0.684	0.082	0.029	0.014	0.017	0.001	6,213
1986	-0.884	0.099	0.039	0.111	0.010	0.000	5,286
1987	-0.729	0.087	0.027	-0.002	0.021	0.002	6,919
1988	-0.719	0.087	0.026	-0.018	0.022	0.002	5,554
1989	-0.868	0.101	0.032	0.118	0.011	0.000	5,992
1990	-1.020	0.116	0.043	0.298	-0.005	0.000	6,653
1991	-0.961	0.112	0.034	0.273	-0.002	0.000	6,025
1992	-0.541	0.075	0.019	0.101	0.015	0.001	5,418
1993	-0.727	0.092	0.024	0.279	-0.003	0.000	5,524
1994	-0.714	0.089	0.026	0.215	0.004	0.000	5,674
1995	-0.642	0.082	0.023	0.312	-0.004	0.000	4,817
1996	-0.405	0.060	0.014	0.289	-0.002	0.000	4,883
1997	-0.224	0.043	0.007	0.161	0.010	0.000	4,828

Note: Table entries are least squares estimation results from equation (1) described in the text using Survey of Consumer Finance Data, Statistics Canada. The coefficients on *ln* Income for University participation are all statistically significant with t-statistics ranging from 5.74 in 1997 to 17.3 in 1990. Those for College participation are not statistically different from zero for 1989 and all subsequent years.

Table 3

Descriptive Statistics, Data from the General Social Survey for the estimation of the Elasticity between Post-secondary participation and Family Income for 18 to 24 year olds

	Mean	Standard Deviation	Minimum	Maximum
1a) 1986, All Children, N = 1,423				
Participation in University	0.27			
Participation in Post-Secondary	0.62			
Father's Predicted Income	36,509	12,359	15,580	70,257
ln (Fathers's Predicted Income)	10.5	0.33	9.65	11.2
Age	21.4	1.93	18	24
1b) 1986, Sons, N = 669				
Participation in University	0.28			
Participation in Post-Secondary	0.62			
Father's Predicted Income	36,783	12,514	15,580	70,257
ln (Fathers's Predicted Income)	10.5	0.33	9.65	11.2
Age	21.4	1.96	18	24
1c) 1986, Daughters, N = 754				
Participation in University	0.25			
Participation in Post-Secondary	0.62			
Father's Predicted Income	36,265	12,222	15,580	70,257
ln (Fathers's Predicted Income)	10.4	0.34	9.65	11.2
Age	21.4	1.91	18	24
2a) 1994, All Children, N = 750				
Participation in University	0.35			
Participation in Post-Secondary	0.65			
Father's Predicted Income	39,500	12,283	18,597	65,263
ln (Fathers's Predicted Income)	10.5	0.32	9.83	11.1
Age	21.3	2.03	18	24
2b) 1994, Sons, N = 344				
Participation in University	0.30			
Participation in Post-Secondary	0.62			
Father's Predicted Income	40,095	12,558	18,597	65,263
ln (Fathers's Predicted Income)	10.5	0.33	9.83	11.1
Age	21.2	2.00	18	24
2c) 1994, Daughters, N = 406				
Participation in University	0.39			
Participation in Post-Secondary	0.67			
Father's Predicted Income	38,995	12,037	18,597	65,263
ln (Fathers's Predicted Income)	10.5	0.32	9.83	11.1
Age	21.3	2.06	18	24

3a) 2001, All Children, N = 1,677				
Participation in University	0.31			
Participation in Post-Secondary	0.62			
Father's Predicted Income	42,984	11,817	18,969	77,369
ln (Fathers's Predicted Income)	10.6	0.28	9.85	11.3
Age	21.1	2.01	18	24
3b) 2001, Sons, N = 735				
Participation in University	0.27			
Participation in Post-Secondary	0.56			
Father's Predicted Income	43,679	11,981	18,969	77,369
ln (Fathers's Predicted Income)	10.6	0.27	9.85	11.3
Age	21.0	2.02	18	24
3c) 2001, Daughters, N = 942				
Participation in University	0.34			
Participation in Post-Secondary	0.67			
Father's Predicted Income	42,442	11,666	18,969	77,369
ln (Fathers's Predicted Income)	10.6	0.28	9.85	11.3
Age	21.2	1.99	18	24

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Note: All income figures are expressed in constant 1994 dollars and are derived from equation (2) in the text using the specifications and information outlined in Appendix 2.

Table 3

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	Mean	Standard Deviation	Minimum	Maximum
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Age	21.3	2.03	18	24
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ln (Fathers's Predicted Income)	10.6	0.28	9.85	11.3
Age	21.2	1.99	18	24

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Note: All income figures are expressed in constant 1994 dollars and are derived from equation (2) in the text using the specifications and information outlined in Appendix 2.

Table 4

## Least Squares Regression Results of the Elasticity between Post-secondary participation and Family Income for 18 to 24 year olds

	University			Post Secondary			Sample Size
	Intercept	$\ln$ (Father's Income)	R <sup>2</sup>	Intercept	$\ln$ (Father's Income)	R <sup>2</sup>	
1. Total							
1986	-2.85	0.296	0.053	-2.43	0.290	0.040	1,423
1994	-3.85	0.396	0.068	-2.54	0.302	0.038	750
2001	-2.42	0.255	0.025	-0.67	0.121	0.005	1,677
2. Men							
1986	-3.07	0.319	0.055	-2.84	0.329	0.048	669
1994	-3.60	0.369	0.064	-1.86	0.234	0.023	344
2001	-2.67	0.275	0.031	-0.94	0.141	0.006	735
3. Women							
1986	-2.61	0.272	0.050	-2.04	0.253	0.032	754
1994	-4.15	0.427	0.072	-3.33	0.380	0.062	406
2001	-2.27	0.245	0.021	-0.51	0.110	0.0043	942

Note: Table entries are least squares estimation results from equation (1) described in the text using General Social Survey, Statistics Canada and relying on predicted parental income as estimated from equation (2). The coefficients on  $\ln$  Father's Income for University participation are all statistically significant with t-statistics ranging from 3.51 in 1986 to 5.88 in 1994.

## Appendix

### Data Sources used to Associate Family Income with Post-Secondary Participation

#### 1. Survey of Consumer Finances

The Survey of Consumer Finances is a Statistics Canada survey administered as an annual supplement to each April's Labour Force Survey (LFS). The SCF provides cross-sectional data on the income of Canadians and information on the labour market activities of all individuals 15 years of age or older in the economic household. The SCF identifies all individuals in the economic household, and maps out their relationship to the head of the economic family.<sup>6</sup> Following completion of the regular LFS, persons who are 15 years of age or older are asked to provide information on their sources of income during the previous year. Due to the absence of data on several key fields we limit the analyses to the period between 1979 and 1997. The SCF was discontinued after the 1997 reference year. In our analysis information on the labour market activities of household members 15 years of age or older is derived from selected LFS from the April LFS and appended to the SCF Master file.

We use data from the master files of these surveys. In developing our analytical files we create two parallel data sets for each year between 1979 and 1997: an individual file of those 18 to 24 years of age, and an economic family file consisting of only those

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<sup>6</sup> One individual in each household is identified by Statistics Canada as the head according to the following rules: (1) if the household is a married couple, either with or without children, the male is considered the head; (2) if the household is a lone parent family with unmarried children then the parent is considered the head; (3) if the household is a lone parent family with married children, then the household member who is mainly responsible for the maintenance of the family, as identified in a survey question, is considered the head; and (4) if the household is a family where the relationships are other than husband/wife or parent/child then the eldest person is considered the head.

families with an 18 to 24 year old who are the children or relatives of the household head. Sample sizes vary from a low of 4,842 individuals in 1983 to a high of 13,321 individuals in 1982, and from 2,209 economic families in 1983 to 5,601 in 1982. We recognize a number of anomalies in the coding of the data from the Labour Force Survey. First, there was a change in how school attendance was coded in the LFS. Respondents to the LFS questionnaire are asked several questions regarding their current attendance in school. In April, 1984 the ordering of codes to represent the four types of schools respondents could report changed. Prior to 1984 the coding was: 1 Primary or Secondary School; 2 University; 3 Community College, Junior College or CEGEP; 0 Other. In April 1984 the codes (for Question 82) were reversed so that Community College was assigned a code of 2 and University a code of 3. This was done to better reflect the hierarchy of educational attainments. Our tabulations for 1984 to 1997 recognize this.

Second, in January 1990 the LFS revised both the flow of questions on highest level of education and the questions. This was done to better reflect the range of post-secondary qualifications and to remove the presumption that all forms of post-secondary education require high school graduation.

Using these data we were able, with some minor deviations, to replicate Tables 1 and 4 in Christofides et al (2001), those tables dealing with the relationship between family income and post-secondary participation. Their measure of post-secondary attendance includes those currently attending college or university but also elementary-secondary schools. We refine this in three ways. First, we exclude youth who are currently attending elementary or secondary schools. Depending upon the survey year

between six to 13% of all youth 18 to 24 year olds fall into this category. Second, we add individuals who completed a post-secondary degree. Third, we distinguish between university participation and other forms of post-secondary education.

Post-secondary participation in our analysis is defined by combining information on highest level of post-secondary education attained and current attendance in school. University participation refers to youth (18 to 24 years of age) who have completed a university degree or certificate, or who are currently enrolled in university. College participation refers to those who have obtained a community college, CEGEP or trade diploma/certificate, or who are currently attending a community college, CEGEP or trade school. This classification gives primary weight to highest educational attainment and only secondary weight to current school attendance. The reason for this is to more accurately reflect access to post-secondary institutions for those individuals who may have completed a university degree but returned to school to attend a community college.

We define parental income as the income from all sources of the household head and his or her spouse. Total income from all sources for the household head and the spouse are extracted from the individual SCF master files and merged with the Economic Family master files. This information is then ascribed to each data file on individuals 18 to 24 years of age who are children of a household head. Parental income is measured in constant 2001 dollars using the Consumer Price Index.

The SCF defines a “child” by each household member’s relationship to the household head. Young adults 18 to 24 years of age who are either the son or daughter (natural or adopted), grandchild, foster child, son or daughter-in-law, brother or sister, or

“other relative” of the household head are considered to be a child living in the economic family. For our purposes youth who are part of an economic family are defined as living at home. Included in this are individuals who are temporarily away from home attending a post-secondary institution but whose usual or permanent residence is with the economic household. Young adults 18 to 24 year old who are not related in any of the above ways to the household head and who are not the spouse of the household head are considered to be the head of their own household. These individuals either live alone in a dwelling or share a dwelling with others not related to them through blood or marriage. This dwelling is their permanent or usual place of residence. As such we are not able to ascribe a parental income to them.

## 2. General Social Survey

The General Social Survey is conducted annually by Statistics Canada. The two primary objectives of the GSS are to gather data on social trends in order to monitor changes in the living conditions and well-being of Canadians over time and to provide immediate information on specific policy issues of current or emerging interest. To meet these objectives the core content of the GSS changes from year to year, with some key subjects repeated on a regular basis. Both the 1986 and 1994 GSS focused on education and work, while the 2001 GSS focused on the family. These are the only three cycles of the survey with information on family background, particularly the occupations of the respondent’s parents when the respondent was growing up (specifically at age 15). Furthermore, just like all other cycles of the GSS they also include information on the current education of

respondent's parents. In addition respondents are also asked questions about their current education, occupation, and incomes.

We classify individuals 18 to 24 years of age as being post-secondary participants if they have ever had some post-secondary education. Likewise university participation refers to those who have ever had any university education. As mentioned, parental education refers to the education level of the parent, as reported by the respondent, when the respondent was 15 years of age. Our regression analysis is restricted to father's education, which is grouped into three categories: high school diploma or less, more than high school but less than a university degree, and finally at least a Bachelor's degree. In the regression analysis high school diploma or less is treated as the reference category. These definitions are consistent across the three versions of the GSS.

Parental occupation is categorized in the 1986 and 1994 GSS at the two digit level using the 1980 Standard Occupational Classification. These are used in our model of parental income, with "managerial, administrative and related occupations" serving as the omitted category. There is one small difference between the 1986 and 1994 cycles of the GSS. The 1986 version of the survey includes a category called "occupations not elsewhere included" that is not present in the 1994 version. This category is included in the analysis of the 1986 data. Since less than 1% of individuals in our sample of fathers fall into this category we feel that this slight difference between the two surveys will have minimal impact on the comparability of our results. Parental occupation in the 2001 GSS is based on the 1990 Standard Occupational Classification. This is fundamentally different from the 1980 SOC since it attempts to incorporate the skill level required for

each occupation. The 1980 SOC is in large part based on industrial sectors without explicit attention paid to skill levels.

There are some differences in the way personal income is captured across the years in the GSS. Income is provided as a continuous variable in the 1986 data, but capped at \$60,000 dollars. In 1994 it is reported as a grouped variable with ranges varying from \$5,000 increments to \$20,000 increments. In addition it is capped at \$100,000. In 2001 it is reported as a continuous variable without top coding. Further, in 1986 and 2001 it is possible to separate out zero or negative income, but in 1994 these incomes are lumped into the less than \$5,000 category. We adjusted incomes in all cycles of the GSS to account for inflation by expressing them in 1994 dollars using the Canada wide Consumer Price Index. We also recoded incomes according to the categorization of the 1994 GSS, assigning each individual the mid-point income of the appropriate range. For those earning \$60,000 or more in 1994 dollars we assigned the weighted average income of males aged between 40 and 60 from the 1986 and 1994 SCF and the 2001 GSS for each of the years under study.

We in fact conducted many more estimations of equations (1) and (2) than reported in the text in order to assess the robustness of our results. At one level this involved using interactions of parental occupation and education as an additional set of regressors in equation (2). The results did not differ substantively. Furthermore we repeated the analysis for each survey year to assess the impact of restructuring the income information and categories for the sake of comparability. These results are available upon request.

Figure 1

University Revenues from Provincial Grants and Contracts, 1972/73 to 1998/99

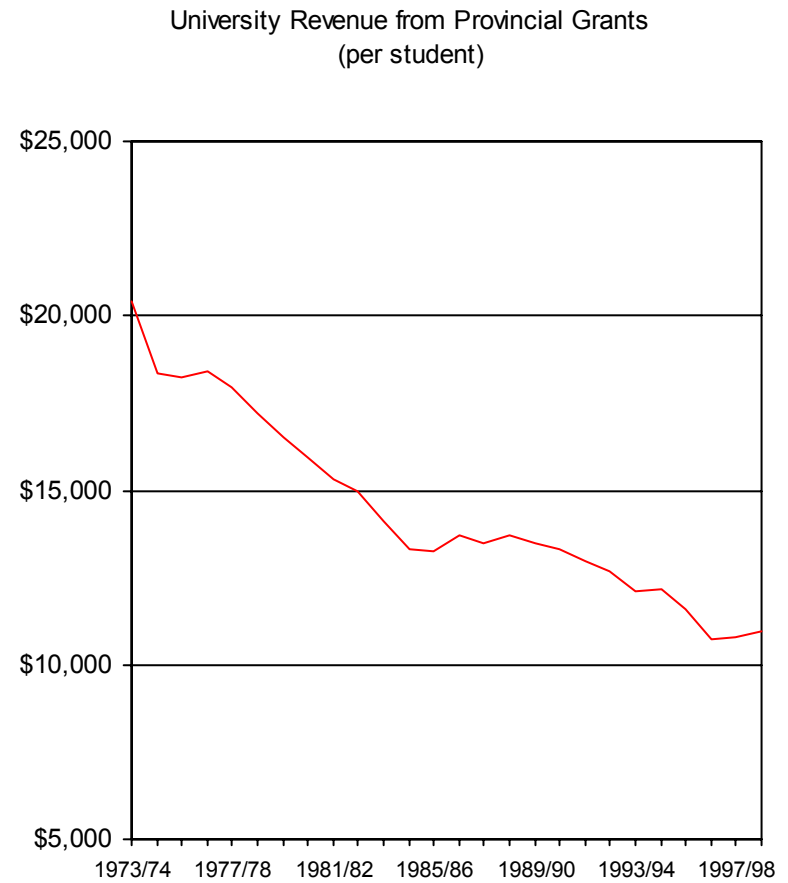
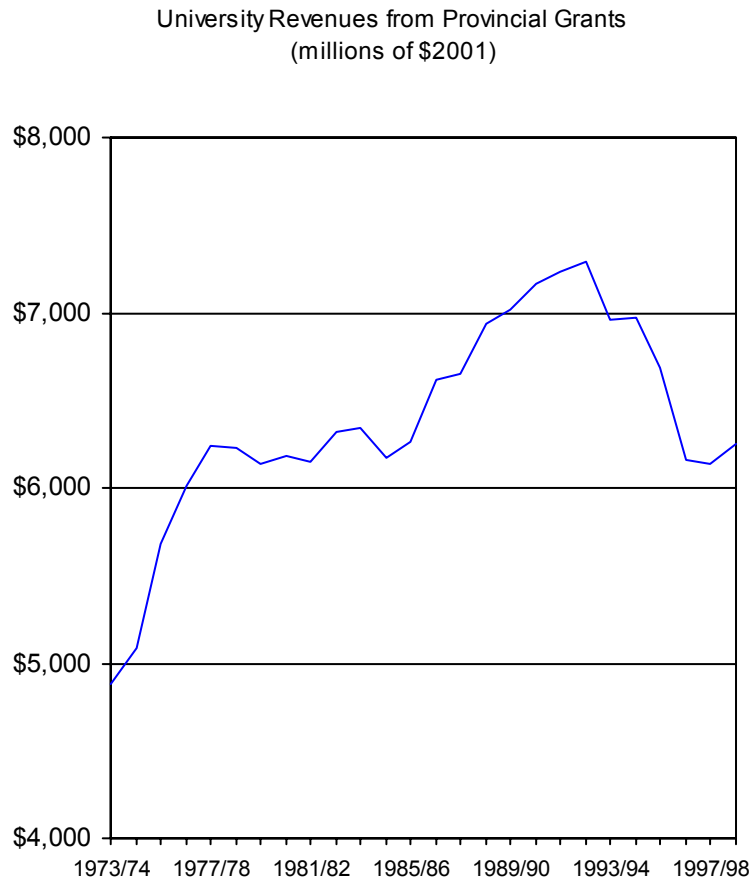
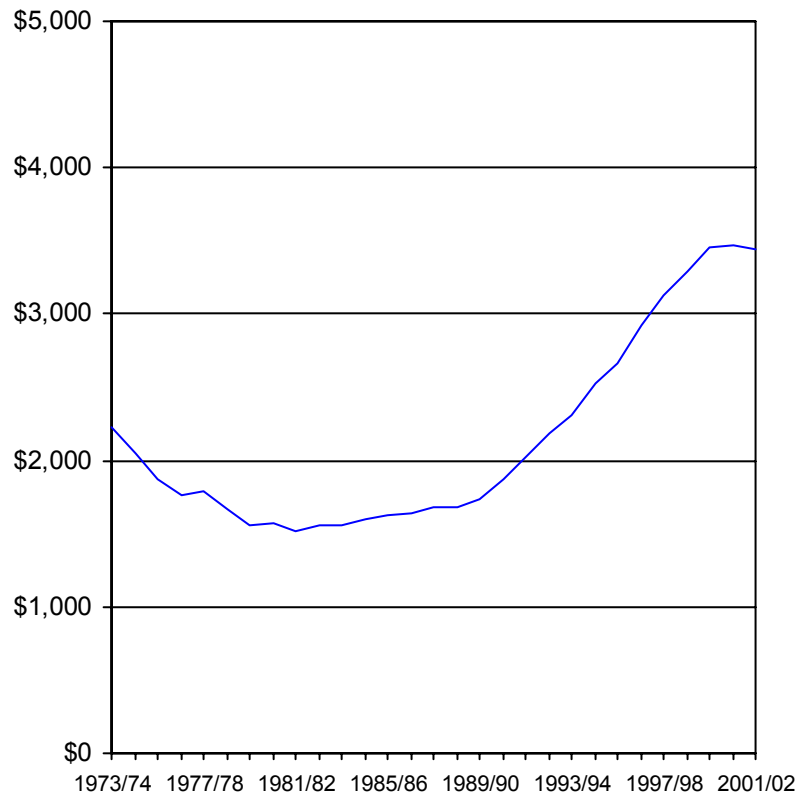


Figure 2A

Average Arts Tuition Fees, Canada and Provinces, 1972/73 to 2001/02 (Weighted and expressed in \$2001)

Average Arts Tuition, Canada (\$2001)



Average Arts Tuition, by Province (\$2001)

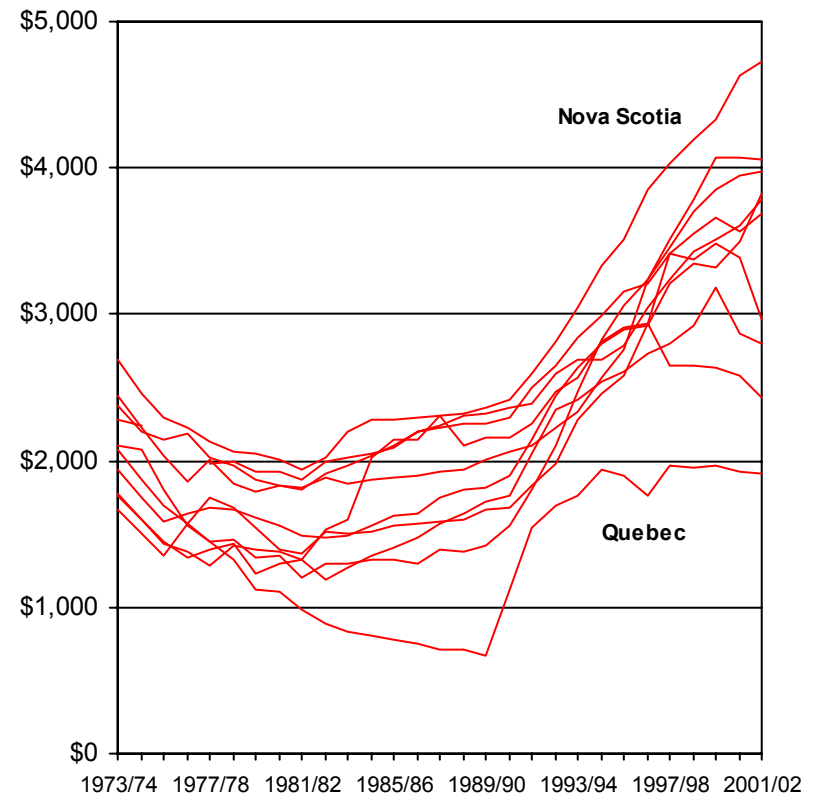


Figure 3

Participation Rates in Higher Education for 18 to 24 year olds

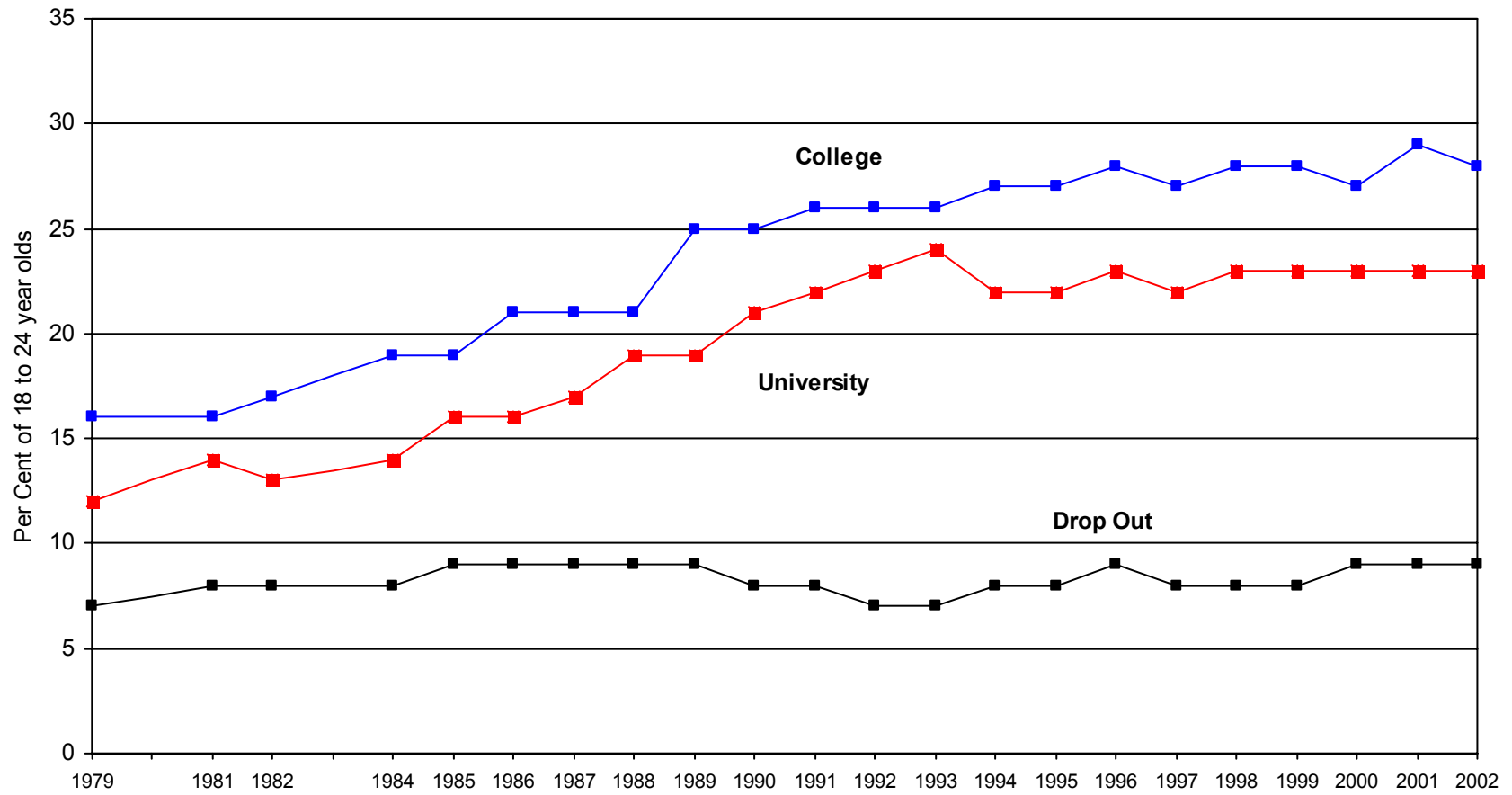


Figure 4A

Proportion of Students working while Studying (for those 18 to 24 years of age)

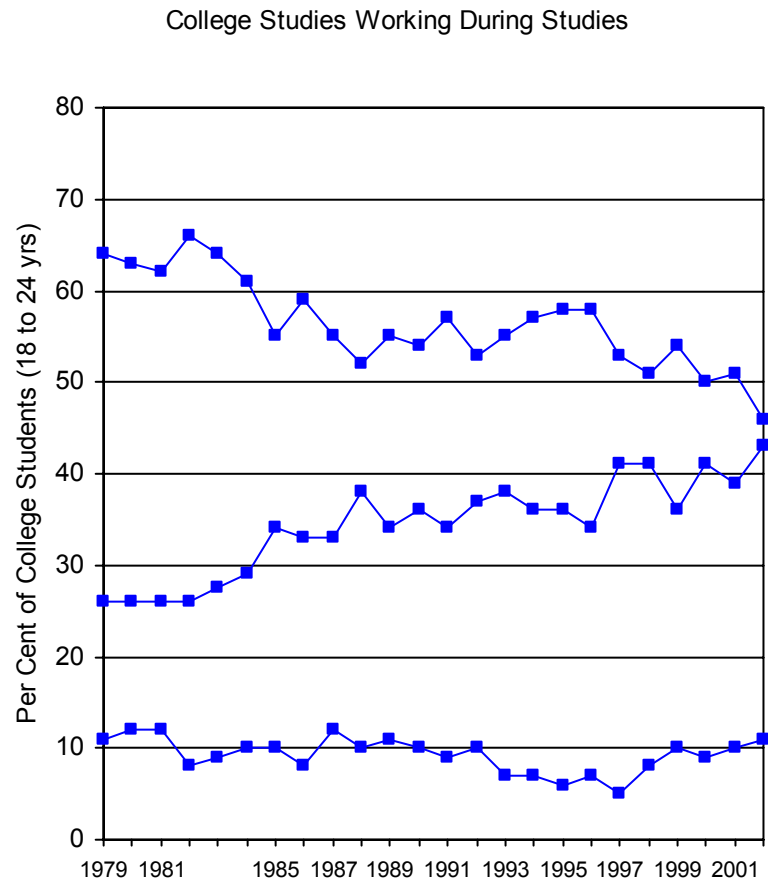
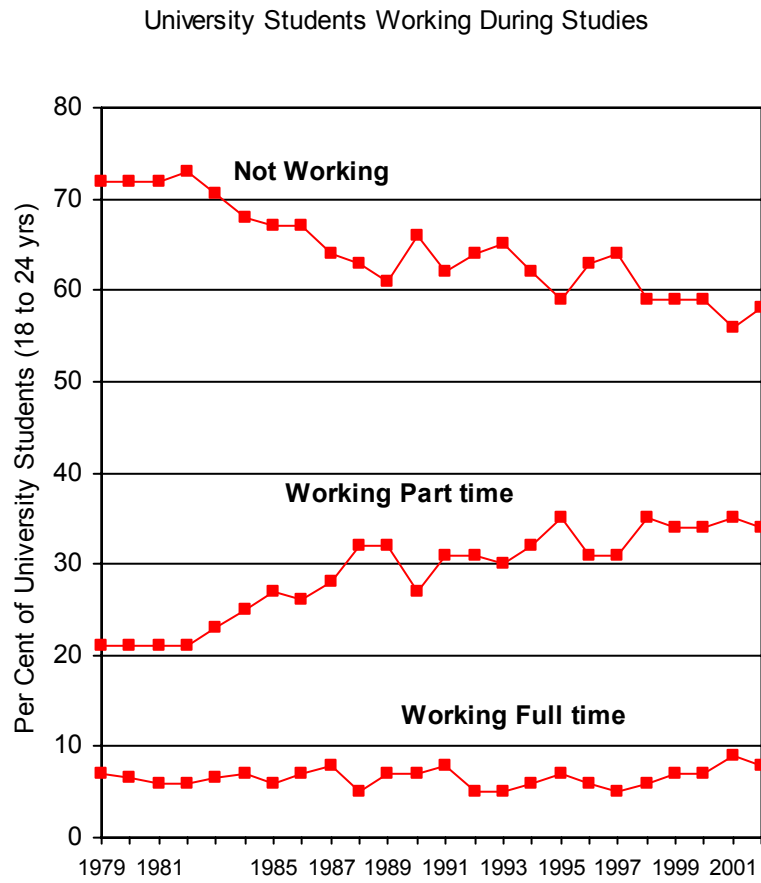


Figure 5

Living Arrangements of Students (for those 18 to 24 years of age)

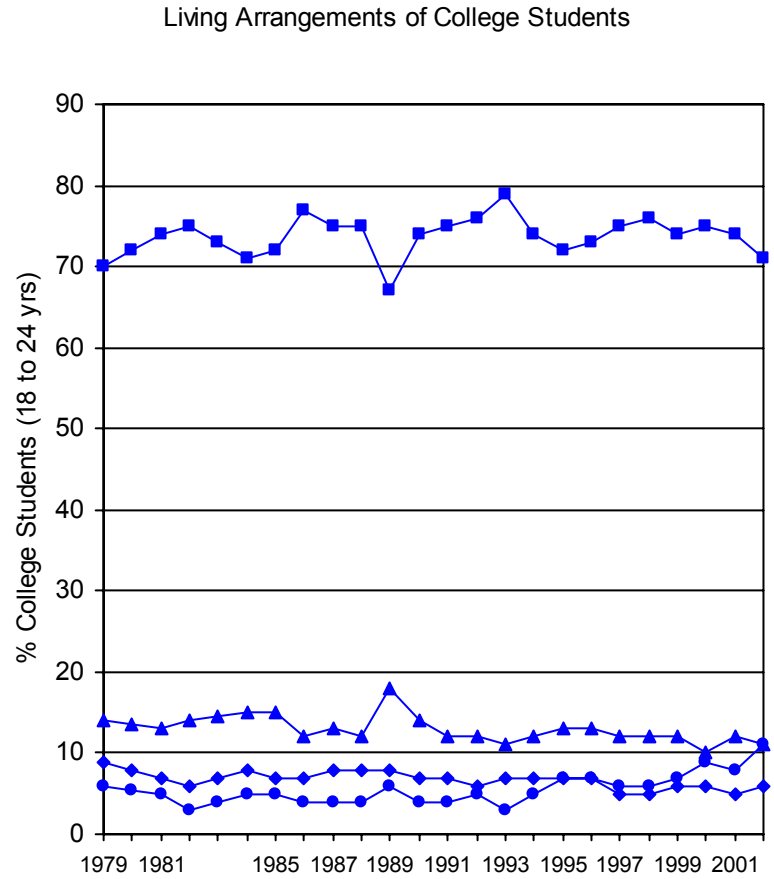
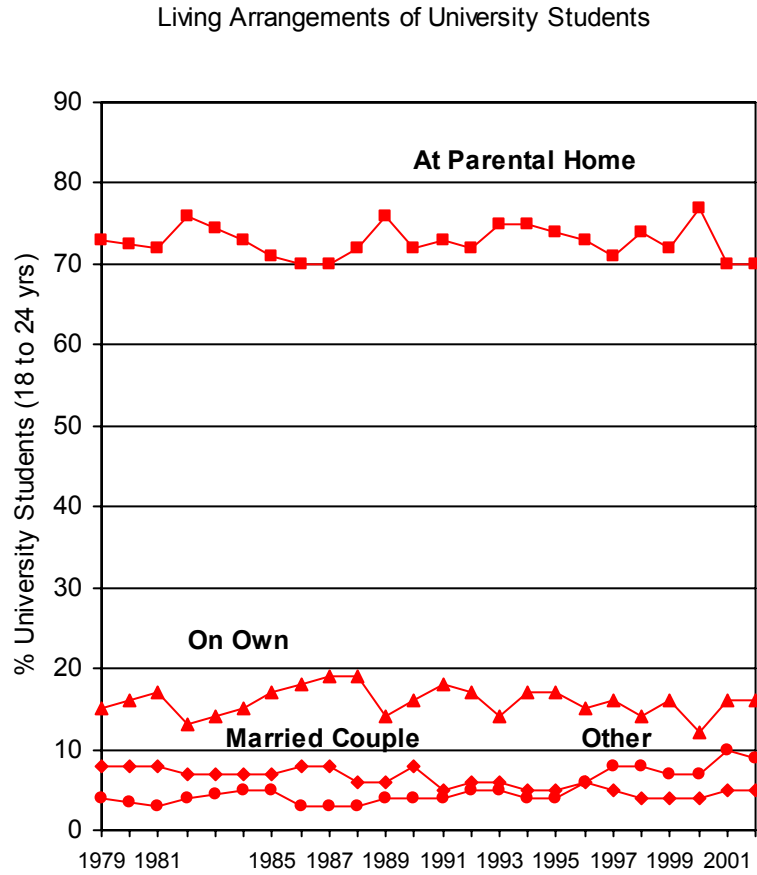


Figure 6

Average amount of student loans by Region

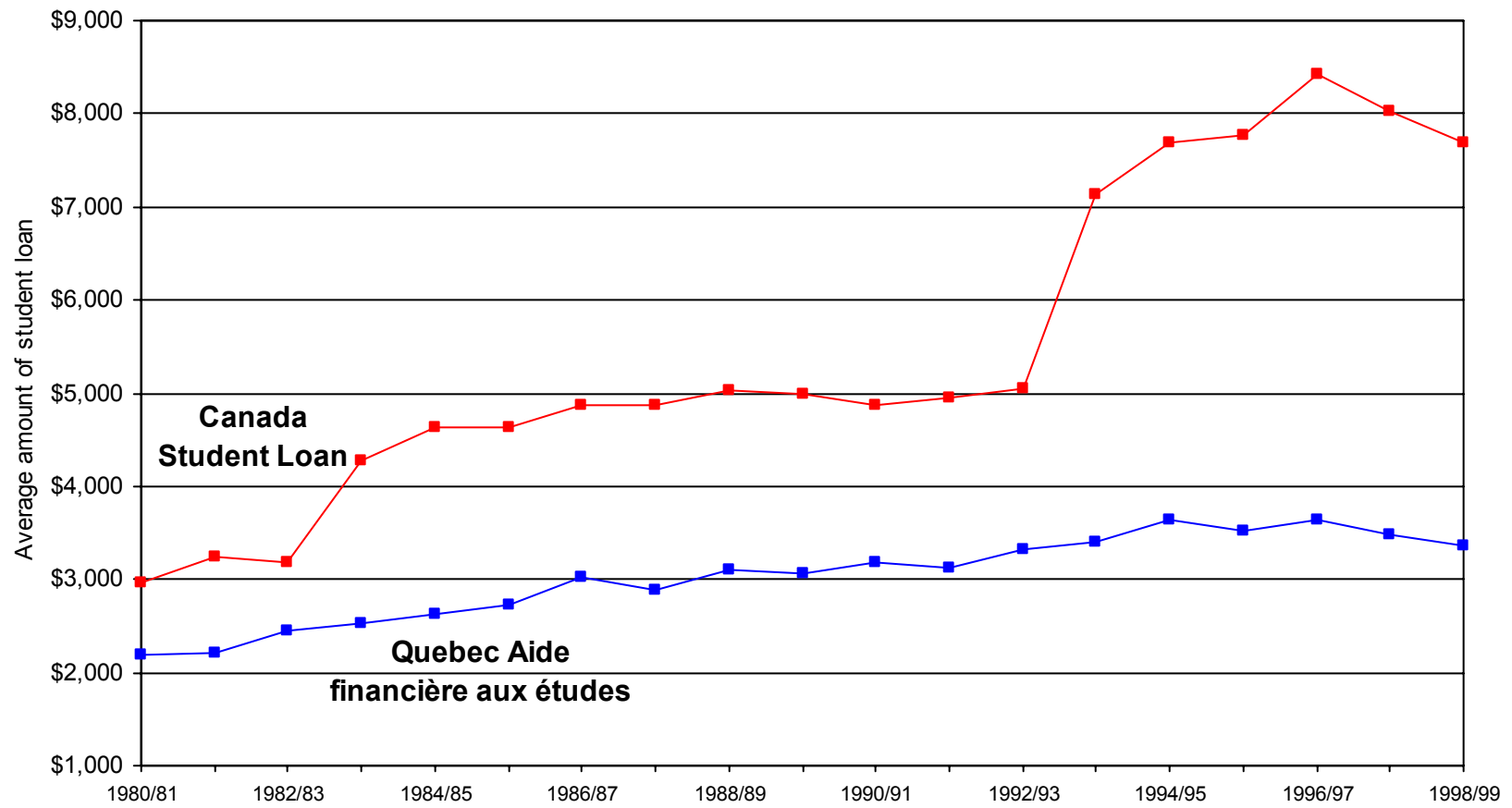


Figure 7

Living Arrangements of all 18 to 24 year olds: 1979 to 2002

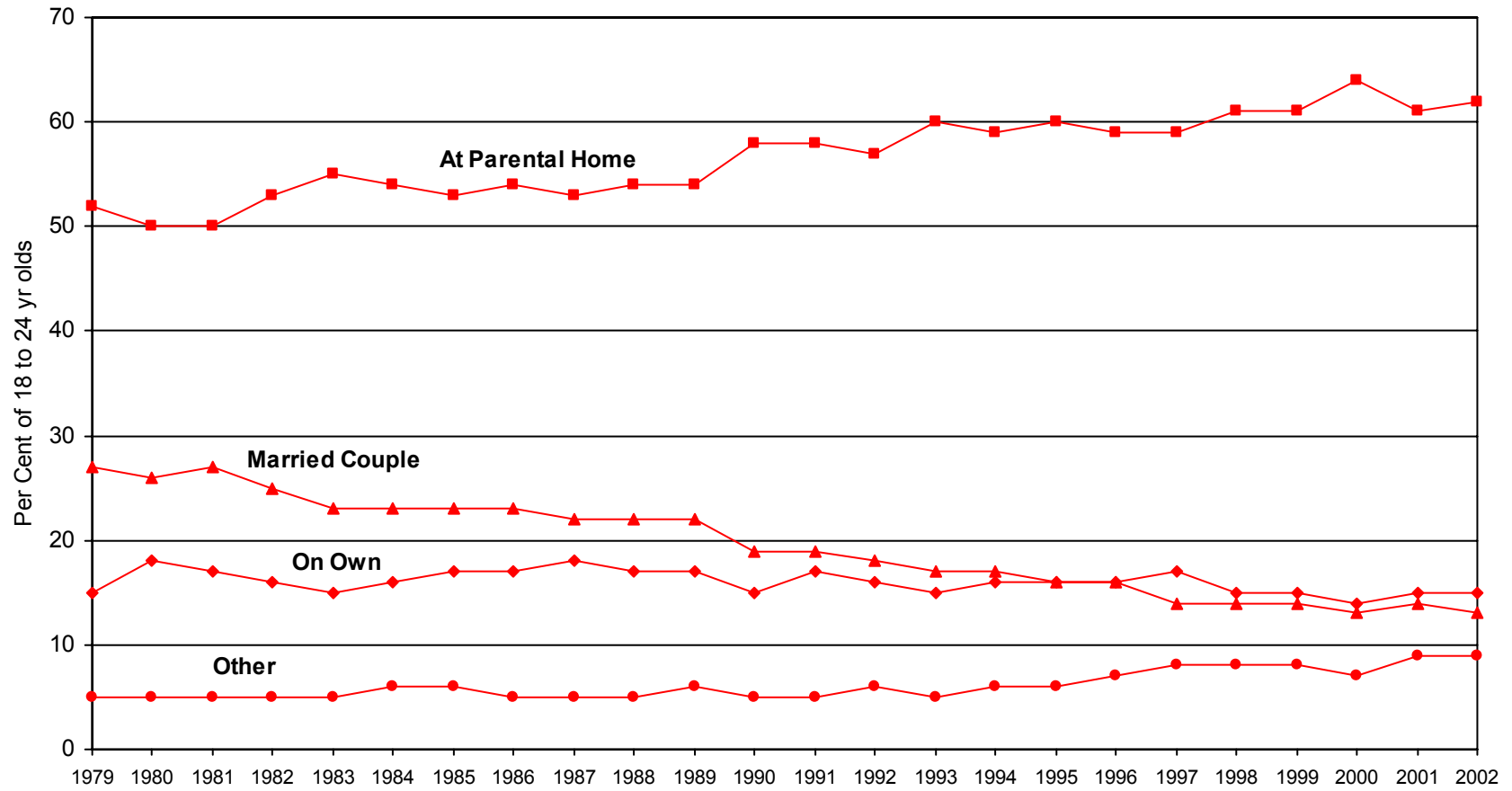


Figure 8A

University Participation Rates of 18 to 24 year olds by Parental Income

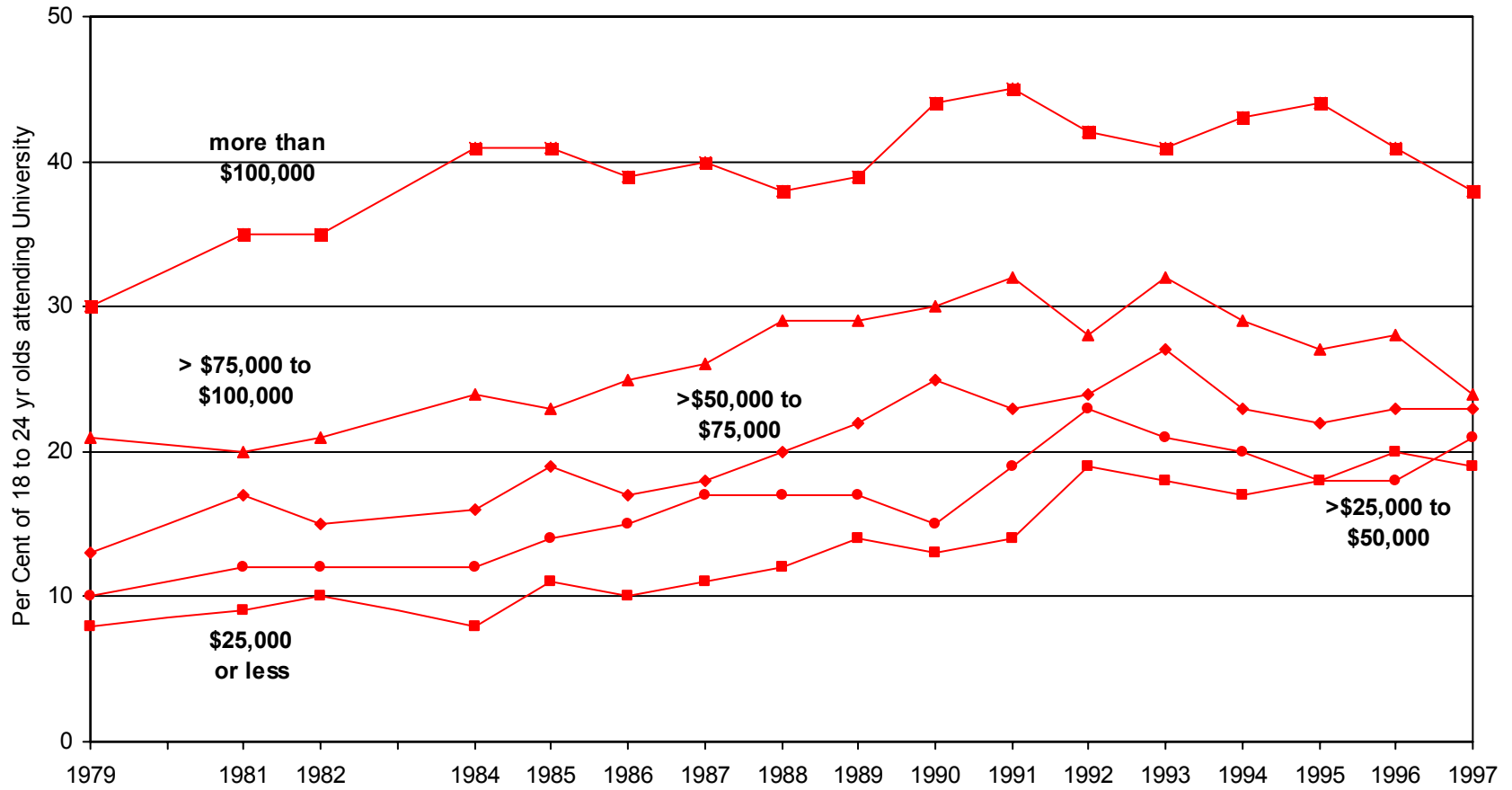


Figure 8B

College Participation Rates of 18 to 24 year olds by Parental Income

