A Comparison of the Labour Market Outcomes of Postsecondary Graduates of Various Levels and Fields over a Four-Cohort Period*

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Abstract: The evolving "knowledge-based" economy is widely believed to affect the labour market outcomes of highly educated workers. However, there are conflicting arguments regarding the needs of the new economy, and there is little evidence available in the research literature to determine whether the labour market outcomes of various postsecondary graduates have changed among graduates of recent cohorts. Drawing on the 1982, 1986, 1990, and 1995 National Graduates Surveys, this paper builds on previous research by comparing the earnings and employment outcomes of graduates of various levels of postsecondary schooling (i.e. trades, college, and university) and fields of study over a 13-year period. The analyses suggest that the labour market experiences of postsecondary graduates of the various programs have remained relatively stable over the period investigated.

Résumé: On croit généralement que les changements amenés par l'économie du savoir modifie le marché de l'emploi des travailleurs hautement qualifiés. Cependant, les exigences de la nouvelle économie font l'objet de débats et la littérature sur le sujet ne fourni pas de réponse définitive à la question de savoir si les opportunités d'emploi des détenteurs d'un diplôme post-secondaire ont réellement changé au sein des récentes cohortes. Basé sur les Enquêtes nationales des diplômés de cohortes 1982, 1986, 1990 et 1995, cet article compare les perspectives d'emploi et de revenu des gradués de différents niveaux post-secondaire (collèges et universités) et formations. L'analyse suggère que ces perspectives ont évolué en parallèle au cours de la période investiguée.

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Introduction

More than a decade ago, it was argued that if "Canada is to remain competitive and benefit from the current microelectronics and information technology revolution, it must provide a closer integration of skill development, on one hand, and skill utilization, on the other" (Lowe and Krahn, 1989: 187). This assertion may be even more important now, as we continue to move through the early stages of the "knowledge-based" economy. Characterized by globalization and the production of knowledge, particularly in areas related to information technology, the evolving knowledge-based economy is believed to require skills that previously did not exist. The changing skill requirements of employers have likely had a profound effect on the transition from school-to-work for graduates with postsecondary credentials (Economic Council of Canada. 1987). However, there is little evidence available to assess whether the relative employment outcomes of graduates with different types of postsecondary credentials have changed over the last few decades, particularly when controlling for a variety of sociodemographic characteristics that might play an important role in the relationship.

Drawing on a series of large cross-sectional Canadian datasets, the purpose of this paper is to build on previous research by comparing the employment outcomes of graduates of four cohorts who were surveyed two years after graduation. By pooling recent waves of the National Graduates Surveys (NGS), this study is able to assess changes in the earnings and employment status of graduates of various levels of postsecondary schooling and fields of study, while, at the same time, controlling for other possible sociodemographic factors.

Review of the Literature

The North American economy has undergone some remarkable changes during the second half of the twentieth-century. It has been marked by two primary epochs, characterized as the transition from the industrial (Fordist) era to the post-industrial era (Esping-Andersen, 1993). Fordism is considered as the form of capitalism constructed after 1945 in all of the advanced capitalist countries (Jenson, 1989: 70). It entailed a form of manufacturing involving standardized mass production oriented toward greater consumption, where organizational structures are considered to be rigid and hierarchical in order to distinguish between management and workers (see Piore and Sabel, 1984). However, beginning in the 1970's, investigators argued that the economy had transformed as a result of advancements in technology, whereby manufacturing jobs largely disappeared, creating a new economic form of structural organization (see Bell, 1973). This new post-industrial economy has been characterized by a type of productive activity found in knowledge sectors, which include research and

development, as well as computer and technology areas (See Bell, 1973).[1] [2] It is also marked by the emergence and expansion of a new professional class of experts, researchers, scientists and technicians. This new professional class of white-collar workers largely replaced the preexisting labour-management arrangement.

Shortly after this transition, debates began to surface regarding whether this economic transformation has had a positive or negative impact on social inequality. On the one hand, it is believed that the post-industrial era provides opportunities for increased job mobility (Mayer and Carroll, 1987). It is also widely assumed that, as a result of advances in technology, the new economy would require graduates with more skills and higher levels of education (See Rubinson and Browne, 1994: 581–585). On the other hand, others argue that the post-industrial economy has not generally enhanced the skill requirements of employers (Braverman, 1974; Rinehart, 1997), while others also question whether the new economy actually requires graduates with higher level credentials (Berg, 1970; Collins, 1979; Livingstone, 1998).[3]

To this date, these debates have not yet been resolved, and the implications of technological development on social inequality are still not completely understood. Moreover, the issues surrounding these debates have become even further perplexed as the North American population has become increasingly educated, and business and research relations continue to be embedded in a global environment oriented heavily around information technology.

Indeed, the intersection of knowledge and technology in the new economy has become a central point of focus in the academic literature (Drucker, 1993; See also Stehr, 1994).[4] Furthermore, the implications of the new economy are even greater as a result of new waves of technological developments in recent decades. For example, during the 1980's, the widespread availability and use of micro-computers have changed the nature and structure of work (Lowe and Krahn, 1989). In the 1990's, the emergence of other information technologies

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1. The transition from the Fordist to the post-industrial era coincided with a shift to services which, in turn, brought about changes in the industrial mix of jobs. The transition began slowly in the 1950's and 1960's, and then more rapidly in the 1970's. By the 1980's, the service economy became a major source of new employment in the North American economy (Myles, Picot, and Wannell, 1993: 172).
2. The transition from Fordist to post-industrial era was also accompanied by a transition to a different 'class-scheme' in North America (See Esping-Anderson, 1993: 12). The transition is also believed to be responsible for changes in political arrangements in Canada (See Jenson, 1989).
3. The latter, less optimistic, images of the new economy emerged when it became clear that the post-war boom ended during the 1970's (Myles et al., 1993: 172).
4. The terms "knowledge" and "postindustrial" are generally used synonymously to reflect the changing economy in the post-war era (Rinehart, 1987: 73).

such as wireless forms of communication, and other information sharing devices (i.e. Internet), have had an additional impact on the way that businesses approach daily operations such as advertising, sales, data collection and storage, and communication. Companies such as Yahoo, Amazon.com, and America Online are just a few examples of information and service providers that have transformed business operations within a global economy that is heavily oriented towards the production and distribution of knowledge.

There are different opinions regarding which types of postsecondary credentials are most required in the emerging economy. The predominant view is that the new economy requires graduates with highly specialized and technical skills. This view is widely shared among researchers, policy officials, as well as the general public (see Allen, 1997). In fact, the majority of the studies in the area tend to support this view, as past research suggests that there is a clear earnings hierarchy among postsecondary graduates of different fields of study (Davies and Hammack, 2004).

The importance of making field of study comparisons has been identified by researchers drawing on data from both Canada (Guppy and Davies, 1998; Lin, Sweet, Anisef, and Schuetze, 2000; Finnie, 2001) and the United States (Jacobs, 1995; Davies and Guppy, 1997). The results of these studies have shown, quite conclusively, that graduates of the more "generalist" liberal arts programs such as the fine arts, humanities, and social sciences generally have poorer labour market outcomes than do graduates of applied, and skill-oriented programs. Graduates of applied and technical fields are thought to obtain jobs with high wages because they later utilize the skills they learned in school, whereas liberal arts graduates are believed to work for lower wages in jobs that do not require postsecondary training (Davies and Guppy, 1997). The knowledge and skills obtained from the latter programs have typically not been formally recognized by employers to be directly related to job requirements, making it difficult for these graduates to find decent jobs (Redpath, 1994).[5]

However, there is an emerging view within the academic literature that the evolving economy requires various types of highly educated workers, not just those with very specific technical skills (see also Allen, 1999a; Allen, 1999b; Krahn and Bowlby, 1999; Axelrod, Anisef, and Lin, 2001; Giles and Drews, 2002). Proponents of this position assert that, technical skills, while important, are not the only skills demanded by employers in the new economy. In fact, in light of rapid technological change, the acquisition of specific technical skills may be risky. Skills that are valuable today may soon be obsolete, possibly

5. Interestingly, however, it has been found that there are little, if any, differences between liberal and vocational university graduates in their perceived possession and acquisition of employability skills (Lin et al., 2000).

leaving narrowly educated graduates at risk of facing unemployment, temporary employment, or limited contract work.

Recent arguments have emerged to suggest that graduates whose skills are less specific and more transferable may be at an advantage, because even though narrowly trained personnel are needed to build and test new forms of technology as it emerges, there may also be a need for even greater numbers of employees who can understand various aspects of the new technology, who know how to use it and how to promote it (See Allen (1999b) for a more elaborate discussion on this issue). Therefore, there is also a need for more middle managers who can understand and analyze information, who can make informed decisions and independent judgments, who can deal with people, and who can work in a team environment. Graduates with strong interpersonal skills who are self-directed and who can make critical assessments are also in high demand.

Since the new economy has created a global economic environment where boundaries between countries have become increasingly open, employers also require graduates who can generate knowledge and are capable of disseminating information within a global business environment. At the same time, the economy requires workers who can think critically, who can make independent judgments, who are capable of understanding, transmitting, and communicating knowledge, and who are both numerate and literate. People with these types of skills are more likely to be found in liberal arts programs, rather than technically oriented programs (Rush and Evers, 1986; Krahn and Bowlby, 1999). Unfortunately, we do not have enough evidence to determine which groups of graduates have benefited the most throughout the early stages of the new economy.

Another issue that requires attention is whether the labour market outcomes of postsecondary graduates of different levels of postsecondary education have changed over time. Contrary to the (once widely held) view that a university degree is the best avenue for career oriented students, popular opinion suggests that most people are much more pessimistic about the prospects of a university education. For example, the results of an Angus Reid poll conducted in Ontario found that most people believe that specific skill training is the best form of job preparation. Of those surveyed, 37 percent believe that a trade or apprenticeship program, or even a high school diploma with technical experience, is the best preparation for the future labour market. Another 35 percent feel that a technical college diploma is the best form of preparation for the modern economy. In contrast, only 25 percent feel that a university degree is the best form of job preparation for the future (Angus Reid, 1998). In fact, a number of private institutions have been exploiting this belief through television commercials directed at university graduates to encourage them to attend their institutions to acquire the technical skills demanded by employers.

Past research which has made labour market comparisons among graduates of different levels of postsecondary schooling has found that graduates with university degrees have better labour market outcomes than graduates with community college diplomas, who in turn, have better outcomes than graduates of trades and technical programs (Allen, 1999b). This same study also found that graduates of higher level university programs (i.e. master's and Ph.D.) have the best labour market outcomes of all postsecondary graduates. However, past studies dealing with the transitions from school to work are subject to a number of limitations. Recent research that has distinguished among different fields of study has generally focused only on university graduates (Krahn and Lowe, 1998; Hay, 2000; Lin et al., 2000; Axelrod et al., 2001; Butlin, 2001; Finnie, 2001). At the same time, other research which compares graduates of different levels of schooling does not control for field of study (Christie and Shannon, 2001; Finnie, 2000a; 2000b). Even fewer studies have made comparisons over time,[6] and no studies could be found that make these comparisons while controlling for field of study.

Furthermore, much of the past research has been restricted largely to profile reports of postsecondary graduates (Krahn and Lowe, 1998; Allen, 1999a; Krahn and Bowlby, 1999; Finnie, 2000a; 2000b; Finnie, 2001; Axelrod et al., 2001). These do not allow one to make statistical inferences. Moreover, since college and university programs have different enrollment patterns, particularly by gender and field of study (Davies and Guppy, 1997; Guppy and Davies, 1998), it is extremely important to control for these variables, as well as other important background characteristics (i.e. region, language, and parental education) when making labour market comparisons among graduates of different postsecondary programs.

It is extremely important to identify whether the labour market outcomes of graduates of various types of postsecondary education are changing, in order to help students make better informed decisions about their future. Since postsecondary programs of the various levels have different admission requirements, program lengths, and tuition costs, it is essential that students are as informed as possible. At the same time, identifying the recent labour market trends of various types of postsecondary graduates will help shed light on the theoretical debates regarding whether highly educated workers have experienced improved job prospects in the new economy.

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6. One study by Ross Finnie (2000b) does make comparisons over time using the 1982, 1986, and 1990 NGS. However, the results are descriptive. Much of the analysis involves the use of either frequencies or cross tabulations. As well, this study does not include the most recent NGS cohort, those who graduated in 1995.

Using regression analysis, this study will build on the limitations of past research in the area by comparing the labour market outcomes of various postsecondary graduates over a four-cohort (13 year) period. The first objective is to determine whether graduates of technical and applied fields have improved their labour market outcomes, relative to graduates of the liberal arts fields. The second objective is to establish whether the relative employment outcomes of graduates of trades, college, and various university programs have changed over the corresponding period. The results will help to identify some of the implications that the new economy may have on the early job prospects of postsecondary graduates, and will provide further insight on the debates in the school-to-work literature.

Data and Methods

The sources of data for this study are the 1982, 1986, 1990, and 1995 National Graduates Surveys (NGS). These are the largest and most comprehensive surveys available in Canada that focus on the relationship between education and work. Each survey has more than 30,000 observations, representing all provinces and territories in Canada. The surveys were conducted by telephone, and the respondents were asked a variety of questions relating to their educational histories and employment situations. Since the data are collected over four cohorts, the NGS are valuable for making labour market comparisons of postsecondary graduates over time. For each survey, the respondents were questioned two years following graduation. The two year survey represents an important source of information on the immediate labour market outcomes of postsecondary graduates, and is used extensively in the research literature (Krahn and Bowlby, 1999; Taillon and Paju, 1999; Lin et al., 2000; Statistics Canada, 2001a).

The base population of each survey is all graduates of Canadian postsecondary educational institutions who have completed the requirements for degrees, diplomas, or certificates during the calendar year for which the survey was planned. The three levels of postsecondary institutions included in the population are universities, colleges, and technical institutions. University degrees are further divided into four categories: bachelors, masters, professionals, and earned doctorate. The population does not include those who graduated from private postsecondary education institutions that do not follow a standard curriculum of the type developed for publicly funded institutions. It also does not include individuals who took part-time trade courses while employed full time, or people who completed vocational programs lasting less than three months.

Selection Criteria

The selection criteria used in this study is similar to the criteria used by other researchers drawing on NGS data (Krahn and Bowlby, 1999; Finnie, 2000a; 2000b).[7] The analyses include those who have not obtained an additional degree, diploma, or certificate subsequent to the one originally received in 1982, 1986, 1990, or 1995. As well, those who work part time because they are continuing their education were also excluded.[8]

Independent Variables

The variables sex, marital status, age, region, mother's education, father's education, and the presence of dependent children are available in all surveys, and are used as independent control variables in this study. Level of schooling and field of study are the two education variables used in regression analyses. The level of schooling variable is divided into the following six categories: 1) Trade or vocational certificate; 2) College diploma or certificate; 3) Bachelor's degree;[9] 4) Master's degree (e.g., M.A., M.Sc., M.Ed.); 5) Degree in medicine (M.D.), dentistry (D.D.S., DM.D.), veterinary medicine (D.V.M.), law (Ll.B); optometry (O.D.); [10] and 6) Earned Ph.D. (e.g. Doctorate, D.Sc., D.Ed.). While a higher score generally implies a higher level of schooling, considering the discrete nature of the categories, this variable will be treated as categorical in the regression models.

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7. A common problem when using a series of cross-sectional surveys is that not all of the questions are asked in every survey. In addition, the wording of questions can often change over time, as can the response options. This is a particular limitation of the National Graduates Surveys, given that Statistics Canada and Human Resources Development Canada made certain changes in the content of the questions asked of the four cohorts. Therefore, a great deal of care and attention was devoted to recoding the variables so that meaningful comparisons could be made across surveys. Only variables that are compatible, or could be made compatible, across the four surveys were used in the analyses.
8. The selection criteria are also based, in part, on the variables available in all of the surveys. The proportions of graduates selected are relatively similar across the four cohorts (13.5% were excluded in 1982, 14.4% in 1986, 12% in 1990, and 13.9% in 1995).
9. Statistics Canada has also grouped graduates with a bachelor of education degree (i.e. B.ed's) in this category because they are not considered to be professional programs of the same level as those included in category number five.
10. This category was coded by Statistics Canada. It also includes graduates of other highly specialized programs (i.e. advanced teaching and nursing programs). Due to the high degree of heterogeneity, the results obtained for graduates of this category should be interpreted with some caution.

In each survey, respondents were also asked to report their field of study, and their responses were then grouped into the following categories:[11]

1. Education, recreational and counselling services;
2. Fine and applied arts;
3. Humanities and related fields;
4. Social sciences and related fields;
5. Commerce, management and business administration;
6. Agricultural and biological sciences;
7. Engineering and applied sciences, technologies and trades;
8. Health professions, sciences and technologies;
9. Mathematics and physical sciences; and
10. Interdisciplinary studies, unknown, or other.

Dependent Variables

The earnings variable in the 1982, 1986, and 1990 surveys was obtained from the respondent's answer to the question: "Working your usual hours, approximately what would be your annual earnings before taxes and deductions at that job?" This earnings variable has been referred to as a somewhat "atypical measure" because it represents what the graduate would earn on an annual basis if the job were to last a full year (adjusting for irregular work patterns), rather than what the graduate actually earned (Finnie, 2000b: 201). At the same time, it is also considered to be a well-defined measure, which is analytically interesting, and presumably well reported (Finnie, 2000: 201). The 1995 survey uses a similar, although derived, estimate of the gross annual earnings for the job held during the 1997 reference week. It is based on the respondent's reported salary, how it was paid (yearly, monthly, weekly, hourly), and his or her usual number of hours worked. To be consistent with the earnings variables in the earlier datasets, the earnings variable in the 1995 NGS was rounded to the nearest thousand dollars, and capped at $99,000.[12] The consumer price index was used to convert the earnings variables to constant (1992) dollars. Because earnings are skewed, the log (base 10) of earnings is used in the ordinary least squares regression models instead of actual earnings.

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11. Unfortunately, the field of study and level of schooling variables in the NGS do not distinguish between trades graduates of highly skilled programs (i.e. plumbers and electricians) and those of vocational programs (i.e. hairdressers and travel agents).
12. The number of cases censored was small (177 cases). However, as a precautionary measure, the regression models for earnings were re-estimated using the Tobit model, which is appropriate for censored data (Tobin, 1958; see also Breen, 1996). Since the estimates obtained from the Tobit model were identical to those of the OLS model, the estimates from the more parsimonious (OLS) model are provided in Table 1.

The employment status variable has three categories: 1) those employed full time; 2) those employed part time; and 3) those unemployed. This variable is treated as a dependent variable in the multinomial logistic regression models (See Long, 1997: 148–186).

Results

Earnings

As mentioned above, the dependent variable for the first series of regression models is the log of real earnings in 1992 dollars. The two models presented in this section can be found in Table 1. The first model includes only the education-related variables, level of education and field of study. The second also includes an interaction between the NGS cohort and each of the education-related variables.[13] [14]

Model 2 includes the interactions between NGS cohort and level of schooling and NGS cohort and field of study.[15] The effects of both interaction variables are statistically significant ($p<.001$). The graph in Figure 1 plots the regression estimates (converted back to real earnings) for graduates of the various levels of postsecondary schooling, while controlling for all of the other variables in the model.[16]

As expected, graduates with higher levels of schooling generally have higher earnings.[17] Perhaps the most surprising finding in the figure is that

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13. Each model includes the sociodemographic variables sex, age, marital status, region, language of interview, number of children, mother's education, father's education, and NGS graduation cohort (1982, 1986, 1990, and 1995). The coefficients for these variables are available upon request from the author.
14. Incidentally, an additional model including two three-way interactions was also estimated. The first three-way interaction was among gender, NGS cohort, and level of schooling, and second was among gender, NGS cohort, and field of study. While the effects of these interactions were statistically significant ($p<.001$), as would be expected with such a large sample, the general earnings and employment patterns for men and women were very similar. Therefore, these results are not provided here. They are available from the author by request.
15. Since the effects of the interactions between NGS cohort and the level of schooling, and NGS cohort and field of study are statistically significant, the parameter estimates from Model 1 are not interpreted.
16. When not otherwise stated, the relationships between the dependent variable and each independent variable are to be interpreted as controlling for all of the other variables included in the respective models.
17. While one might expect that some of the wage premium to graduates with higher level credentials could be explained by the fact that they may have had prior participation in the labour market, part of this effect would likely be captured by the age variable included in the analysis.

Table 1. Ordinary Least Squares Regression: Earnings

	Model 1			*Model 2*		
	b	*SE (b)*	*p*	*b*	*SE(b)*	*p*
Field of Study			***			***
Education	0.01	0.003		0.01	0.005	
Fine Arts	−0.07	0.004		−0.06	0.007	
Humanities	−0.05	0.003		−0.06	0.006	
Commerce	0.04	0.002		0.06	0.004	
Agricultural/Bio Sci	−0.02	0.003		0.00	0.006	
Engineering/Ap Science	0.09	0.003		0.14	0.005	
Health Professions	0.12	0.003		0.09	0.005	
Math	0.07	0.004		0.09	0.008	
Other	−0.01	0.005		−0.04	0.011	
Social Sciences	—	—		—	—	
Level of Schooling			***			***
Trades	−0.18	0.002		−0.18	0.004	
College	−0.09	0.002		−0.11	0.003	
Professional	0.07	0.004		0.03	0.008	
Master's	0.11	0.003		0.11	0.005	
Ph.D.	0.10	0.008		0.09	0.013	
University Undergrad	—	—		—	—	
NGS* Field of Study (Model 2)						***
NGS* Level (Model 2 only)						***
	R-square .2560 Adj R-square .2554 n=88941			R-square .2611 Adj R-square .2501 n=88941		

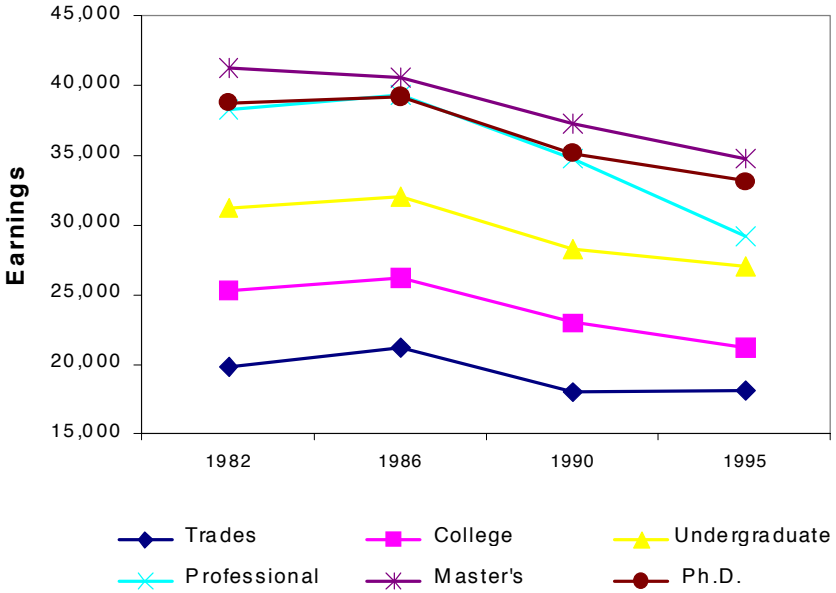
*** = p < .001

professional graduates experienced the most dramatic decline in real earnings when comparing graduates of the 1986 cohort with those of the 1990 cohort, and also when comparing graduates of the 1990 cohort with those of the 1995 cohort.[18] [19] Incidentally, graduates of trades programs experienced the smallest decline in real earnings over the last two cohorts. The earnings decline that occurred for trades graduates between those of the 1986 and 1990 cohorts is statistically significant (p<.001), whereas the earnings difference between 1990 and 1995 is not.

When one controls for the sociodemographic variables, along with the field of study variable, there does not appear to be any clear evidence that college

18. The earnings decline during both periods is statistically significant (p<.001).
19. By comparison, the average earnings in the population were $22,490 in 1984, $23,946 in 1988, $23.667 in 1992, and $23.130 in 1997 (Statistics Canada, 2001b).

Figure 1. OLS Regression Results: Earnings by Level of Schooling



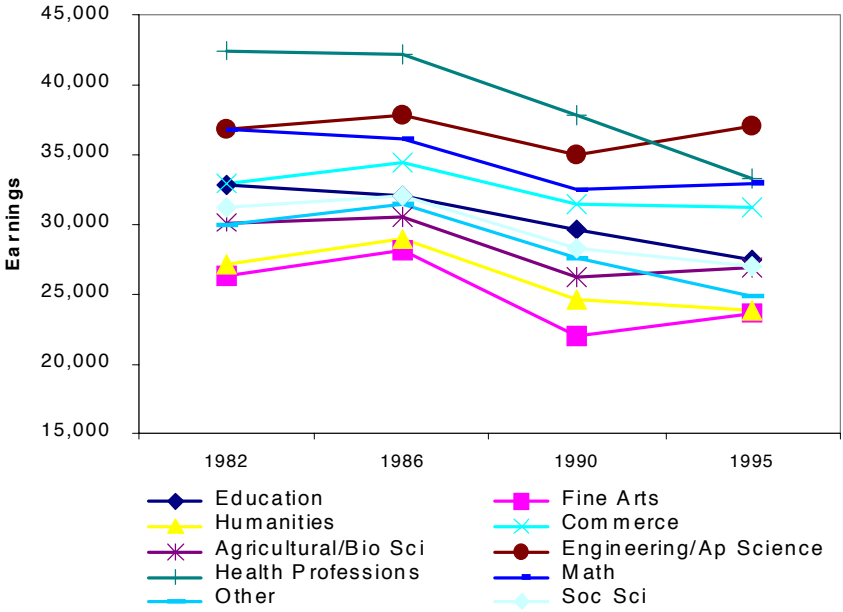
and trades graduates have narrowed the earnings gap when compared with graduates of university programs. Trades, and then college, graduates are clearly at the bottom of the earnings hierarchy for each of the four cohorts. In fact, the gap between them and university undergraduates appears to have widened slightly, particularly when one considers the graduates who belong to the 1995 cohort.

As can be seen in Figure 2, graduates of health programs were at the top of the earnings distribution for the first three cohorts; however, they were surpassed by graduates of engineering programs in the 1995 cohort. Graduates of health programs experienced an earnings decline between the 1986 cohort and the 1990 cohort, and then again between the 1990 cohort and the 1995 cohort.[20] Lastly, fine arts, humanities, and agricultural and biological science graduates have consistently been at the bottom of the earnings distribution, whereas social science graduates and graduates of education programs have generally been in the middle.

When comparing the earnings of graduates of different fields of study, there does not appear to be solid evidence that the new economy has increasingly

20. The sharp earnings decline of health graduates during both periods is statistically significant ($p<.001$).

Figure 2. OLS Regression Results: Earnings by Field of Study



favoured graduates with technical and applied skills. While engineering graduates were able to increase their earnings relative to the other fields of study, graduates of health programs have lost much of their earlier earnings advantages over the other fields.

Employment Status

Employment status is the dependent variable for the multinomial logistic regression models estimated in Table 2. The three employment status categories for this variable are: employed full time, employed part time, and unemployed.[21] [22]

Model 1 presents the parameter estimates for the effects of level of schooling and field of study on employment status,[23] and Model 2 includes the

21. Respondents employed full time represent the reference group.
22. For both sets of analyses the coefficients for the sociodemographic variables, as well as the extended set of coefficients for the interaction terms, are available upon request from the author.
23. Since the effects of the interaction terms between NGS cohort and each of level of schooling and field of study are statistically significant in Model 2, the parameter estimates from Model 1 are not discussed.

Table 2. Multinomial Logistic Regression: Employment Status

	Model 1						*Model 2*					
	Part-time			**Unemployed**			**Part-time**			**Unemployed**		
	b	*SE (b)*	*p*	*b*	*SE (b)*	*p*	*b*	*SE (b)*	*p*	*b*	*SE (b)*	*p*
Field of Study						***						***
Education	0.335	0.037		−0.514	0.0448		0.45	0.099		−0.42	0.098	
Fine Arts	0.368	0.050		0.114	0.0516		0.30	0.126		0.03	0.109	
Humanities	0.284	0.047		0.207	0.0464		0.26	0.123		0.14	0.106	
Commerce	−0.75	0.039		−0.462	0.0368		−0.44	0.103		−0.50	0.085	
Agricultural/Bio Sci	−0.32	0.054		−0.124	0.0484		−0.12	0.131		−0.02	0.102	
Engineering/Ap Science	−1.125	0.049		−0.332	0.0391		−0.53	0.14		−0.19	0.088	
Health Professions	0.303	0.038		−1.107	0.054		0.25	0.106		−1.22	0.117	
Math	−0.887	0.087		−0.446	0.0661		−0.56	0.229		−0.26	0.161	
Other	0.395	0.068		0.218	0.0676		0.54	0.205		0.07	0.190	
Social Sciences	—	—		—	—		—	—		—	—	
Level of Schooling						***						***
Trades	0.63	0.034		0.83	0.032		0.76	0.074		1.22	0.063	
College	0.20	0.030		0.15	0.031		0.18	0.070		0.35	0.065	
Professional	−0.72	0.075		−0.14	0.075		−1.46	0.296		0.02	0.163	
Master's	−0.30	0.050		−0.43	0.054		−0.48	0.130		−0.25	0.113	
Ph.D.	−0.66	0.161		−0.58	0.154		−0.53	0.428		−0.44	0.371	
Undergraduate	—	—		—	—		—	—		—	—	
Field of Study * NGS (Model 2)												***
Level * NGS (Model 2)												***
	LR (146) = 10418.84 p > chi2 = 0.0000 Pseudo R2 = 0.0730 L1 = −66160.184 n = 107948						LR (230) = 11061.51 p > chi2 = 0.0000 Pseudo R2 = 0.0775 L1 = −65838.851 n = 107948					

*** = p<.001

interaction terms between NGS cohort and each of the education variables, level of schooling and field of study. The effects of both of the interaction terms are statistically significant ($p < .001$), suggesting that the effect of postsecondary education, determined by field of study and by level of schooling, on employment status is different for each cohort. To better interpret the relationship between education and subsequent employment, the parameter estimates for these coefficients are converted into predicted probabilities (see Fox, 2002: 172–178). They are plotted in Figures 3 and 4.[24]

As can be seen in the Figure 3, graduates of university undergraduate programs generally have a higher probability of being employed full time than do graduates of college programs,[25] who, in turn, have a greater probability of being employed full time than do graduates of trades programs. The probability of being employed full time for university undergraduates declined steadily over the four cohorts.

Graduates of professional, Ph.D., and master's programs generally have the highest predicted probabilities of being employed on a full time basis.[26] Ph.D. graduates have the highest probability of being employed on a full time basis for every cohort, except for the 1986 cohort, where graduates of professional programs had the highest probability of being employed full time.

For every single cohort, trades graduates have the highest likelihood of being employed part time.[27] College graduates are the second most likely to find themselves employed part time, except for the 1986 cohort, where their probability of being employed part time was identical to that of university undergraduates. For every other cohort, university undergraduates have a lower probability of being employed part time than do college graduates. Professional, master's, and Ph.D. graduates generally have the lowest probabilities of being employed part time; professional graduates of the 1982 and 1986 cohorts are the least likely to be employed part time, while Ph.D. graduates belonging to the 1990 and 1995 cohorts are the least likely to be employed part time.

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24. All predicted probabilities are calculated holding the other variables constant at their means.
25. Except for the 1986 cohort, where their respective probabilities of being employed full time are the same.
26. An interesting exception is professional graduates of the 1995 cohort. Their probability of being employed full-time in 1997 is surprisingly low, .78.
27. Although, the probability of being employed part time is nearly identical for college and trades graduates of the 1995 cohort. Their respective probabilities are .125 for trades, and .124 for college. This difference is not statistically significant. Incidentally, the corresponding part-time employment rates in Canada were 16.8 in 1984, 16.8 in 1988, 18.5 in 1992, and 19.0 in 1997 (Statistics Canada, 2001c: 5).

Figure 3. Multinomial Logistic Regression Results: Predicted Probabilities of Full-Time, Part-Time, and Unemployment by Level of Schooling

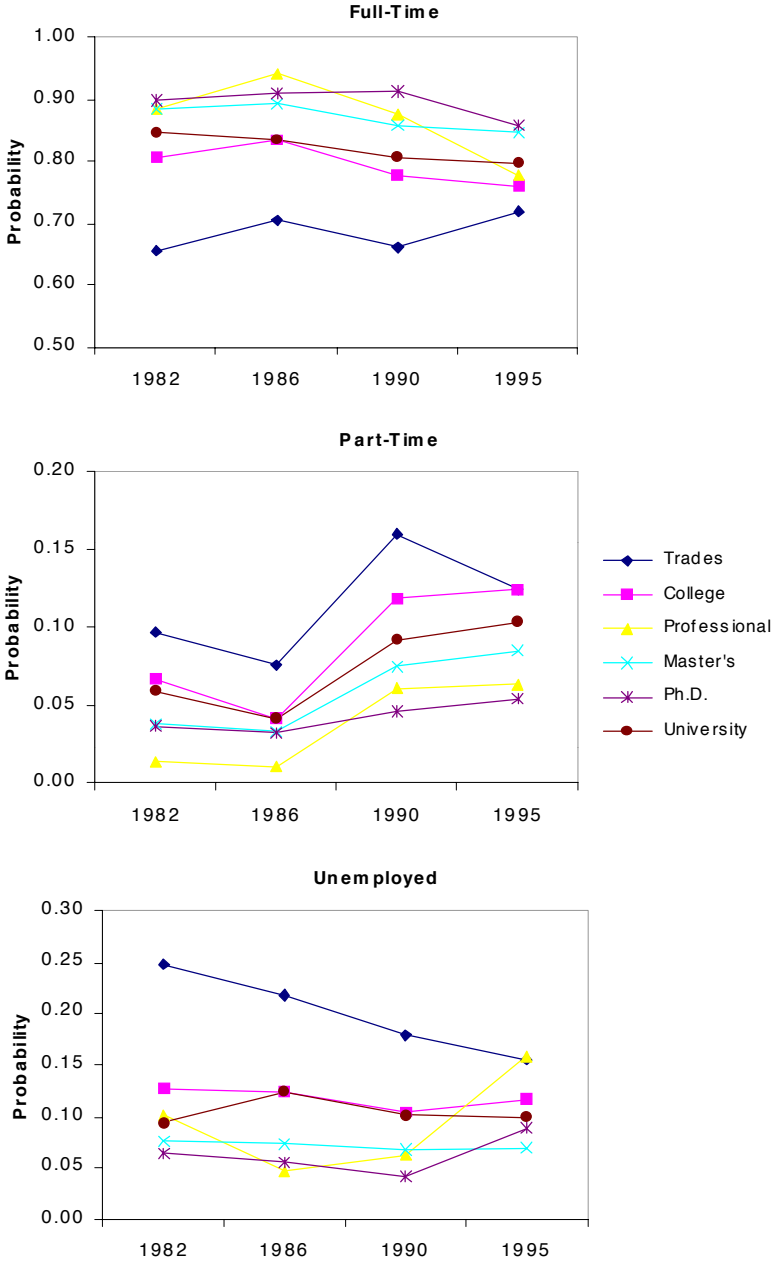
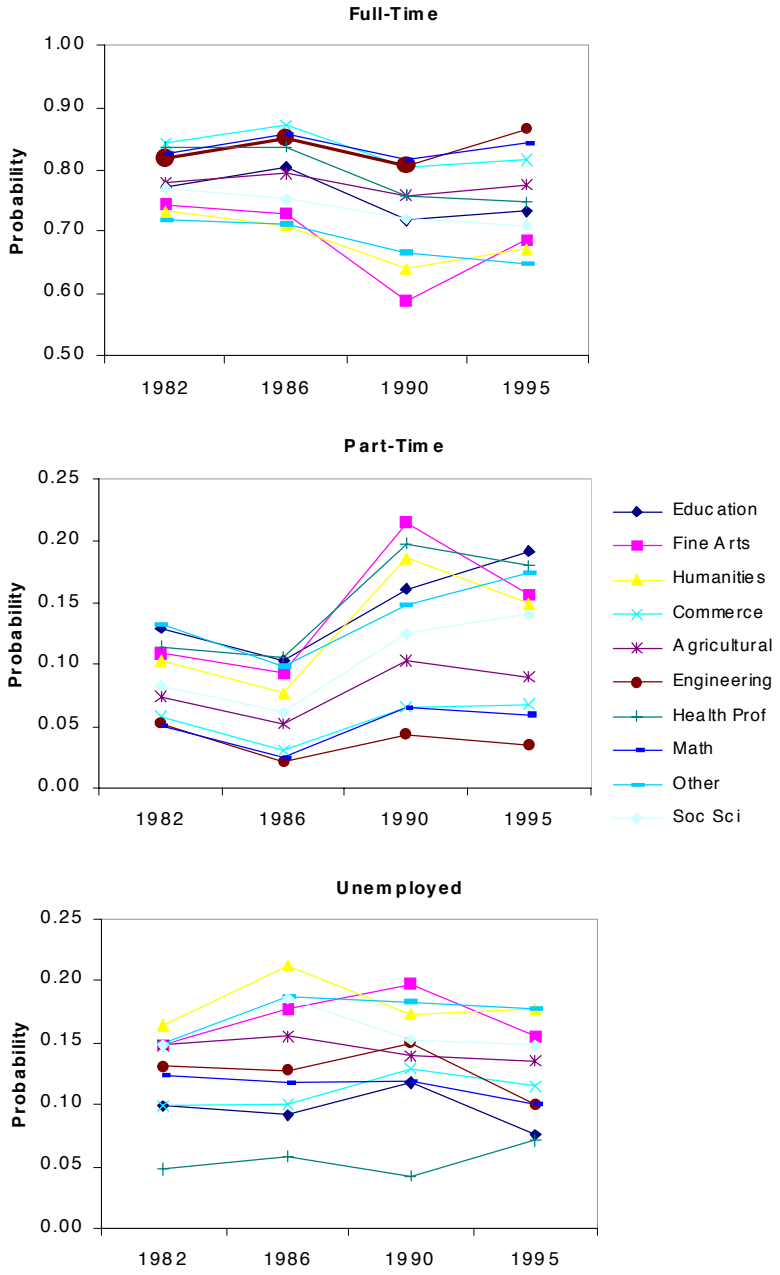


Figure 4. Multinomial Logistic Regression Results: Predicted Probabilities of Full-Time, Part-Time, and Unemployment by Field of Study



In all cohorts, except for the 1995 cohort, trades graduates have the highest probability of being unemployed.[28] However, their chances of being unemployed declined steadily for graduates of each successive cohort. College graduates are generally slightly more likely to be unemployed than are university undergraduates. One exception is the 1986 cohort, where the predicted probabilities of being unemployed are nearly identical for college and university undergraduates. For each cohort, graduates of professional, master's, and Ph.D. programs have the lowest probabilities of being unemployed.[29]

The predicted probabilities for field of study are provided in Figure 4. As one would expect, graduates of the fine arts, humanities, and those programs classified as "other" are least likely to be employed full time, although their relative positions at the bottom fluctuate from cohort to cohort. The probability of being employed full time is somewhat higher for social science graduates. Graduates of education and the agricultural and biological sciences programs generally have a slightly higher probability of being employed full time than social science graduates across the cohorts. Lastly, graduates of engineering, mathematics, and commerce programs generally experience the best full time employment outcomes, and this is relatively consistent across cohorts. Health professionals show a similar pattern, but only for members of the 1982 and 1986 cohorts. In general, there appears to be a greater variability in the predicted probabilities of being employed full time when comparing graduates of different fields of study from the 1990 and 1995 cohorts than from the 1982 and 1986 cohorts.

Figure 4 also shows the predicted probabilities of part-time employment for graduates of different fields of study. There appears to be a greater variability in the predicted probabilities of being employed part time when one compares graduates of various fields of study belonging to the 1990 and 1995 cohorts with graduates belonging to the 1982 and 1986 cohorts. It also appears that there is a slightly disproportionate shift in employment of health, education, liberal arts, and graduates classified in the "other" category from full time jobs into part time jobs.

We can also see from the graph that graduates of fine arts, humanities, education, health, and "other" programs have the greatest likelihood of finding themselves employed part time. This is applicable to graduates of all four cohorts**.** Social science graduates have a lower likelihood of being employed part time than graduates of all of the above fields of study, and this applies to

28. In comparison with these figures, the overall unemployment levels for the population in 1984, 1988, 1992, and 1997 are 11.3, 7.8, 11.2, and 11.2, respectively (Statistics Canada, 2001d).
29. Graduates of professional programs of the 1995 cohort are an exception. They have the highest probability of being unemployed (.16).

graduates of every cohort. Graduates of engineering, mathematics, and commerce programs are clearly the least likely to find themselves employed part time.

As can also be seen in Figure 4, graduates of the fine arts, humanities, social sciences, and "other" programs have the greatest likelihood of being unemployed. Agricultural and biological sciences graduates have a lower probability of being unemployed than social science graduates, and engineering graduates generally have a lower probability of being unemployed than agricultural and biological sciences graduates (except in the case of the 1990 cohort, when engineering graduates had a slightly higher probability of being unemployed). Commerce graduates generally have a probability of being unemployed that is lower than that of engineering graduates (except in the case of the 1995 cohort). Next to graduates of health programs, graduates of education programs generally have the lowest probability of being unemployed.

Discussion and Conclusion

A major limitation of the past research on the earnings and employment outcomes of postsecondary graduates is that little attention has been devoted to making comparisons over time, for both graduates of different levels of schooling and fields of study. Thus, by investigating the effects of level of schooling and field of study on both earnings and employment, while also controlling for the possible effects of sociodemographic characteristics, this study is able to make a unique contribution to the research on transitions from school to work.

A key issue addressed in this study is whether or not college and trades graduates have improved their earnings and employment outcomes relative to university undergraduates. The results illustrate that the relative earnings differences among graduates of various levels of schooling have remained constant throughout the period analyzed here. More specifically, graduates of trades and college programs have not improved their earnings outcomes relative to graduates of university undergraduate programs. In fact, the relative differences in earnings are maintained even though larger proportions of individuals opted to acquire higher postsecondary credentials (undergraduate degrees and above) over the period investigated in this study.[30]

30. For example, from 1982 to 1995 the number of college graduates increased by 8%, whereas graduates of bachelors and professional programs increased by 47%; the number of graduates with master's degrees increased by 72%, and the number of graduates with Ph.D.'s increased by 114% (see Statistics Canada, 1995).

One notable trend is the relative earnings decline of graduates of professional programs over the last two cohorts. The poorer labour market prospects among professional graduates during the 1990's, particularly of health related programs, might be attributable to decline of public funding in these areas during this period (see Canadian Institute for Health Information, 2002), accompanied by low retirement levels (see Foote and Stoffman, 1996). This, in turn, would create a temporary oversupply of professional graduates if enrolment levels for these programs were not tightened.[31]

With respect to employment status, the results also show that college graduates have not been able to improve their employment prospects relative to university graduates. However, graduates of trades programs did experience higher levels of full time employment and lower levels of part time employment, relative to graduates of all of the other levels of schooling. Similar to the earnings results, the recent employment outcomes of graduates of professional programs have also deteriorated relative to graduates of other levels of postsecondary programs.

These results also indicate that the earnings and unemployment levels of liberal arts graduates, relative to those of graduates of applied fields, have not changed over the period examined here. While there is some evidence to suggest that liberal arts graduates have experienced a slightly greater shift toward part time work, particularly when comparisons are made between graduates of the 1986 and 1992 cohorts, this pattern is also observed for graduates of the more applied areas such as education and health related fields. Moreover, this pattern is also largely consistent with that of the general population.

For the most part, the results suggest that the labour market requirements of employers during the 1980's and 1990's have not shifted to markedly favour graduates with one form of skill set over graduates with another. Instead, they indicate that the late-twentieth-century economy requires a "mix" of graduates with both general and technical skills to work in various capacities.

There are a few limitations of this study that are worth discussing. Unfortunately, some variables were not available in all four NGS surveys, or were not worded consistently across the surveys. Thus, certain variables (e.g. ethnic status) could not be controlled in this study. Furthermore, the NGS does not include variables that adequately address social class.[32] Therefore, trends associated with social class (or SES) in the labour market outcomes of recent postsecondary graduates could not be explored in this study. This is unfortunate, as the impact of social class on educational attainment and outcomes has been a growing concern among policy makers over the last few decades, par-

31. Such an interpretation is consistent with the credentialist perspective, which asserts that an oversupply of graduates leads to the devaluation of credentials (Collins, 1979; Livingstone, 1998).
32. The mother's and father's education variables only represent rough proxies for parental SES, and could not be used for more elaborate analysis involving parental background.

ticularly as the costs of education have increased and have shifted from the public sector to the students (Finnie and Garneau, 1996; see also Statistics Canada, 2001a: 28).[33] This is a genuine concern since students of higher class families are more likely to have financial support than are students of lower class families.

Additional variables would have been useful to help further explain why graduates of the various programs have different labour market outcomes. For example, measures that tap into ability would make it possible to determine whether there is a selection effect. In other words, it is quite possible that graduates with higher levels of ability enter the most rewarding academic programs. At the same time, it is also possible that the employment outcomes of various postsecondary graduates are partly attributable to the "gate-keeping" mechanisms used in many programs, especially professional programs, in order to enhance their status (see Collins, 1979: 185).[34] Fields that are more selective than others are likely better able to attract higher quality applicants. Thus, some programs may be able to raise the average wage and employment levels of their graduates simply by keeping their enrolment numbers low. Unfortunately, it is not possible to adequately test either of these assertions with the NGS data, as the appropriate variables are not available.

Also, it is not possible using this data to say definitively whether the results (i.e. earnings and employment patterns) are attributable to the fact that various postsecondary programs impart different skills to their students, or to the possibility that some programs have more or less effectively responded to the changing skill requirements of employers, or some combination of the two. To make this assessment, more information on the interrelationship among education, skills, and labour market outcomes is needed. While the 1995 NGS provides a variety of measures that tap into the skills graduates obtain from their programs (see Krahn and Bowlby, 1999; Lin et al., 2000), comparable measures are not available in the earlier surveys.

Comparisons of postsecondary graduates over a longer period of time would also be extremely valuable. Fortunately, the two-year follow-up survey of 2000 graduates is under way, and when the data becomes available, researchers will be able to compare the employment outcomes of the 2000 graduates with those of earlier cohorts. The 2000 NGS will be particularly valuable to those conducting research on the changing needs of the economy, given that the graduates of this cohort are more likely to have been affected by the recent

33. In fact, the amount of student debt has increased substantially. For example, college and university undergraduates alone owed 65% more (at the time of graduation) in 1990 than they did in 1982 (Finnie and Garneau, 1996; see also Statistics Canada, 2001a: 28).

34. "Gate-keeping" might also be used to ensure that the salaries of professionals are not undermined by allowing the supply of recently trained professionals in a field (for example, law or social work) to outstrip the demand for these professionals.

rapid expansion of the Internet and other forms of information technology. At the same time, the labour market requirements of the economy will become increasingly complex as the population ages. The retirement of teachers and other public service employees will certainly affect the employment opportunities of large numbers of postsecondary graduates in the near future. In fact, it has also been argued that health fields will rapidly expand because of the greater need for health care services given the aging of the Canadian population (Foote and Stoffman, 1996: 52). Future NGS surveys will be valuable for determining how the school-to-work transitions for postsecondary graduates are affected during this period.

Finally, it is important to reiterate that the results are based on the early labour market experiences of graduates two years out of school. While it has been found that the two year period immediately following graduation strongly influences the eventual labour market outcomes of graduates (see Anisef, Turrittin and Lin, 1999), it may take a longer period of time for some graduates to get sorted into their labour market positions than others. Thus, the five-year follow-up to the 1995 NGS will be valuable for identifying the long-term employment prospects of recent postsecondary graduates of different programs. The longitudinal files for earlier versions of the National Graduates Surveys have been examined (Finnie, 2001); however, we still know very little about the earnings trajectories of recent postsecondary graduates.

The five-year follow-up for the 1995 NGS will be valuable to determine whether the earnings trajectories of 1995 graduates have changed between 1997 and 2000. This is an intriguing issue because earlier research, drawing on data from a sample of university graduates surveyed in 1993 and 1997, suggests that it takes some time before the more transferable skills obtained by the graduates of liberal arts programs actually translate into labour market advantages (Giles and Drewes, 2002). However, further research is needed before any definitive conclusions can be drawn.

Nevertheless, the results of this study provide some important insight to both students and policy makers. By identifying recent trends, these findings can be used to help students navigate the contemporary labour market; to let them know which programs are likely going to offer them the greatest employment advantages. At the same time, these results also reinforce some genuine concerns about the labour market conditions of recent graduates, lending some support to the assertion that the knowledge-based economy has not provided graduates with better labour market conditions, as was previously believed (see Rinehart, 1987).[35]

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35. Rinehart's (1987) argument is that while the new economy may create higher level "professional" jobs, it may also be responsible for a disproportional shift into part-time work, even among the more highly educated workforce.

Since the results are based on the labour market outcomes of graduates who were surveyed two years following graduation, they will be of particular concern to students who need to obtain student loans, since they are generally required to begin paying back their loans six-months after graduation. Indeed, the results of this study provide important information for policy officials involved in making decisions related to setting tuition levels and the allocation of government funding to various programs. For example, graduates with the least favourable outcomes will be most likely to experience difficulty repaying their student loans. Thus, policy decisions might be made to accommodate their labour market circumstances.

Lastly, with respect to policy concerns regarding the continued funding of various postsecondary programs, these results suggest that the economic benefits of a liberal arts postsecondary education are not as great as the results of other studies imply (Allen, 1997; 1999b; Axelrod et al., 2001). At the same time**,** they also suggest that the earnings of liberal arts graduates are relatively stable when compared with graduates who have obtained technical and applied credentials. Thus, these findings challenge policy initiatives advocating funding cutbacks to liberal arts programs on the grounds that the labour market outcomes of these graduates have been declining. Hopefully policy makers will consider these results in conjunction with the arguments made by others who have outlined the non-economic benefits of a liberal arts education (see Axelrod et al., 2001).

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Appendix A

Sociodemographic Control Variables

Sex
Men
Women

Age
Marital Status
Married
Separated/Widowed/Divorced
Single

Number of Children
No children
One child
Two children
Three or more children

Region
Eastern provinces
Quebec
Western Provinces
Ontario

Language of Interview
English
French

Age
20-45

Mother's and Father's Education*
High school
Some postsecondary
Trade
College
University
Master's
Professional
Ph.D.

* To deal with missing data, the mother's and father's education variables each include an additional category for those who either did not know or did not report their mother's or father's education.