THE DEMAND AND SUPPLY OF POST-SECONDARY
EDUCATION AND TRAINING IN BRITISH COLUMBIA

by

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This paper compares the growth in demand for people with different educational credentials to the production of those credentials in British Columbia. Since 1976, virtually all of the growth of labour demand has been for people with some post-secondary education. Demand growth has been split fairly evenly between university graduates and those completing trade, technical, and vocational programs. In the 1990s, the growth in demand for the latter has been about equal to provincial supply; however, the number of undergraduate university degrees and certificates awarded in B.C. has only been one third of the number required by the growth of the B.C. economy. This shortfall has been met by the immigration of graduates from elsewhere in Canada. While B.C. is second only to Ontario in the fraction of its adult population with a university degree, it is last among all the provinces in the number of degrees awarded per resident aged 20-29. While running such a small university system saves the B.C. government tax revenue, it reduces the lifetime earnings prospects of children growing up in the province. The burden is greatest outside of the Lower Mainland and Victoria since university participation rates in the Interior and northern Vancouver Island are only half of those in the large metropolitan areas. In the past, boys (if not girls) growing up in those regions could expect to make high incomes working in the woods or mines. But those days are over, and the present university policy of the province condemns children growing up
outside of the big cities to low paying, service sector jobs.

I. Introduction

While it is commonly believed that advanced education is essential for prosperity in the twenty-first century, it is none too clear what form that education should take. In particular, what balance should be struck between trade, technical, and vocational programs, on the one hand, and the academic and professional programs offered by universities, on the other? To clarify this issue, this paper addresses two questions about the fit between B.C.'s economy and its system of colleges and universities:

1. How has the demand for labour of various types been changing in the province?
2. Does the province produce enough graduates to meet the needs of the new economy?

As to the first question, the data reviewed in this paper show clearly that the growth in labour demand (net of retirements) is exclusively for people with post-secondary credentials. People with only a high school diploma—and especially people who do not finish high school--face a very bleak labour market. Moreover, the growth in demand for people with post-secondary credentials is divided evenly between people with university degrees and people with trades, technical, and
vocational certificates and diplomas. On the order of 35,000 of each are required annually to satisfy the requirements of the growing B.C. economy and to replace people retiring.

As to the second question, the size of the province's post-secondary programs are not so well balanced. The trade, technical, and vocational programs produce about as many completers as the provincial economy requires. However, the province's universities produce only one-third of the graduates required by the provincial economy. Two-thirds of these high paying jobs are going to people from other parts of Canada because B.C.'s colleges and universities are too small to meet the province's economic needs.

These conclusions are quite different from those recently advanced by the B.C. Labour Force Development Board in its report Training for What?. Although the Board no longer exists, its report still warrants discussion since no other body has tackled these questions and since the Board's conclusions reflect common, popular views on the subject.

The Labour Force Development Board argued that the new economy requires the specific skills taught in trade, technical, and vocational programs rather than the general education offered by universities. Moreover, it claimed that, in the 1990s, B.C. would produce about as many university graduates as the provincial economy requires, while the number of people completing trade, technical, and vocational programs would be
only about one third of that required by the growth of the provincial economy.

The conclusions of the Labour Force Development Board were based on forecasts with a version of the COPS (Canadian Occupational Projection System) model, which was calibrated with data from the 1980s and projected that experience into the future. As the 1990s unfold, however, we can compare the Boards projections with what is actually happening. The differences are startling. The demand for university graduates is growing much more rapidly than the Board predicted with the result that B.C.'s university programs produce only about one third of the graduates needed for economic growth. Meeting the needs of the B.C. economy requires a tripling of the capacity of the province's universities and of the academic programs of its colleges.

II. Changes in the Demand for Labour

The first question to address is how the demand for labour has been changing in the province. Our method is to use changes in employment to measure changes in demand. This approach does not always work, however, since, in general, employment is determined by both supply and demand so that changes in either could cause employment to change. There are, however, two special circumstances that allow us to identify demand changes from employment changes in the case at hand.
First, the earnings of university graduates and of trades, technical, and vocational program completers have been constant with respect to each other since the 1970s and have risen with respect to the earnings of those with less education. The growth in employment of educated workers has, therefore, not been induced by a fall in their wage but has occurred in spite of it, so the demand for their labour must have been rising faster than supply. Consequently, we can be confident that the employment changes shown in Figure 1 and Tables 1 and 2 indicate changes in demand not supply.

Second, since people move freely throughout Canada, the supply of labour to each province is effectively unlimited so long as firms in that province pay their employees the going wage in the rest of the country. Under these circumstances, employment in each province is determined by provincial demand rather than supply. Consequently, the differences between provinces in the fraction of the adult population with post-secondary credentials shown in Tables 3 and 4 are also demand driven rather than supply induced. The fact that B.C. is a small part of the Canadian labour market has important implications for several other issues, as we shall see.

What does the evidence show about changes in employment and, hence, in the demand for labour? Since 1976, the Labour Force Survey, conducted monthly by Statistics Canada, has broken down employment in B.C. by educational level. Figure 1 plots the
Appendix I explains how these data were compiled and discusses problems in their interpretation.

data,\(^1\) distinguishing four categories are distinguished by the highest level of schooling completed: (1) workers with a high school diploma or less, (2) workers who entered but did not complete a post-secondary program, (3) those who completed a trade or vocational program or a two year college career or technical program, and (4) those who completed a university program and received a certificate or degree. Changes in the educational attainment questions in the Labour Force Survey probably mean that the employment of people with a high school diploma or less (category 1) was higher in the 1970s and early 1980s than Figure 1 indicates, while the employment with a trades, technical, or vocational credential (category 2) was correspondingly lower.

Between 1976 and 1996, employment in B.C. has increased from 1,070,000 to 1,806,000, a rise of 69%. The growth of employment for people with only elementary or secondary educations has been small or nonexistent. In 1976, 577,000 people with only an elementary or secondary education were employed. In 1996, the corresponding figure was 693,000--just 20% more. Even this small increase may overstate the truth, if the employment of people in 1976 with only an elementary or secondary education is understated in Figure 1. Hence, it is likely that there has been

\(^1\)Appendix I explains how these data were compiled and discusses problems in their interpretation.
almost no growth in employment among people with only elementary or secondary educations since 1976.

In contrast, the employment of people with post-secondary educations has grown rapidly in B.C. Since 1976, the employment of post-secondary noncompleters--i.e. people who entered a post-secondary program but did not complete it--rose from 129,000 to 216,000 or by 67%. The employment of those with a trade, technical, or vocational certificate or diploma jumped from 240,000 to 514,000 or by 145%. Indeed, growth was even faster for this group if its employment was overestimated in 1976, as suggested earlier. The employment of university graduates also increased very rapidly--perhaps fastest of all--rising from 124,000 to 383,000 or by 208%. Clearly, the demand for labour has been shifting dramatically in favour of people with post-secondary credentials, and universities have been leading the way.

How have these trends changed since the advent of the "new economic reality" of the 1990s? Has demand shifted in favour of people with trades, technical, or vocational credentials as the Labour Force Development Board imagines? The answer is no. The trend of demand in favour of educated workers has continued, but demand has grown most rapidly for university graduates. Between 1990 and 1996, the demand for people with only elementary or secondary schooling fell 3%. In contrast, demand for those entering but not completing post-secondary programs has risen 15%; the demand for trades, technical, or vocational program
completers has grown by 34%. The demand for university graduates has risen most of all--by 52%. Indeed, the Labour Force Development Board was right that the structure of demand is changing in B.C., but it was wrong about the direction: Demand is now changing dramatically in favour of university graduates—not trades, technical, and vocational program completers.

The strong demand for university graduates is also apparent in unemployment rates. Figure 2 shows these rates since 1990 with the slightly finer breakdown that is possible with the revised questions in the Labour Force Survey. University graduates have always had the lowest unemployment rates and the best employment record. The unemployment rates of high school graduates, post-secondary noncompleters, and those with trades, technical or vocational credentials cluster together at a higher level. People who did not finish high school have a distinctly worse employment experience. The Labour Force Development Board believed that university graduates cannot find work because they have not learned practical skills. Figure 2 shows that this view is patently inconsistent with the facts.

II. Gaps in Post-Secondary Education

Is B.C.'s post-secondary education system large enough to meet the needs of the new labour market emerging in the 1990s? To answer the question, we must compare the number of educated people required by the economy with the number of degrees and
other credentials awarded. The difference between the two is the "gap" in the supply of educated labour. In the 1990s, B.C. 's universities have supplied only about one third of the growth in demand for graduates in the province. The remaining two-thirds of the growth of demand has been met by importing educated men and women from elsewhere. In contrast, trade, technical, and vocational programs have supplied about as many trained people as the provincial economy has demanded. There is, therefore, a large gap in the provision of post-secondary education, but it is at the university level rather than at the trades, technical, and vocational level.

To work out the number of university or other graduates required by the provincial economy, it is necessary to deal with two issues besides the growth in employment of people with each credential. The first issue is retirements. Consider people with only an elementary or secondary education. Since 1990, their employment has declined slightly. However, there have been many job openings for high school noncompleters and new high school graduates since many retirees in these categories have been replaced by people with the same level of education.

In general, the number of job openings equals the growth in employment (shown, for instance, in the Labour Force Survey) plus the number of retirements. Hence, to calculate gaps, it is necessary to estimate the number of retirements. This has been done using the micro data file from the 1991 Census of Canada.
This source shows, for each level of educational attainment, the age distribution of the population and the fraction of people who are working at each age. From these figures, one can estimate the number of people who retire each year at each educational level.

The second issue that must be addressed is that not every adult works. Some are involuntarily employed, but many chose not to work, often because they are raising children. The 1991 Census micro data set shows the fraction of people working at each age and educational level. For people of prime working age--from 30 to 54--86% with a university degree are employed. Therefore, the educational system must produce 100 university graduates to fill 86 jobs requiring a university degree. In general, people with less education have a lower probability of working, so the educational system must produce correspondingly more graduates to satisfy the demand for workers.

Table 1 shows the number of additional people at each educational level required to meet the changes in labour demand in B.C. in the 1990s. These figures are inclusive of retirements and make allowance for those not employed. To identify gaps, these figures must be compared to the number of people produced each year in each category.

The employment outlook is bright only for people with post-secondary credentials:

- The job prospects of those who do not complete high school
are dire, since, for that group, more jobs are being
eliminated than are being created through retirements.
Hence, the net demand for people who have not finished high
school is falling steadily.

- The situation is better for those who have finished high
school, but the balance between supply and demand is
tenuous. About 9,200 job openings per year have been
created for high school graduates. About 28,000 high school
diplomas are awarded each year in B.C. About two-thirds of
those graduates undertake further education, and that
fraction is just large enough to cut the supply of high
school graduates not continuing further studies back to
equal provincial demand. This close balance along with the
excess supply of people not finishing high school
contributes to unemployment and falling real wages for less
educated people in their twenties.

- Job openings have increased for people who started but have
not finished a post-secondary program. However, the rise is
small compared to other sectors.

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2Table 5 combines high school graduates and high school noncompleters. Unfortunately, the 1991 census
does not seem to distinguish accurately between these two
categories. On the assumption that 15% of 18 year olds do not
complete high school, Table 5 indicates that approximately two-
thirds of the high school graduates do get some post-secondary
education, although by age 23 many have not completed programs.
In greater Vancouver and Victoria, the situation is probably
better than that; on the North Island and in the Interior, it is
worse.
The most job openings have been created for people with trades, technical, or vocational diplomas. While net employment growth for this group was less than for university graduates, gross employment creation was higher for two reasons. First, retirements have occurred at a far higher rate. The retirees are mainly older tradesmen. Second, trades, technical, and vocational graduates experience higher unemployment rates than university graduates, so, perversely, more program completers are required in the adult population for each job opening.

The growth of demand for trades, technical, and vocational program completers is roughly in balance with provincial supply. According to Statistics Canada data, about 37,000 people per year completed trades, technical, or vocational programs, apprenticeships, or received college diplomas in the 1990s. This compares well with the 34,200 people required per year by the growth in the provincial economy. There is no gap here.

Job openings for university graduates have also grown very rapidly in the 1990s. University graduates accounted for 39% of the job openings in the province.

However, the provincial supply of graduates is far below demand. In the 1990s, B.C.'s universities have awarded on average 11,200 undergraduate degrees and
certificates each year. This number is only 39% of the number of graduates required by the growth in the provincial economy. There is, thus, a very large shortfall in the supply of university graduates.

The growth of demand for graduates in B.C. has usually exceeded the provincial supply, but the gap has rarely been as large as it is now. Table 2 shows the gap for five year intervals since 1977. Between 1977 and 1986, the number of graduates required by the growth in the economy was about twice the number of degrees and certificates awarded in the province. Since 1992, the gap has widen: On average, the economy requires 35,500 university graduates, while the province's universities produce only 11,900—only one third of the total required. Moreover, the need for graduates is almost three times as large as the number of graduates (13,000 per year) that the Labour Force Development Board thought was adequate for this period.

Table 2 suggests, however, a partial reconciliation of the Labour Force Development Board's conclusions and the analysis presented here. That reconciliation is based on the figures for 1987–91. In that period, the demand for university graduates grew fairly slowly, so that the graduates required for the economy were about equal to provincial supply. Rough calculations suggest that the number of trades, technical, and vocational program completers required to match job creation leaped up very rapidly and, for the first time, greatly exceeded the
required number of university graduates. This, of course, is the Board's vision of the future. The late 1980s was the period when university graduates had trouble finding a job, but people with training in specific skills seemed in great demand. When the Labour Force Development Board described the future, it was really describing the late 1980s.

Why did the Board confuse the late 1980s with the future? The Board's forecasts of gaps were derived from simulations of a version of the COPS model. This model was formulated using data from the 1980s. Despite the Board's attempts to be up-to-date, they used a forecasting methodology that projected the 1980s into the future. Consequently, the Board missed the dramatic changes that have occurred in the 1990s.

It is important to emphasize that the 1990s have been different from the 1980s. Today's labour market requires university graduates and trades, technical, and vocational program completers in equal numbers. While B.C.'s post-secondary institutions are large enough to satisfy the second demand, the province's universities are far too small to provide the graduates required by the expansion of the B.C. economy.

III. Education and Interprovincial Flows

What happens when the B.C. economy requires 35,500 university graduates a year and the province's universities produce only 11,900? Economic growth does not halt. Instead, migration
fills the gap. Some of this migration is international, but most of it is from the rest of Canada. University graduates in Ontario or the Maritimes move to British Columbia and take the jobs that would otherwise have gone to residents of this province, had there been sufficient university places to meet the needs of the provincial economy.

The number of university graduates in the Canadian population as a whole grows at a rate roughly equal to the number of graduates from the country's universities. Consequently, the size of Canada's universities constrains the growth in the country's graduates. To the extent that graduates are needed for economic growth, more universities can accelerate growth in Canada as a whole.

The same considerations do not apply at the provincial level due to the high rates of interprovincial migration. Provinces can produce many more graduates—or many less—than the number required by their economies. For decades British Columbia has produced far fewer graduates than its economy employs.

If B.C. produces less, other provinces must produce more. The imbalances can be seen by juxtaposing two sets of figures, as in Table 3:

- The first figure is the percentage of the adult population

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3 Some degrees, of course, are brought by immigrants from abroad, but their number is offset by deaths, by immigrants who return home, by degrees granted to foreign students, and by Canadians who emigrate.
in each province with a university degree. This figure indicates the province's demand for graduates. B.C. ranks second (after Ontario) with 14.7% of its adults having a degree. The B.C. economy requires a high number of university graduates.

The second set is the number of university degrees awarded in each province divided by the average number of residents in their twenties. B.C. ranks last by this measure--B.C. has the smallest university system, relative to its population, of any province in Canada, so children growing up in this province have the lowest chance of getting a university degree. In Ontario, the chance of a child's getting a university degree is over 50% higher than in B.C. In Nova Scotia, the percentage is over 100% higher, but the students in that province include a significant number of nonresidents.

The difference in B.C.'s rank with the two sets of figures emphasizes the extent to which B.C. has chosen to import educated people rather than educate children growing up in the province. The high fraction of the B.C. population with a university degree is due to the high demand for university graduates arising in the provincial economy. The small number of degrees awarded shows the small size of the provincial system relative to population. The imbalance is met by migration. Table 3, thus, provides important, additional evidence for the small size of B.C.'s
university sector and the gap between the demand and supply of university graduates.

There is no corresponding imbalance in the provision of trades, technical, and vocational courses:

- Table 4 shows the fraction of the adult population with a post-secondary certificate or diploma. In this case, there is not very much difference among the provinces, and B.C. is in the middle of the distribution at number six. This ranking implies that the B.C. economy requires only an average number of workers with technical or vocational certificates—not an exceptional number.

- There is considerable difference among the provinces, however, in the number of trades, technical, and vocation certificates and diplomas awarded per resident. In Table 4, this standardization for population size is done by dividing the diplomas and certificates by the average number of people in their twenties. (Of course, people over 29 take these courses as well. High enrollments of older students make some of the figures in Table 4 greater than one.) B.C. is third from the top by this measure.

The patterns shown in Tables 3 and 4 are very long standing. W.A.C. Bennett's Social Credit governments were well known for operating a small post-secondary education system. Despite some expansion in the province's colleges and universities, Table 2 shows clearly that there has been no fundamental change in
policy in recent decades.

IV. The Federal Role in Higher Education

Tables 3 and 4 raise important questions about the roles of the provincial and federal governments in financing post-secondary education, because the tables show that a province's educational policy does not determine the educational attainment of its population. B.C. is an important example, for, as noted, it awards the fewest university degrees per capita while it is second only to Ontario in the fraction of its adult population having a degree. The point can be made more generally by correlating the number of degrees, certificates, or diplomas per capita with the fraction of the adult population having the credential. The correlation is statistically insignificant with the data in both Tables 3 and 4.

Provincial education policy does not determine provincial educational attainment because educated people move to where the jobs are. Nova Scotia sends the highest fraction of its twenty year olds to university. When they cannot all find good jobs in Halifax, some move to Toronto or Vancouver where economic growth is more rapid. Conversely, employers in Vancouver do not suffer from the relatively small size of the province's universities since they can always fill job openings with new graduates from Ontario or the Maritimes. Migration in response to economic opportunity means that provincial governments cannot use
educational policy to influence the educational attainment of their populations.

This truth has two important corollaries: First, a provincial government cannot use educational policy to promote economic growth. If B.C. expands its universities, the main effect will be to forestall the migration of educated people from other provinces rather than to increase the number of educated people here. Second, every provincial government has an incentive to freeload on other province's universities. Universities are expensive, and public revenues can be saved by importing graduates from other provinces rather than educating them locally. Of course, the children who miss an education are the ones who will pay for this policy in the future.

While the supply and demand of university graduates do not balance at the provincial level, they do at the national level since international migration is relatively small. Canada can raise the fraction of its population with a university degree only by expanding the country's universities. Moreover, university graduates earn more than people with less education, and the earnings premium of graduates is a measure of their contribution to economic growth. Graduates are good for growth. To realize the potential for growth, Canada as a whole must spend more on universities.

The comparison of the national and the provincial perspectives highlights the Federal role in financing universities.
First, since provinces can always import trained personnel, it is only the federal government that directly confronts the fact that more graduates are necessary for economic development. Consequently, it would be more sensible for the federal government to finance universities than for the provinces.

Second, how long can one expect Nova Scotia to tax itself to educate people who will then move to B.C. and pay taxes on the West coast rather than on the East? Since the federal government is the only one that can recoup the costs of education through national taxation, it ought to pay a large share of university costs.

Third, giving unrestricted funds to the provinces is an ineffective way to finance universities since the provinces can reallocate the money to other ends and have an incentive to do so. Federal funding for universities ought to go directly to the universities rather than into provincial general revenues.

The devolution of powers and spending authority to the provinces is the current vogue in Canadian politics. However, in the areas of training and education, this policy is counter-productive since the provincial governments can freeload off the rest of the country by importing trained people rather than incurring the costs of operating colleges and universities. The history of British Columbia shows that this option is attractive even when it penalizes many of the province's residents. Direct federal funding of post-secondary education would improve the
situation.

**V. B.C.'s post-secondary education policy; Who Gains and Who Loses?**

The main reason that B.C. operates a small educational system is to save money. Saving money, however, has the effect of denying university access to people who would otherwise attend. In all provinces, people from working class backgrounds are less likely to attend universities than are the children of middle and upper class parents. What distinguishes B.C. from the rest, however, is the regional inequities. Until recently, all of the province's universities were located in Vancouver, Burnaby, or Victoria. Despite the creation of the University of Northern B.C. in Prince George and the expansion of some colleges in the interior into four year degree granting institutions, most of the undergraduate places are still located in the lower mainland and Victoria. The concentration of universities in these areas means that children from the interior or northern Vancouver Island have only half the chance of getting a university degree as do children from the large coastal cities.

The difference between the regions can be established using the 1991 census. Table 5 analyzes the educational attainment of 23 year olds in the province. The Vancouver and Victoria metropolitan areas--where the universities have been located--are distinguished from the North Island/Interior portions of the
province. The analysis focuses on 23 years for two reasons. First, many students who entered a university program after graduating from high school have finished by that age, so university completion can be studied. Second, the census indicates the respondent's residence five years previous, i.e. when the 23 year olds were 18 and thus finishing high school. This is important since students from the interior who did a university degree had to move to greater Vancouver or Victoria and were generally still there when they were 23. The question about their residence five years previously allows them to be mapped back into their region of origin, so the various regions can be compared in terms of the success of 18 year olds in getting a university degree.

Table 5 shows that eighteen year olds in the large metropolitan areas were much more likely to receive a university degree than were students from other parts of the province. 12.6% of the 23 year old women from greater Vancouver and Victoria had received a university degree versus 7.3% from the North Island and Interior. The corresponding figures for men were 14.5% and 8.2%. Coming from the Vancouver or Victoria metropolitan regions raised an eighteen year old's chances of completing university by three-quarters.

It is also noteworthy that the rate of completion of technical and vocational programs was similar in all parts of the province. Women in the big cities had a slightly higher chance
of completing these programs, as did men outside of them. The combined completion rate was almost identical.

The greatest difference between the regions in post-secondary educational attainment was at the university level. There was a corresponding difference—in the opposite direction—of people who did not continue their education past high school. To raise the educational attainment level of the North Island and Interior districts to the level prevailing in greater Vancouver and Victoria, it would be necessary to increase the number of high school graduates continuing their education and to make sure that the net increase was at the university level rather than the trade, apprenticeship, or college level. The Labour Force Development Board was wrong to conclude that

an imbalance has been created in the public post-secondary system as a result of significant increases in degree and university transfer programming that occurred under the Access for All initiative and the advent of university colleges. There was always an expectation that career/technical, vocational and university applied programs would receive a commensurate boost, but this was short-circuited by the funding constraints of the early 90s. Skills Now represents an important first step to redress this imbalance. (36)

Greater university access—not more technical or vocational programming—is required to close the gap in educational attainment between greater Vancouver and Victoria, on the one hand, and the North Island and Interior, on the other.

Closing the educational attainment gap between the large metropolitan areas and the rest of the province would also
eliminate the gap in degrees awarded between B.C. and other provinces. The North Island/Interior districts contain about half of British Columbia's eighteen year olds. If the rate at which they attained university degrees were doubled to equal the rate in greater Vancouver and Victoria, then the overall rate for British Columbia would increase 50%. Such an increase would close the gap that presently exists between B.C. and Ontario in degrees awarded per resident aged 20-29. (See Table 3.)

To put the matter the other way, the reason that B.C. awards the fewest number of university degrees per person aged 20-29 is because of the low levels of educational attainment in the North Island and Interior districts. The long standing policy of saving tax money by keeping the universities small and relying on importing educated personnel has been born by the regions outside Vancouver and Victoria. In the past, the outlying districts may not have needed university programs, but in the economy of the 1990s, such programs are essential for financial success. Children from the North Island and Interior districts will suffer in the long run unless their access to universities is radically expanded.

The provincial government has been responding to the shortfall in university places in two ways. First, colleges outside of the metropolitan areas have been upgraded to four year degree granting institutions, and the University of Northern B.C. has been established. These initiatives are in the right
direction. Second, the government has forced colleges and universities to accept more students without providing the universities with more staff or facilities. This policy is detrimental since it reduces the quality of education. In this paper, university graduates have been analyzed as though the quality of all degrees was the same whatever university awarded them. If B.C. reduces funding per student, it will lower degree quality and put all of the graduates of the province's universities at a competitive disadvantage in labour market of the 1990s.

VI. Conclusion

For decades, British Columbia has operated the smallest university system (relative to population) of any province in Canada. While it may be widely believed that there are too many university graduates, that they cannot find work, or that B.C.'s employers do not "really" want to hire them, the facts indicate otherwise. The British Columbia economy of the 1990s generates a demand for university graduates three times greater than the provincial universities can supply.

Under these circumstances, the provincial government ought to expand the size and number of universities in the province. Such a recommendation can be justified from both a national and a provincial perspective:

- From the national point of view, greater university spending
in B.C. would increase the national supply of university graduates and, thereby, increase economic growth in Canada as a whole. The additional growth, however, would probably take place outside of B.C. since more B.C. graduates would displace interprovincial migrants without increasing the employment of university graduates here. Consequently, the Canada-wide increase in the employment of university graduates and the resulting increase in GDP would take place outside of British Columbia. B.C. could console itself, however, with the thought that it was no longer freelading off the rest of the country.

- From the provincial point of view, greater university spending in B.C. would improve the life chances of children growing up in this province. The children who got the additional degrees would be the ones displacing the migrants from Nova Scotia and Ontario. These B.C. children would be able to remain in the province and earn the high income that a university degree usually provides.

In the past, when resource industries comprised a larger share of provincial employment, this consideration may not have been important since boys (if not girls) without a post-secondary qualification could look forward to a high paying job in the woods or the mines. But those days are over. To run a small university system in the twenty-first century is to condemn the children of B.C. to low-paid, service-sector jobs, while the high
paid jobs go to people from other parts of Canada.

B.C. taxpayer's as a whole might also bear some cost of underfunding universities if labour markets do not work as smoothly as assumed here. If B.C.'s educational system is under supplying university graduates, then it is over supplying high school graduates and high school noncompleters. Balancing labour supply and demand in Canada may require that some of these people leave the province for jobs elsewhere. If they stay in B.C. instead, the result will be rising unemployment and welfare dependency in this province. In that case, the tax savings from operating a small university sector will be lost in higher social assistance costs.
Table 1
Job Openings in B.C., 1990-96
(Thousands per year, on average, by educational level)

<table>
<thead>
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<th></th>
<th>change in employment</th>
<th>retirements</th>
<th>job openings</th>
<th>pop/emp</th>
<th>required number of graduates</th>
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</thead>
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<td>7.0</td>
<td>-2.9</td>
<td>1.47</td>
<td>----</td>
</tr>
<tr>
<td>HS graduate</td>
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<td>4.8</td>
<td>7.1</td>
<td>1.29</td>
<td>9.2</td>
</tr>
<tr>
<td>PS noncompleter</td>
<td>4.7</td>
<td>1.9</td>
<td>6.6</td>
<td>1.30</td>
<td>8.6</td>
</tr>
<tr>
<td>trade/vocational</td>
<td>21.8</td>
<td>6.0</td>
<td>27.8</td>
<td>1.23</td>
<td>34.2</td>
</tr>
<tr>
<td>university</td>
<td>21.9</td>
<td>3.1</td>
<td>25.0</td>
<td>1.16</td>
<td>29.0</td>
</tr>
</tbody>
</table>

Sources:
retirements--Computed by multiplying the labour force population (those 15 and over) by the fraction that would retire each year. The fraction retiring was estimated from tabulations of the micro data sample of the 1991 Census of Canada for B.C. The B.C. population was divided into five year age groups for each educational level. For the groups 55-9 through 70-4, the fraction employed was calculated. (I assumed this fraction was zero for those 75 and over.) By multiplying the fraction of 60-4 year olds working by the number of people 55-9 and subtracting that product from the number of 55-9 year olds actually working, I computed the number of retirements for those 55-9. Likewise for the other age groups. Summing the retirements and divided by the total labour force population gave the required fraction retiring. The total labour force population for each educational level in B.C. was obtained from Statistics Canada, Labour Force Survey, special tabulations.

job openings--change in employment plus retirements

population/employment--computed from the micro data sample for the 1991 Census of Canada for the age group 30-54.

number of required graduates--job openings multiplied by the population/employment ratio.
Table 2

B.C. Demand and B.C. Supply of University Graduates
(Thousands per year, on average)

<table>
<thead>
<tr>
<th></th>
<th>Graduates required for job openings</th>
<th>Graduates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977-81</td>
<td>11.9</td>
<td>6.6</td>
</tr>
<tr>
<td>1982-86</td>
<td>14.1</td>
<td>7.4</td>
</tr>
<tr>
<td>1987-91</td>
<td>8.6</td>
<td>8.8</td>
</tr>
<tr>
<td>1992-96</td>
<td>35.5</td>
<td>11.9</td>
</tr>
</tbody>
</table>

Sources:
graduates required for job openings--computed as in Table 1.
Table 3

University Attainment and Education by Province

<table>
<thead>
<tr>
<th>Province</th>
<th>Percentage of Population 15 and Over with a University Degree (%)</th>
<th>Undergraduate Degrees and Certificates Awarded per 100 People Aged 20-29</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td>14.7%</td>
<td>19.61</td>
</tr>
<tr>
<td>Alberta</td>
<td>13.3</td>
<td>21.87</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>10.1</td>
<td>31.83</td>
</tr>
<tr>
<td>Manitoba</td>
<td>12.6</td>
<td>29.86</td>
</tr>
<tr>
<td>Ontario</td>
<td>15.3</td>
<td>30.68</td>
</tr>
<tr>
<td>Quebec</td>
<td>12.4</td>
<td>27.02</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>10.5</td>
<td>26.31</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>12.3</td>
<td>41.00</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>10.3</td>
<td>22.01</td>
</tr>
<tr>
<td>Newfoundland</td>
<td>7.7</td>
<td>22.52</td>
</tr>
</tbody>
</table>

Source:


Table 4

Trades, Technical, and Vocational
Certificates and Diplomas
Attained and Awarded by Province

<table>
<thead>
<tr>
<th>Province</th>
<th>Percentage of Population 15 and Over With a Trades, Technical, or Vocational Certificate or Diploma</th>
<th>Certificates and Diplomas Awarded per 100 People Aged 20-29</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Columbia</td>
<td>26.7%</td>
<td>92.07</td>
</tr>
<tr>
<td>Alberta</td>
<td>28.3</td>
<td>68.71</td>
</tr>
<tr>
<td>Saskatchewan</td>
<td>23.2</td>
<td>50.00</td>
</tr>
<tr>
<td>Manitoba</td>
<td>23.8</td>
<td>33.10</td>
</tr>
<tr>
<td>Ontario</td>
<td>24.3</td>
<td>34.67</td>
</tr>
<tr>
<td>Quebec</td>
<td>27.6</td>
<td>77.52</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>24.6</td>
<td>70.76</td>
</tr>
<tr>
<td>Nova Scotia</td>
<td>29.7</td>
<td>48.98</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>28.0</td>
<td>136.10</td>
</tr>
<tr>
<td>Newfoundland</td>
<td>27.2</td>
<td>114.95</td>
</tr>
</tbody>
</table>

Source:

certificates, etc. per twenty year old--The number of certificates and diplomas includes completions of trades, technical, and vocational programs, apprenticeships, and college diplomas. These figures are from Statistics Canada, *Education in Canada*, 81-229, 1993, and unpublished tabulations by Statistics Canada. The population aged 20-29 is from Statistics Canada, *Annual Demographic Statistics*, 91-213.
Table 5

Educational Attainment in B.C.
by Residence at Age 18

<table>
<thead>
<tr>
<th></th>
<th>Women</th>
<th></th>
<th></th>
<th>Men</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Victoria</td>
<td>N.Island/</td>
<td>Vancouver/</td>
<td>N.Island/</td>
<td>Victoria</td>
<td>Interior</td>
</tr>
<tr>
<td>High school</td>
<td>31.0</td>
<td>41.9</td>
<td>39.4</td>
<td>44.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS noncom</td>
<td>24.4</td>
<td>23.6</td>
<td>26.6</td>
<td>24.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tech/Voc</td>
<td>32.0</td>
<td>27.2</td>
<td>19.5</td>
<td>22.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Univ degree</td>
<td>12.6</td>
<td>7.3</td>
<td>14.5</td>
<td>8.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
(1) High School includes high school noncompleters and high school graduates.

(2) Tech/Voc includes trade certificates and diplomas, college certificates and diplomas, and university certificates less than a bachelor.

(3) The census micro data set indicates whether an individual lived in the Vancouver CMA, the Victoria CMA, or elsewhere in the province in June, 1991. The variable on residence five years previous indicates whether or not someone lived in the same census division in 1986. I assumed that the residence five years previous was the North Island/Interior for people living in the Vancouver or Victoria CMA's in 1991 who lived in a different census division in 1986. Conversely, for people living outside Vancouver and Victoria and who changed the census division of residence between 1986 and 1991.

Source: computed from micro data file for 1991 Census of Canada.
Appendix I

The Labour Force Survey and the Educational Attainment of the B.C. Population

The Labour Force Survey (LFS) findings on educational attainment are the basis of Figure 1 and the ensuing discussion of changes in the demand for labour by educational attainment. The LFS, however, presents several problems of interpretation. This appendix explains those problems and the solutions adopted in this study.

The situation since 1990

The educational questions of the Labour Force Survey were revised at the beginning of 1990, and the information subsequently collected is reliable in most respect provided it is aggregated in certain ways.

One test of the LFS is to compare its results for June, 1991, to those of the Census of Canada taken in the same month. A similar breakdown of educational attainment was used in both sources. The fractional breakdown of the population is quite close except for two categories. The Census returns more high school noncompleters and correspondingly fewer high school graduates than does the Labour Force Survey. A smaller discrepancy relates to those earning a university certificate less than a bachelor degree. Here the Census reports more people than the LFS. For other categories, however, the two sources are in reasonable agreement.

Another way to test the accuracy of the Labour Force Survey is to compare the changes from one year to the next in the numbers of people in each educational category with the number of graduates or program completers for that category in Canada as a whole. These numbers should be approximately equal, although a perfect resolution of the matter would also incorporate mortality and the effects of immigration and emigration. These comparisons show that the Labour Force Survey categories must be aggregated in two ways to be meaningful.

First, one must aggregate people with a bachelor degree (but no graduate degree) with people holding a university certificate less than a bachelor. The Labour Force Survey reports too many of the former and too few of the latter to be consistent with the numbers of degrees and certificates awarded. Evidently some people with only a university certificate claim to have a university degree when asked the educational attainment questions in the Labour Force Survey.

Second, one must also aggregate those claiming a trade certificate or diploma to those reporting a college certificate or diploma. Many people in the former category report themselves in the latter. With this aggregation, the average annual
increase in people in the combined category equals the annual flow of trade and college certificates and diplomas as reported by Statistics Canada.

The situation before 1990

Between 1976 and 1989, the Labour Force Survey used a different set of educational attainment questions with a breakdown that cannot be easily compared to the post-1989 responses. For 1976-89, the categories were elementary or secondary education including those with a post-secondary certificate not requiring high school completion, post-secondary noncompleter, post-secondary certificate or diploma including a university certificate less than a bachelor degree, and a university degree. Since 1990, the categories were elementary or secondary education without high school graduation, high school graduation, post-secondary noncompletion, trade certificate or diploma irrespective of whether it required high school graduation, college certificate or diploma, university certificate less than a bachelor, undergraduate degree, and graduate degree.

The major noncomparabilities relate to two classes of people--those who did not complete high school but who acquired a trade certificate or diploma and those with a university certificate less than a bachelor. The former were classified as only have a high school education pre-1990, while they were included in the trade certificate or diploma category with the post-1989 questions. The latter were classified in the "post-secondary certificate or diploma category" pre-1990, while, in this study, they have been included with university graduates since 1990.

In this paper, the series were made comparable in four steps. First, the post-1989 categories were aggregated to those discussed in this paper--i.e. people not completing high school, high school graduates, post-secondary noncompleters, trades/technical/vocational program completers, university graduates including those holding only a certificate less than a bachelor. Second, for 1976-89, it was assumed that 20% of those with high school or less education had a trade certificate. These people consequently have been reassigned to the trade certificate category, and the high school category was reduced accordingly. The 20% figure was obtained by comparing the LFS results for December 1989 with those for January 1990. Third, in the pre-1990 questions, people with a university certificate less than a graduate were included in the post-secondary certificate and diploma category. Their number was estimated at 7% of the university graduates, and this number was shifted from the post-secondary certificate and diploma category to the university graduate category. Fourth, all figures were adjusted to be in accord with the most recent, revised figures for the total B.C. labour force by multiplying them by the revised figure for the year in question divided by the figure recorded in Statistics

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These adjustments of the pre-1990 responses are only as accurate as the percentages used to adjust the categories. The biggest problem is that they probably shifted over time with the error increasing as one moves back in time from 1990. As a result, the errors in measuring the number of people with an elementary or secondary education or a trades, technical, or vocational certificate are probably larger for the 1970s than, say, for 1989. The implications of this problem are discussed in the main text.

UPON REQUEST, TWO GRAPHS AVAILABLE FROM THE DEPARTMENT OF ECONOMICS.