BCIT: ASSESSING THE ECONOMIC IMPACTS OF HIGHER EDUCATION OUTCOMES

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Purpose

This paper is a review of recent literature on assessing the economic impact of higher education. It questions the approach used in that literature. It argues the need to re-think traditional approaches to this kind of analysis; it argues the need to shift from a focus on inputs to a focus on outcomes.

The first part of this paper is a review and critique of how studies of the economic impact of Higher Education have been done until now. It identifies their limitations and recommends adding another dimension -- one that estimates the economic impact tied to skill developments that foster wealth creation.

The Traditional Approach

Most studies of the economic impacts of higher education examine the effects of institutional spending on local economies. They estimate the value of spending in the local economy, which typically includes institutional salaries, institutional purchases of goods and services, and student spending. To this is added an estimate of the further spending in the local economy which occurs as a consequence of spending directly associated with the institution. This yields the estimated total economic impact on the local economy. This approach is based on a model initially developed by the American Council on Education.[1]

One limitation of this approach is that its magnitude is affected by the size of multiplier chosen to estimate indirect impacts. Recent studies we reviewed used multipliers ranging from 1.49 (UBC, 1994) to 1.86 (SFU, 1992).[2] Others range from a low of 1.4 to a high of 1.99. Most pick a multiplier; some show the sensitivity of the estimated total economic impact to the multiplier chosen.

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1 See Caffrey, John and Herbert H. Isaacs , *Estimating the Impact of a College or University on the Local Economy*, Washington, DC: American Council on Education, 1971.

2 For a review of the methodology for selecting a multiplier, see Office of Analytical Studies, *The Impact of Simon Fraser University on the Economy of the Greater Vancouver Regional District,* Burnaby, B.C.: Simon Fraser University, 1992

Additional Economic Impacts

Another limitation of this approach is its single dimensional view of economic impacts. As Bluestone notes, "the traditional methodology *under*states the dollar value of higher education by treating the college or university simply as a... 'tourist' industry, and not as an investment instrument....It overstates the impact ...by counting a number of income flows...that, in fact, would exist even if the institution did not. "[3]

Recent studies have begun to redress these shortcomings; they encompass some other dimensions of economic impact. These include:

- the 'export base' impacts. These are the impacts which occur because of higher education and would not have otherwise occurred. They are the impacts of attracting to (or keeping within) B.C., activities that would otherwise go elsewhere. The optimal arrangement? Foreign money spent locally. Next best? Other Canadian money spent locally.

- the impacts of research as a source of economic growth. These impacts can take two forms: local and national.

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3 See Bluestone, H., "States May be Making a Healthy Profit on Their Public Colleges and Universities", in *The Chronicle of Higher Education,* October 6, 1993, p. A52.

- the economic returns to individuals (in lifetime earnings), net of institutional and personal costs.[4]

In a recent analysis, UBC combined these additional perspectives with the traditional regional impacts. In doing so, UBC estimated its overall economic impact at $2.2 billion per annum., or roughly 3% of the Gross Domestic Product of B.C.[5] This was substantially higher than estimated using only the traditional approach; on its own, that one view created an economic impact of only $600 million (large, still, but much smaller when compared to the overall estimated impact).

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4 UBC used the U.Ma ss model to estimate this impact. It assumed that lifetime earnings of graduates will be the same for all graduates, regardless of the field of study in which they earned their credential. We suspect this will not be true; graduates in some fields and some occupations are likely going to be in much higher demand (in terms of the value of their skills in contributing to wealth creation) than others. Differentiation between occupations (or between graduates from specific institutions) in the pace of inflation in graduates' entry level salaries may be further evidence of the relative economic value of graduates with certain skills.

Another limitation: the distinction between graduate skills and credential 'signaling'. Signaling is where it is the credential, not a graduate's skills, that causes income differentiation. Various studies have concluded that skills are more important predictors than credentials in differentiating graduate salaries. See Economic Council of Canada, *op. cit.*; see also Kroch, E.A. and Sjoblom, K., "Schooling as Human Capital or a Signal", in *The Journal of Human Resources,* Vol. XXIX, No. 1, pp 156-176.

5 The economic returns to individuals are estimated using techniques described in the University of Massachusetts economic impact study. The UBC study adds estimates of economic impact from each of these three approaches; there is a risk, in doing so, of counting some of the same parameters in more than one model and, as such, double counting their impacts.

The Missing Impacts

Higher education serves many purposes; one of them is economic. In an economic sense, the objective is wealth creation.

Colleges and universities have traditionally defined their economic impacts from an input -- not outcomes -- perspective. The argument: "the more resources we have, the more economic impact we create." UBC's recent analysis shows the value of adding an outcomes perspective. It does so, however, only for research outcomes -- not for learning outcomes. It does not include any estimates of the economic impacts arising from college and university supplies of talented graduates. As Jaffe notes, it is plausible that talented graduates will "facilitate the process of commercial innovation in their neighborhood, but there has been very little systematic empirical analysis of this phenomenon."[6]

This type of analysis is necessary. Teaching is a core production activity in higher education; its outcomes should have demonstrable, positive, economic impacts. The missing pieces:

- students' acquisition of additional skills.
- students' use of those additional skills in the labour market.
- the wealth-creating impacts of the use of these added skills.

Bluestone's work in assessing graduate earnings is an important first step. It, however, does not distinguish between the economic sectors in which those earnings accrue. We believe it is important to begin to identify the strength of the relationship between teaching outputs and

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[6] See Jaffe (1989).

wealth-creating activities in the labour force. Innovation and productivity matter; the industries in which they occur matter; the skills graduates require to succeed in export-oriented industries matter; their use of those skills matters.

Skills acquired through higher education impact wealth creation by:

- enhancing the quality, range, and value of Canadian goods and services, thereby expanding exports.
- improving the cost-competitiveness of Canadian goods and services by enhancing productivity; or
- improving the effectiveness of public services which, themselves, provide inputs needed to enhance the quality or cost-competitiveness of Canadian goods and services.

We need to measure and add these impacts to current economic impact models. To do so requires, first, some analyses of available data.

Institutions that place most of their graduates in industries that primarily create wealth, are expanding exports, and are innovation driven will have a different kind of economic impact (wealth creation) than those that supply other industries.[7] Taken to extreme, without the former there will be no future resources for the latter.

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7 Another view is that the economic value of graduates' skills can best be viewed by comparing pre- and post-training incomes. Students who have moved from income assistance to low-paying temporary employment may still represent a larger net economic gain than students who have moved from one high income job to another as a consequence of their higher education studies. The distinction, here, of course is between new entrants to the labour market (for whom entry salaries may be most pertinent) and skills upgraders (for whom income gains may be most pertinent). The State of Oregon has pioneered analyses of this latter phenomenon as part of their shared information system initiative.

There is another factor to consider, as well. The investments made to yield the economic returns we notice. There is a risk that, in its mix of investments, higher education may be generating substantial short term economic returns...but at the cost of its long term viability. The total economic effects could, in this circumstance, be negative and we would not notice.

The key, in SIRI's view, is to incorporate economic impact models with the inter-relationships between higher education and the labour force. These will differ by institution (depending on the mix of fields of study taught) and the specific occupations supplied.

To do this requires analyses of available information on:

- the distribution of employment by economic sector;
- the distribution of graduate employment by economic sector;
- the relative earnings of recent graduates by economic sector (relative both to average earnings within each sector, and relative to other recent graduates); and
- the relative technology-intensity of the skills used by graduates in doing their work.

It also requires that these new analyses be combined with analyses of other data that highlight economic aspects of graduates' destinations in the labour market. These include:

- the innovation-intensity, or change-intensity, of the nature of work, by economic sector (measured, here, in our view via capital investments in types of equipment likely to improve sectoral productivity);[8]
- the comparative mix and pace of capital investments in higher education (in relation to the economic sectors served);
- output per employee by sector (relative productivity levels);
- the distribution of GDP by economic sector.[9]

Table 1 provides an initial summary of some of these conditions. It highlights the pace of economic and employment growth, by economic sector; it estimates how this compares to where college graduates went looking for work and their success in finding it.

These data show that:

- overall graduate placement rates are dramatically affected by the relatively high placement rates in Health-care. Exclude Health care from the total and the average graduate placement rate in 1994 was less than 70%.

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8 Over time, changes in graduates' use of various skills may also highlight the relative pace of change in the nature of work...at least in the occupations that they enter.

9 Here, it is important to note the inter-dependencies of Canada's economic sectors. Employment and skill use in one sector is not, by definition, an economically greater impact (in terms of wealth creation) than employment and skill use in some other sector. For a discussion of such inter-dependencies, see Economic Council of Canada, *Employment in the Service Economy*, Ottawa: Supply and Services, 1991, pp 31-53.

Table 1:
Comparing Economic Growth, Employment Growth and Estimated Graduate Placement, by Economic Sector

This table compares economic and employment growth in recent years, by industrial sector, to college graduate outcomes for Career and Vocational programs. Its estimates assume that the distribution of graduates jobs, by industry, are representative of where graduates looked for work (in terms of in what industries). Estimates suggest that graduate placement rates in training-related jobs are roughly 70% in all sectors of the economy except one -- Health care (where an estimated 82% are now in training related jobs). Estimates also suggest that most college graduates are detined for industrial sectors in which employment growth and economic growth have been higher than average. The downside? Only an estimated 11% are destined for the faster growing part of the economy -- business services.

	Canadian Economy Real GDP (output)		**B.C. Employment**		**B.C. College Outcomes, Spring 1994**				
	Average annual rate of growth (1967-89)	Share of total GDP (1989)	Total Employ-ment growth (1984-1992)	Share of total employment (1992)	Estimated number of jobseeking former students	Share of total training-related employed	Estimated placement rate of qualified 1993 graduates	Median full-time training-related monthly salary	Average skill level* for training-related occupations
	%	%	%	%		%	%	$	
Service Sector	**4.7**	**64.2**	**30.4**	**72.3**	**9697**	**78.0**	**72.6**	**2000**	**2.9**
Dynamic services	***5.3***	***36.0***	***32.8***	***26.4***	***2882***	***21.9***	***68.5***	***2000***	***3.0***
Transportation, communications, and utilities	5.2	11.4	15.5	8.3	597	4.5	68.1	2300	2.8
Wholesale trade	5.4	6.2	30.6	5.3	419	3.1	67.2	2000	2.9
Finance, insurance, and real estate	4.8	14.8	33.3	6.8	398	3.2	71.7	2000	2.9
Business services	7.9	3.7	69.1	6.1	1468	11.1	68.2	2000	3.2
Traditional Services †	***3.4***	***11.1***	***33.7***	***23.8***	***2224***	***16.2***	***65.8***	***1600***	***2.9***
Nonmarket Services ††	***3.1***	***16.0***	***24.3***	***22.0***	***4591***	***39.9***	***78.4***	***2100***	***2.9***
Health and social services**	4.1	5.2	33.0	9.7	3066	27.8	82.0	2000	3.0
Education	2.4	4.8	27.8	6.6	500	3.9	70.8	2090	2.9
Public Administration	2.9	6.0	8.6	5.7	931	7.4	71.9	2400	2.9
Goods Sector †††	**2.7**	**35.8**	**-34.0**	**23.5**	**2909**	**22.0**	**68.3**	**2300**	**2.9**
Other			45.5	4.2					
Grand Total	**3.8**	**100.0**	**6.4**	**100.0**	**12607**	**100.0**	**71.6**	**2000**	**2.9**
Total, excluding Health	3.8	94.8	4.0	90.3	9541	72.2	68.3	2000	2.9

* Average skill levels are based on the National Occupational Classification system developed by Human Resources Development C
5=Management Occupations, 4=Skill level A (Professional), 3=Skill level B (Technical, Paraprofessional), 2=Skill level C (Secondary, On the Job Training), 1=Skill level D (Some secondary, short on Job Training)

** 75% is from Health Sector.

† Traditional Services include Personal and Household Services and Accommodation Indust

†† Membership organizations included in sub-total for Nonmarket Services.

††† Goods Sector includes primary industries and manufacturing.

- only an estimated 11% of all college graduates are looking for work in that part of the economy that is growing most quickly -- business services. Those that do look here have average success in finding training related jobs, but those jobs are especially high skill.

- despite a 34% decline in employment in recent years in goods production industries, college graduates continue to get jobs in those industries. When they do, their salaries are relatively high.

Differentiating The Impacts of Selected Outcomes

Are all graduate employment rates created equal? Some programs may place 75% of their graduates into well paying, high- skilled jobs in industries that primarily create wealth. These may yield a higher net positive economic impact than others placing 95% of their graduates into well paying lower-skilled jobs in other industries.[10]

To the extent that this may be true, there is a need to differentiate higher education outcomes by the types of industries supplied (ie where graduates go after completing college, and the skills they use when they get there).[11] From these differentiated outcomes, this type of economic impact may be calculable.

This, of course, assumes that graduate outcomes differ enough to justify the burden of additional analysis; that the economic sectors supplied with college graduates are not uniform across institutions.

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10 Impact, of course, is only part of the equation for 'economic rate of return'. If the costs per graduate are substantially lower for the 75% employment rate, the total 'rate of return' will be even higher.

11 Jaffe introduces this notion of economic impacts being differentiated by industry, in terms of university R&D impacts. His analysis shows that university R&D has more of an impact on corporate patents in Pharmaceuticals (Drugs) than in Mechanical Arts. See Jaffe (1989), pp 967-968.

To test this premise, we re-visited the 1994 results of the B.C. Colleges' Provincial Graduate Survey. It is an annual census co-sponsored by the B.C. Ministry of Skills, Training and Labour and all public colleges and institutes in B.C.[12] We wanted to know if the average graduate placement rates by institution might be affected by the mixes of economic sectors served.

We found that colleges differ significantly in the industries entered by their graduates; BCIT has a much higher than average share of its graduates bound for sectors of the economy that trade internationally and, primarily, create wealth (ie goods production and dynamic services) (see Table 2). These, also, are sectors which, on average, have lower graduate job placement rates (and lower salaries) than in the health care sector.

12 For the latest edition, see SIRI, 1994 B.C. Colleges and Institutes Student Outcomes Report, Victoria: Ministry of Skills, Training and Labour, (publication pending)

Table 2:
Percent of Graduates in Training Related Jobs, by Economic Sector and Institution (Spring 1994)

This table breaks out the details, by institution, of the estimated job placement rates of recent college graduates. These estimates assume that the distribution of industries in which graduates found training related jobs is representative of where they looked for training related jobs. These estimate suggest that institutions that place a relatively small % of their graduates into Health care (such as BCIT) are likely to have lower graduate placement rates than institutions whose graduates largely go to work in Health care.

	BCIT			All BC Colleges and Institutes		
Industry Grouping	Estimated Number of Jobseeking Graduates	Share of Estimated Number of Jobseekers	Estimated Job Placement Rate	Estimated Number of Jobseeking Graduates	Share of Estimated Number of Jobseekers	Estimated Job Placement Rate
		%	%		%	%
Service Sector	**1392**	**60.3**	**74.7**	**9697**	**76.9**	**72.6**
Dynamic services	***766***	**33.2**	***74.2***	***2882***	***22.9***	***68.5***
Transportation, communications, and utilities	208	9.0	69.3	597	4.7	68.1
Wholesale trade	134	5.8	72.7	419	3.3	67.2
Finance, insurance, and real estate	109	4.7	80.0	398	3.2	71.7
Business services	316	13.7	76.0	1468	11.6	68.2
Traditional services†	***289***	***12.5***	***67.6***	***2224***	***17.6***	***65.8***
Nonmarket services††	***336***	***14.5***	***81.9***	***4591***	***36.4***	***78.4***
Health and social services**	239	10.3	83.0	3066	24.3	82.0
Education	24	1.0	77.8	500	4.0	70.8
Public Administration	69	3.0	78.4	931	7.4	71.9
Goods Sector†††	**918**	**39.7**	**71.0**	**2909**	**23.1**	**68.3**
Grand Total*	**2310**	**100.0**	**73.2**	**12607**	**100.0**	**71.6**
Total Excluding Health	**2071**	**89.7**	**72.1**	**9541**	**75.7**	**68.3**

* Due to the process of estimation, totals will not completely reconcile to the sum of the categories.
** 75% is from Health Sector.
† Traditional Services include Personal and Household Services and Accommodation Industries.
†† Membership Organizations included in sub-total for Nonmarket services.
††† Goods Sector includes primary industries and manufacturing.

The key implication of this? Comparisons of institutional placement rates, by themselves, are not a sufficient view of economic impact; they need to be cast in the context of prevailing economic conditions, by sector, and their susceptibility to (or contribution to) economic re-structuring.

For institutions that place most of their employed graduates into trade-oriented sectors of the economy, placement rates and salaries may be lower than the norm. Recent analyses of National Graduate Survey data suggest that for some of these types of colleges (such as BCIT) employment rates and salaries are relatively higher than average; this is surprising in light of the economic sectors served. It is unusual. Its economic impacts are worth discovering and estimating. Those estimates should include some notion of the relative costs of sustaining faculty, curricular, and equipment currency in programs that supply parts of the economy in which the nature of work is changing rapidly.

SIRI's view is that when the industries colleges serve are diverse and growing quickly (but have in common their trade-orientation), it will be especially hard for colleges to keep pace of industrial demands for program renewal. Finding ways to balance this cost pressure against the estimated economic returns may be key to finding policy mechanisms that promote such renewal.

The Policy Contexts

Why should economic impact analyses be of any interest to higher education institutions today? There are now three main policy issues driving government agendas in Canada: creating wealth, managing the income gap, and containing public deficits. At their core, these issues address the value-for-money of public investments in economic development, the quality of Canadian society, and the public infrastructures that maximize both.

Given these overriding public policy agendas, the focus of assessing the economic impact of higher education can no longer be "what is the scale of impact"; it must now shift to "what is the scale of impact for this investment as opposed to others that might have been made." Showing large 'rates of return' is an insufficient condition; governments are faced with zero-sum solutions...they are looking to maximize rates of return from a limited pool of public investments.

This is an agenda that governments and higher education institutions have in common. Institutions, too, are looking to maximize the economic impacts of their investments (doing so, after all, will improve their chances of successfully competing for available resources).

As noted close to twenty-five years ago,

> *"future economic growth and prosperity in a technological age depend in good measure (although sometimes forgotten, not entirely) upon a rapid, and continuous increase in the output of highly educated and trained personnel."* [13]

Institutions have traditionally undertaken economic impact analyses to "look good"; increasingly, they will conduct economic impact analyses to be good. For it is in the act of having substantive economic impacts that their own economic futures become secure. Their investors (students, government, the public) will see and recognize the economic returns intended by their investments.

It is critical that this happen. The risk, alternatively, is that higher education's connections to wealth creation will be seen as remote and treated as such. The result? Canada's capacity to strengthen its economy through skilled human capital will be diminished. The timing, in terms of Canada's shift to a more knowledge intensive economy, would be poor.

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13 Robert Pike, *Who Doesn't Get to University -- and Why?: A study of accessibility to Higher Education in Canada,* Ottawa: Association of Universities and Colleges of Canada, 1970...summarizing the findings of several Economic Council of Canada annual reviews.

Next Steps

SIRI recommends that BCIT take the following next steps:

- build a profile, by Field of Study, which shows the occupations and industries which BCIT graduates are entering. Use this profile to highlight main inter-program differences in the sectors of the economy that graduates enter, the skills they use when they get there, the technology intensity of the work environment they enter, and relative labour force productivity. This will show differences without estimating the economic impacts of those differences.

- locate and test models that estimate the economic impacts of graduate placements in various occupations and industries. Then apply these to the B.C. graduate outcomes data, including BCIT's. This would require developing some collaborations with scholars whose work might logically dovetail with SIRI's for this purpose[14];

- from this build an index of the economic impact of college graduate outcomes (with the intention of incorporating this into BCIT's emerging list of performance indicators for the college accountability framework).

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[14] Two possibilities here. First, there is the Economic Development program of the Canadian Institute for Advanced Research (CIAR). The CIAR has identified some economists involved in that program who may be able and willing to help. Second, Marie Lavoie, formerly of the Science Policy Research Unit at the University of Sussex (and, earlier, the Economic Council of Canada) and Ross Finnie of the School of Public Administration at Carleton (and Statistics Canada) are working on related analyses using National Graduate Survey data for engineering graduates. Their work is scheduled for publication in Spring 1995. They, too, might be able to help.

Annotated Bibliography

Bluestone, Barry. "States May Be Making a Healthy Profit on Their Public Colleges and Universities." *The Chronicle of Higher Education: Point of View*, October 6, 1993, p. A52.

Bluestone develops a new approach to estimating the economic impact of education. "...(C)aptures the increment in earning power of college-educated students, calculates the added income and sales taxes paid as a result of their higher earnings, and compares this with the state's cost of 'subsidizing' those students." Found that for the University of Massachusetts, the government's return on investment is about 1.57 (that is, for $1 spent, it gets back $1.57 in additional income and sales taxes).

Caffrey, John and Herbert H. Isaacs, *Estimating the Impact of a College or University on the Local Economy* , Washington, DC: American Council on Education, 1971.

This appears to be the economic impact model which serves as the bases of practically all of the economic impact studies conducted by institutional researchers in Canada. The one notable exception is UBC's recent economic impact study (which incorporates the University of Massachusetts methodology, amongst others).

Davis, H. Craig, "Income and Employment Multipliers for Seven British Columbia Regions" in *Canadian Journal of Regional Science* , IX:1 (Spring 1986): 103-115.

Methods paper on how to estimate income and employment multipliers. Addresses the seven regions in BC. Produces the multipliers for each region in a table.

Economic Council of Canada, *Employment in the Service Economy* , Ottawa: Supply and Services Canada, 1991.

Provides an overview of Canada's service industries...their size, their interactions with goods production industries, etc. Identifies structural changes in employment that are occurring and effects they are having on certain groups. Highlights the growth in employment in high skilled occupations.

Economic Council of Canada, *Innovation and Jobs in Canada* , Ottawa: Supply and Services, 1987.

Includes a description of the sources of employment change in Canada. Identifies industries and occupations for which structural (technological) change has a positive effect on employment growth (and those for which it has a negative effect). One problem: uses data for the decade of the 1970's.

Jaffe, Adam B., "Effects of Academic Research", *in The American Economic Review, December, 1989.*

The author, a Harvard economist, presents a methodology for estimating the spillover effects of research on commercial innovation. These include effects of locally induced industrial R&D and corporate patents.

Lipsey, R., *Convocation Address to the University of Western Ontario* , June 6, 1994.

Provides an overview of the fundamental changes occurring in the economy and their implications for developing human skills.

Office of Institutional Analysis, *The Economic Impact of the University of Victoria,* Victoria, B.C.: The University of Victoria, 1989.

This study uses a model developed by the American Council on Education (ACE). Total cash flow into regional economy. Categorized by: (1) faculty and staff spending from income; (2) non-university expenditures by full time students; (3) direct local spending by the institution; (4) non-university expenditures of visitors.

Office of Analytical Studies, *The Impact of Simon Fraser University on the Economy of the Greater Vancouver Regional District* , Burnaby, B.C.: Simon Fraser University, 1992.

This study uses a model developed by the American Council on Education (ACE). Impact includes direct and indirect flows. Direct impact categorized by: (1) faculty and staff spending - only those residing in GVRD; (2) student spending - full time students' spending assumed to be in GVRD, part time students' non-university spending excluded. Controlled for married and single, university residence, parent's, private; (3) visitor spending - conferences; (4) university spending on goods and services. Indirect impact equals direct spending times an income multiplier. Provides an appendix showing alternative approaches to calculating the multiplier. Uses multiplier of 1.8571 (note that UBC used 1.99 in their 1983 analysis, and 1.49 in their 1994 analysis; UVIC uses 1.90). Uses a separate employment multiplier of 1.0.

Office of Budget and Planning, *The Economic Impact of the University of British Columbia,* Vancouver: University of B.C., 1994.

Authored by Walter Sudmant, this is the most complete treatment of current economic impact models we could find. It incorporates the University of Massachusetts model ("The returns to investments"). It compares these results with those of three other models (regional

spillover effects of research, traditional regional impact, and export base). The last of these addresses the main criticism of traditional regional impact models; it extracts economic activities that would have occurred with or without the university and examines the economic activities imported to B.C. because of the university.

Office of Institutional Analysis, *Summary of The Economic Impact of the University of Calgary on the City of Calgary in 1987-88* , Calgary: University of Calgary, Sept. 6, 1988.

Uses the ACE model (short term, cash flow model).

Office of Institutional Analysis, *Economic Impact of The University of Calgary Sponsored Research Expenditures on the City of Calgary in 1988-89,* Calgary: University of Calgary, Feb. 1990.

Analysis of the economic impact resulting from research activity. Uses ACE model on only "sponsored research" fund expenditures.

Office of Institutional Analysis, *The Economic Impact of the University of Calgary, 1989-90 (brochure),* Calgary: University of Calgary.

Office of Institutional Analysis, *The Economic Impact of The University of Calgary on the Calgary Economy. Report 275* , Calgary: University of Calgary. 1987.

Office of Institutional Analysis, *The Impact of the University of British Columbia on the Economy of the Greater Vancouver Regional District -- An Economic Impact Analysis* , Vancouver: The University of British Columbia, 1983.

Uses the ACE model. Uses Statistics Canada's Summary of Family Expenditure, by Family Income (cat. 62-550) to get the pattern breakdown of spending for faculty and staff. Employment multiplier and income multiplier both 1.99.

The Roles of the Universities in the Economic Development of British Columbia (SFU, UVIC, and UBC), 1982.

Uses ACE model. Direct and indirect impact. Indirect: used income or employment multiplier of 1.99. This multiplier comes from an inter-industry input-output study conducted in GVRD by Dr. H. Craig Davis of the School of Community and Regional Planning at UBC. See Davis, H.C., , "Income and Employment Multipliers for Seven British Columbia Regions."

Planning Office, *The Economic Impacts of Brandon University* , Brandon, Manitoba: Brandon University. 1990.

Uses the ACE model. Impact measured by direct expenditure flows and indirect flows attributed to the institution. Cash flow categories: (1) the institution's expenditures; (2) faculty and staff expenditures (use Statistics Canada's family expenditures); (3) students' expenditures (residence, rental, parent's home); (4) visitors' expenditures (non-credit courses, conferences, alumni reunions, etc.). Calculate direct flow and indirect flow. Indirect flow equals direct flow multiplied by a multiplier. Use income multiplier of 1.4 to 1.7 (range they found other universities using). Employment multiplier also 1.4 to 1.7. So, estimates a range of impact.

Salley, Charles D. "Calculating the Economic Multiplier for Local University Spending" in Robert H. Fenske (ed), *Research and Planning for Higher Education*, Association for Institutional Research, 1978. pp: 49-54.

Presents a model for institutional researchers to conduct survey of faculty and student spending and to calculate a multiplier. Reviews impact studies from 1964 to 1976 in the United States.

Sheehan, Bernard S., and Barbara Serediak "University Impact on Local Economy" in Robert G. Cope (ed.), *Tomorrow's Imperatives Today*, Association for Institutional Research, 1973.

A methods paper outlining economic impact model. Provides definitions of variables, mathematical equations. Some discussion of other dimensions of impact that are more complex to measure (eg. expansion of local credit bases, unrealized local business volume due to university's facilities, value of capital and property, local government expenditures and revenues).

University Studies Group, *The Economic Impact of the University of Saskatchewan on the City of Saskatoon* (Report USG-019-0875), Saskatoon, Saskatchewan: The University of Saskatchewan. 1975.

It appears that this study uses the ACE model. Short-term cash flow model; conservative. Impact measured by first round inflow of gross income into local economy and second round inflow (actually subsequent rounds). Categories of flow: (1) faculty and staff income; (2) institution (goods and services); (3) students' expenditures (undergraduates at home, residence, other, graduates, summer session); (4) visitor expenditures; (5) associated organizations' payroll, goods and services purchased (laboratories, etc. that are financially independent of U of S but are associated with it and have located in Saskatoon because of U of S). Most other studies do not include this component. Also discusses U of S as employer (number of jobs generated). Equals direct employment and indirect from associated organizations. Number of jobs indirectly created equals ((total jobs in Saskatoon / total gross income) * (gross income generated by

university - employee incomes from University and associated organizations).

Western Centre for Economic Research, *A Report on the Community Impact of the University of Alberta*, Edmonton: The University of Alberta. 1990.

Very sketchy report, very short on data. No apparent model used. Discuss revenues and expenditures of U of A but unable to distinguish what monies stay in local economy and what flow out. Expenditures include number of staff positions; total salaries; maintenance, utilities, scholarships and bursaries (etc.); students (no breakdown); visitors (no data). They do not use *any* multipliers.