

# **University Growth Poles in Canada: An Empirical Assessment<sup>(1)</sup>**

**Stephen P. Meyer and Alfred Hecht**

**Department of Geography**

**Wilfrid Laurier University**

**Waterloo, ON N2L 3C2**

Few would dispute the value of universities in preparing a more educated and socially adaptable population. Many researchers have estimated the net economic gains that society derives from its graduates. While all agree utility is gained, not all authors assess the net gains from universities equally. Some authors have warned that the public costs associated with education, particularly post-secondary, need to be more closely monitored (Psacharopoulos and Woodhall 1985).

It has been demonstrated that society experiences diminishing returns to higher education: both through time and with the level of education. Psacharopoulos (1989) shows that as education expands in a nation, society's gains are reduced and therefore the largest gains are found in developing nations. In a similar vein Vaillancourt (1995) demonstrates that after the completion of high school, the societal economic returns to continuing education diminish. Constantatos and West (1991) argue that in Canada the returns from high school justify the public cost, but that universities are just at the 'borderline' and therefore additional funding to universities should be questioned.

There is, however, another major economic role that universities play beyond increasing society's (or a nation's) welfare through its graduates. Many universities are instrumental in encouraging a higher level of income, employment and general prosperity in the local and regional economies in which they operate (McCready 1985; Cousineau and Vaillancourt 1987; Found 1988; Committee on Banking, Finance and Urban Affairs House of Representatives 1992; Carboni 1992; et al.). The university, typically through interaction with high-technology industry, has been viewed as replacing the traditional manufacturing plant as the new growth pole (Luger and Goldstein 1991).

Since a university's influence on the community is more than just academic, funding cuts to higher education often create considerable concern not only from those involved with the university, but from the community. For instance, the Kitchener-Waterloo *Record* (1996) released information from a study conducted by Kubursi who estimates that businesses in Kitchener-Waterloo and Guelph stand to lose as much as \$200 million through the 20 percent provincial funding cut to the universities. Due to the strong economic attachments the three universities (the University of Waterloo, Wilfrid Laurier University and the University of

Guelph) have in the region, local business could suffer a substantial trickle-down effect of lost jobs and expenditures. Provincially, the same study estimated that the overall loss could total \$1 billion.

Since universities in Canada are financed in part by provincial governments, it may be misleading to interpret this as an absolute loss to the people of Ontario. If the savings from reduced university funding were redirected into other avenues (such as in improving the infrastructure or tax relief), then conceivably the overall province-wide impact may be considerably less than \$1 billion. Therefore, while funding cuts will certainly redistributed some income away from those connected with the local universities, the actual net loss (or gain) to the province remains unclear.

In an attempt to better understand how essential the university growth pole may be in many areas of Canada, this study aims to empirically assess the local/regional non-academic economic benefits accruing from these institutions. However, where most university impact-type studies have looked at individual cases, this study considers all of Canada's universities simultaneously. Specifically, this aggregate analysis will attempt to address the following questions:

- Are universities in Canada acting as growth poles and thereby inciting a higher level of well-being in their communities?
- If so, how far does this 'prosperity' extend over space?
- Is the university growth pole argument robust, at least temporarily?
- Is the economic influence of universities consistent for all regions of Canada?

While the overall intent of this study is to examine the properties of the university growth pole, our aim is not to justify its existence. In other words, we do not explore the issue of whether non-academic economic benefits from universities vindicate the amount of public funding that these institutions receive; nor do we attempt to determine whether this funding (or some portion of it) would be better utilized in other government policies and/or projects.

Prior to describing the results of our empirical research, the foundations of growth pole theory and its application to the university is offered.

### **Growth Poles and Growth Centres**

The growth pole concept owes its origin primarily to three scholars; Francois Pérroux (1955), Gunnar Myrdal (1957) and Albert Hirschman (1958). Pérroux was the main formulator but both Myrdal and Hirschman contributed greatly by exploring the spatial processes involved. Pérroux used the actual term growth pole to define a growing economic institution (usually an industry or perhaps more broadly defined as an industrial sector) that had the ability to influence growth in other entities.

"Pérroux's basic idea is that once a 'key-industry' has been installed within a region, the whole economy will improve through forward and backward linkages with this 'key-industry'. A 'key-industry' is characterized by very high growth rate, a high degree of intra- and inter-industrial dependency, as well as having a dominant position in the market" (Pletsch 1982: 160).

Theoretically then, once a growth pole emerges, other economic sectors and specific establishments that are in contact with this pole will prosper as well.

Growth centres are actual developing places. Hoover (1971: 277) defines growth centres as:

"places where there exists or can easily be created the necessary condition for expanding employment opportunity and especially the public infrastructure and the external economies that most activities require. Such growth centres are then expected to attract commuters and migrants from surrounding areas of labour surplus and at the same time stimulate secondary growth of employment in some of these areas".

The ideal growth centre, whether emerging naturally or as a result of government policy, will foster economic development in the less prosperous surrounding area. Often, in terms of government policy, the incitement of peripheral development occurs through linkages with the growth pole located in a growth centre.

The potential for significant peripheral development (beyond the growing centre) depends on what Myrdal refers to as backwash and spread effects. In Hirschman's terminology, these opposing forces are called polarization and trickle-down flows. In effect, if the spread effects outweigh the backwash effects, areas surrounding the growth centre can prosper. Hirschman suggests that these spread (trickle-down) effects can take the form of purchases and/or investments made by the growth pole in surrounding peripheral areas. Ideally, the peripheries will develop enough contacts with the growing region and eventually reach a state in which growth is self-sustaining.

It should be realized that both spread and backwash effects tend to operate simultaneously and are not mutually exclusive. It is the relative strength of one effect over the other that will determine the success of the growth centre strategy.

The majority of growth pole/centre studies, both theoretical and applied, have assumed that an industry or major firm with invention or innovation traits would be the growth agent (as

Schumpeter (1955) had previously assumed in his classic research. For a more modern view of this issue see Tödtling (1995)). However, given the ever increasing importance of higher education to all aspects of modern society, the university's research-oriented nature, and the increasing prominence of high-technology industry-university liaisons; it seems entirely reasonable to believe that the modern university is in fact a growth pole that incites regional/community growth and prosperity.

### **Universities, Industrial Linkages and Regional/Community Impact**

The role of the university has matured over time to such an extent that many perceive it not only as an institution of training for students, but also as an advisory body to serve the business world and the local community. Such thinking has led to an increased awareness of the various forms of university-industry collaborative ventures. Many, including Downer (1986), stress that although a university's prime obligation should be to the students, the university's intellectual and physical resources must also be made available to industry and government.

Downer classifies university-industry collaborations into three general categories: consultantships, affiliate programs and research parks. Consultantships usually refer to a situation where university faculty serve as paid industrial advisors. The industry receives an impartial assessment and/or information on innovative developments. The university professor, working as a paid consultant, benefits by becoming more professionally competent through participation in practical affairs. Affiliate programs bring the two sides even closer together in that businesses are granted an affiliate membership upon payment of a fee to the university. Both parties benefit from an exchange of technological knowledge and the students gain knowledge of practical issues (and sometimes secure employment after graduation). Arguably the most publicized and large-scale form of university-industry liaison is the research/science park. This is an area set aside for industry to locate research facilities on land typically leased by the university. In effect, the corporate employees become part of the university community and have access to libraries, seminars, courses and an innovative atmosphere.

The regional development overtones of the research park are quite evident. In 1959 the Research Triangle Park in North Carolina was set up strategically between the three campuses at Raleigh, Durham and Chapel Hill and provides a good application of the university growth pole notion. Not only has the region benefitted through the attraction of high-technology industry settling within the park, but the spin-off activity generated beyond was perhaps even more significant (Moriarty 1987). The park acts as a regional incubator by providing a forum

for high-technology enterprises to pursue research and development endeavours and to benefit from research-oriented agglomeration economies. Yet, as new products were developed, much of the production was carried out in satellite production plants outside of the park but still within the region.

By 1988, the increased economic prosperity of the region became evident with much of the success credited to the Research Triangle Park. Luger and Goldstein (1991: 97) estimate that over 20 000 jobs of direct employment in the park has resulted from this university-industry-government collaboration and that at least another 30 000 jobs have been created regionally through spin-off activities. Luger and Goldstein identify another 116 cases in the United States where a university plays a key role in the development and/or operations of the local research park.

In Canada, virtually all of the major universities participate in some capacity with local industry, whether through research park-like activities or ad hoc faculty industrial advising. Bathelt and Hecht (1990) consider the factors that were important to high-tech firms locating in what is promoted as Canada's Technology Triangle (Kitchener-Waterloo, Cambridge and Guelph). Based on a survey of 33 high tech firms, they reveal that two out of the top three industrial location criteria were related to the operations of the three local universities and one local college: availability of skilled labour (in place and potentially from new graduates) and accessibility to working liaisons with the universities (particularly with the University of Waterloo).

While most authors have emphasized the employment, business, and revenue generating attributes that can accrue from these university-industry relationships, others have warned that such acclaims are over-stated and in some cases such relationships (particularly science parks because of their dependency on government involvement) have absorbed more from the economy through public funding than they have generated through additional economic activity. Massey et al. (1992) not only take issue with the ability of research parks to incite development in depressed regions but question the entire mind-set of the 'high-tech panacea' in re-establishing aging industrial regions. They claim that the success of university collaboration in Silicon Valley and Route 128 in Boston have led many to: "weave general principles from what were actually more like special cases" (Massey et al. 1992: 6).

Amongst other issues, Massey et al. explore the validity of research parks as instruments of government policy in combatting regional disparities in the United Kingdom. They found that despite the hype surrounding the phenomenon, most research parks actually encourage the widening of gaps in well-being over space. The authors ascertain that most of the parks had

very limited linkages to the local community and as result tended to benefit the highly educated, predominantly male professionals working within their 'island' of high technology.

In a wider sense, this UK application illustrates that regional disparities are, in part, a symptom of social differences and that any technological change will be most beneficial to the classes that can best utilize it. In effect, then, government funding that subsidizes research parks that produce few local linkages is only perpetuating the growing disparity between the rich and poor. One might, however, question the comparability of such parks in the North American and UK industrial and social milieus. It is quite possible that the impacts of science parks vary with the setting. As well, local linkage potential is but one of many issues inherent to research parks and that it is probably erroneous to evaluate their effectiveness solely on this criterion.

Given the number of 'how-to' business publications that offer advice on university and industry collaboration (Carboni 1992; Geisler and Rubenstein 1989; et al.), the science/research park debate is sure to continue. However, it is conceivable that the role of the university has been understated and perhaps too much credit has been levied towards high-tech industry in fostering local prosperity. Luger and Goldstein (1991: 161) agree with the idea that it could well be the university (rather than the research park) that is the real growth pole. They identify five potential growth impacts accruing from university operations:

- University expenditures on payroll, purchases, and taxes or in-lieu-of-tax payments, which stimulate regional demand for goods and services and consequently, for labour and capital via a multiplier process;
- The provision of knowledge and training to students (human capital investment) and expertise to local businesses;
- Technology transfer activities, such as manufacturing modernization, which should increase the productivity, and hence the competitiveness, of the existing business in the region;
- Direct investments in, and technical assistance to, small business start-ups and faculty entrepreneurship, which should increase the rate of enterprise formation and decrease small business mortality in the region; and

- Attraction of businesses to the region that seek access to trained labour, expertise and facilities, and a favourable intellectual-cultural milieu.

Therefore the university has the ability not only to develop liaisons with (and thereby attract) high-tech firms, but also to encourage direct expenditure and employment and to provide the mechanism by which firms may better utilize technology.

## **The Effect of Canadian Universities on Their Local Geographic Space**

### **A Canadian University Application: The Study Defined**

Every university has both quantifiable and non-quantifiable economic effects on its immediate region. One way to understand the growth pole tendencies of Canada's universities would be to separately consider each university community and draw general conclusions from each individual case. The local impact of York University on the city of North York (Found 1988) and of Wilfrid Laurier University and the University of Waterloo on the Waterloo region (McCready 1985) are two examples of specific university growth pole type studies. In our view if Canada-wide generalizations are to be made, a far more effective research route is to analyze the effects in aggregate terms.

In an effort to determine if universities are effective growth poles, four important questions are addressed. First, do areas with universities exhibit a higher level of economic well-being relative to those without universities? Second, if so, how far does this influence extend over space? Third, is the economic impact of universities consistent through time? Fourth, does the economic influence of universities differ regionally in Canada? Fundamental to this analysis is understanding how 'well-being' and 'university areas' are defined.

There are, of course, many ways of measuring the economic well-being of people within their respective regions. To establish a theoretical basis for this study, the university-related impacts outlined by Luger and Goldstein (1991) (as shown above), were adopted. Therefore, it may be hypothesized that universities should be particularly instrumental in increasing local expenditure, employment, and firm development (particularly in the area of high-technology activity). (Incidentally, Found's (1988) impact study of York University came to strikingly similar conclusions regarding the nature of the university's local effect).

With the use of the Canadian census (for the years 1981, 1986 and 1991), these expected university-fostered aspects of local well-being were incorporated into an aggregate analysis and were measured in the following fashion.

- Local expenditure was proxied with median income. Not only is it expected that areas with higher income levels should also exhibit greater local expenditures, but average/median income is arguably the best single indicator of an area's overall level of economic well-being.
- Employment was measured as the employment rate (number employed over the age of 15 as a percentage of the total population).
- High-tech activity is probably the most difficult factor to measure accurately in aggregated terms. However, those classified in quaternary-related occupations (managerial, professional, teaching, medicine, health, natural sciences, social sciences, religious, artistic and other related occupations) should provide a reasonable surrogate for high-tech employment intensity (if not for overall high-tech industry concentration). This quaternary employment composite measure was taken as a percentage of the overall labour force.
- The creation of new business is another aspect that is not easily measured with census data. Yet, it can be expected that locales exhibiting higher levels of population growth must also be experiencing increases in business output (whether through new firm start-ups or existing firm expansion). As such population change (over a 5 year time span) was included in the analysis.
- Overall community growth and prosperity (while also indicated by population change) was also estimated by average house value.
- Within this post-industrial information-driven era, it has been argued that the manufacturing sector is not the dominant economic 'motor' that it once was. Nevertheless, manufacturing activity continues to sustain many jobs and important linkages to other sectors and, subsequently,

influences the economic well-being of regions. We are arguing, however, that universities (and their inherent attachment with high-technology industry) may well be the 'new' growth pole, and have replaced manufacturing, in many areas of Canada. As a result, it may be expected that a relative absence of manufacturing activity will be apparent in university areas. As such, the percentages employed in manufacturing was included within the analysis.

If universities are acting as growth poles in Canada, it may be hypothesized that median income, average house value, the employment rate, the quaternary labour rate, and population change should exhibit comparatively favourable levels in university locales. It may also be hypothesized that the manufacturing labour rate should be lower in communities with universities.

In attempting to understand the spatial influence of universities in Canada, the spatial scale of census division (CD) was used. In comparing the 290 census divisions (as of 1991), Canada was divided into three distinct geographic sub-areas (see Figure 1). The first group consists of 42 CDs that have at least one university (as listed in *The Directory of Canadian Universities*, Association of Universities and Colleges of Canada 1991) within its borders. The second group is made up of the 114 adjacent CDs that border the university census divisions. The third group (134 CDs) is made up of cases that either:

- are not 'university' or 'adjacent to university' CDs, or
- are technically 'adjacent to a university' CDs but were assumed to be too distant from a university for potential influence (only 8 CDs fell into this designation). The four large, northern most CDs in Central Canada (two in Ontario and two in Quebec) are good examples of such.

One inherent problem of this analysis has to do with the imperfect ability to isolate the precise effect of universities. As many universities are located in large urban areas, it is unclear how much prosperity can be attributed to the presence of a university or on the more general effects of economies of urbanization. However, this bias is considerably reduced by measuring the variables (when applicable) as rates of the population or labour force. Moreover, by considering all of Canada's universities in aggregate, we believe that the problem associated with 'urban bias' is further reduced as almost half (18 of 42) of the university CDs are located in non-census metropolitan area locales. This reasonable split in large centre/medium centre cases for university CDs, is also shared by the adjacent CDs (refer to Figure 1). Only the 'remaining' category would feature a high proportion of CDs that are rural-biased.

**FIGURE 1 Spatial Distribution of 'University' and 'Adjacent' Census Divisions (CDs) in Canada (1991)**

**Evidence of University Growth Poles in Canada**

As shown on [Table 1](#), the 42 university CDs displayed higher averages for the tested variables, for the vast majority of cases, in comparison to the two other spatial categories. Median income, average house value, and quaternary labour rate were all highest in university census divisions for 1991, 1986 and 1981. The employment rate and population change variables also provided some support for the university growth pole argument as university CDs had highest averages in two out of three of the sampled years. For the manufacturing labour rate the university category average was consistently below the two other spatial categories, as expected.

It is also important to note that virtually all of these differences across the three spatial categories were statistically substantiated via Kruskal-Wallis one-way analysis of variance. Specifically, there was a significant difference amongst the university, adjacent and remaining categories for the variables: median income, average house value, the employment rate, and the quaternary rate. These variables even surpassed a 99 percent level of confidence and did so in all three of the sampled years. Except for the 1981 period, the same can be said for the population change variable. From a significance standpoint, the manufacturing rate was the weakest of the six variables, but there was still a confirmed difference at a 90 percent confidence level for 1991 and 1986.

[Table 2](#) shows a more 'spatially specific' Kruskal-Wallis test that independently compares the university CDs with adjacent CDs and the adjacent CDs with remaining CDs. It was determined that for median income, average house value, the employment rate and the quaternary rate, the adjacent and remaining categories were not significantly different. As there was a significant difference between the university and adjacent CDs, this indicates that most of the variance in these variables occurs from the university census divisions' category. Strikingly, this was the case for 1981, 1986 and 1991. This result of significant difference between the university and adjacent CDs, but not between the adjacent and remaining CDs, occurred only in 1991 for the population change and manufacturing rate variables.

These results suggest that universities in Canada, collectively, are acting as growth poles and are economically enhancing their surrounding area. Yet, as the adjacent CDs were statistically dissimilar from the university CDs (in most cases), any influence of the typical university does not extend beyond the immediate census division boundary. In other words, the

spread/trickle-down effects are quite localized. It is also clear that manufacturing activity is not much influenced by universities, particularly in comparison to the, arguably more compatible, quaternary sector.

In addition, there is evidence to suggest that the economic impact of universities as institutions capable of attracting income and employment may even be strengthening through time. The results in [Table 3](#) show that, when the averages for university CDs are compared against all CDs in Canada, the distinctiveness of university areas is actually increasing.

### **Regional Trends of University-Space Influence**

It is interesting to note that these findings remain quite consistent when the analysis is applied regionally in Canada. As shown on [Table 4](#) (Eastern Canada), [Table 5](#) (Quebec), [Table 6](#) (Ontario) and [Table 7](#) (Western Canada), all the measures that were expected to be higher in university census divisions (in comparison to the national results) were so in all regions. As well, most of the regions showed a comparative deficiency of manufacturing labour in university areas.

However, with regard to statistically substantiated difference across the three spatial categories, some regional variation occurred. All variables were significant (with 90 percent confidence or better) in Atlantic Canada. Ontario also demonstrated convincing results for the growth pole argument as median income, average house value, the employment rate, and the quaternary rate all had averages significantly higher in university locales. Whereas in Quebec and Western Canada, fewer economic well-being variables achieved statistical significance. Four variables in Quebec were significant (including the manufacturing rate which was lowest in university areas). In Western Canada, only average house value, the employment rate, and the quaternary labour rate attained significance.

The variables that were most prominent, in terms of at least 90 percent confidence within the regions were: average house value, the employment rate, and the quaternary labour rate (all three variables were significant in all four regions). The manufacturing labour rate was significant in three of four regions. As with the national picture, the average values tended to be lowest in university census divisions. While median income was significant in two of four regions, the population change variable demonstrated a lack of importance in all regions except Eastern Canada.

Despite this less than perfect congruence in statistical significance amongst Eastern Canada, Quebec, Ontario and Western Canada, there remains evidence that the university growth pole argument is quite spatially robust. Of the six variables tested, only Western Canada had less

than four significant outcomes and Eastern Canada and Ontario had five indicators achieving the 95 percent confidence level.

The importance of universities in Canada, then, is not just limited to, for instance, the most populated regions in Ontario. Evidence from this research indicates that universities also exert an influence within less metropolitan settings (such as in areas of the Maritimes). This may indicate that university presence is particularly instrumental in encouraging economic prosperity in the Maritimes. In addition, this regional analysis demonstrates the particular importance of certain variables (average house value, the employment rate and the quaternary labour rate) and that the important link between universities and local employment maintenance is universal across Canada.

### **University-Space Influence: The Search for Causality**

Some strong evidence for the university growth pole has been presented through the Kruskal-Wallis application. Yet, such evidence in no way implies causality. In this section, the analysis will be extended to question more explicitly if university presence causes an increase in economic well-being.

A series of regression equations (shown on [Tables 8a and 8b](#)) were estimated. Intuitively, if universities are exerting an economic influence on their regions then their presence or absence should impact upon the economic well-being variables. As such, the independent variable of interest, in this analysis, was the university 'dummy' variable -- comprised of the 42 university census divisions (coded as 1) and the remaining non-university CDs (the adjacent and remaining categories coded as 0).

As a continuous independent variable was needed in each of the regression equations, median income (Table 8a) and population change (Table 8b) (two good indicators of overall community well-being) were utilized. Without a continuous variable on the right-hand side of the equation (and testing, say, only the university binary independent variable with each dependent variable), all that is achieved is a difference of means test which was previously accomplished with the Kruskal-Wallis application.

In all, university presence was a significant predictor (with at least 90 per cent confidence) in eighteen of the thirty regression runs (see [Tables 8a and 8b](#)).

And, with the exception of only two cases, the direction of effect in each of the regression models occurred as expected. Interestingly, nine out of ten of the regression equations for 1991 featured the university variable as significant; whereas university presence was causally linked to far fewer dependent variables for the 1986 (three) and 1981 (six) time periods. This

may add further support for the aforementioned notion that the economic influence of universities may be strengthening over time.

As with the Kruskal-Wallis analysis, the regional pattern of university impact is quite consistent across Canada with perhaps a slightly reduced influence in Western Canada (see [Tables 9a and 9b](#)). The university variable was significantly related to a well-being dependent variable seven out of ten times in Eastern Canada, Ontario and Quebec. In Western Canada exactly half (five out of ten) of the dependent variables could be significantly predicted by university presence.

Overall, the series of regression models yielded results similar to the Kruskal-Wallis analysis. The utility in using the regression format was to upgrade the implied causal influence of universities (as shown through the Kruskal-Wallis test of significant difference) into more confirmatory terms. However, the specification is too ad hoc to draw strong conclusions and the addition of this explicit causal link between university presence and regional-economic well-being is only convincing for the latest time period (1991).

## **Conclusions**

The notion of the university growth pole is intuitively appealing and has been tested repeatedly with individual case studies in various settings. By considering all of Canada's university locales simultaneously, this study attempted to append the literature by providing an aggregated view to the 'university-regional influence' question.

After consulting the literature, it was determined that universities can economically enhance the local area in specific ways and an effort was made to collect Canadian census information that echoed these ideas. Specifically, for the years 1981, 1986 and 1991 university census divisions were compared to other regions (adjacent and remaining census divisions) with respect to median income, average house value, the employment rate, the quaternary labour rate, population change and the manufacturing labour rate. Some important results were obtained:

- In general, the measures of economic well-being were higher in university CDs for all three sampled years. The notable exception was the manufacturing labour rate which was, as anticipated, consistently higher in non-university areas. Statistically significant differences across the three spatial categories were achieved for 16 of 18 variables (six variables tested for three years). Median

income, average house value, the employment rate and the quaternary rate were particularly important. Not only were these variables always highest in university areas, but all differences were significant at the 99 percent confidence level.

- In addition, as most of the variables showed no significant difference between the adjacent and remaining CD categories, it was concluded that university CDs are a spatially distinct subset in Canada. These results suggest that universities are acting as growth poles, but that their spread/trickle-down effects are quite local (extending no further than the boundaries of the immediate census division).
- Two specific observations from the analysis suggest that university influence may be strengthening over time. First, the difference in economic well-being between university CDs and all of Canada's CDs has widened over the three sampled years (for median income, average house value, the employment rate and the quaternary rate). Second, results from the regression analysis, where university presence was causally linked with regional well-being, were most encouraging for 1991 (and less so for 1986 and 1981).
- The higher level of economic well-being exhibited by Canadian university CDs is not just a result of Central Canada bias (where over half of the university CDs are located). Support for the university growth pole argument was confirmed when the analysis was specifically applied to four of Canada's regions: Eastern Canada, Quebec, Ontario and, to a lesser degree, Western Canada.

The results of this study demonstrate the influence that universities were having within their regions. It follows, then, that if a 'university growth pole' is weakened (through decreases in government funding, for instance), the impact on the spatially immediate community could be highly detrimental. However, it remains unclear how much of this increased well-being in university areas can be attributed to: actual income creation, income redistribution (as

universities are partially financed by tax-payers and funding universities means that less money is available for other programs perhaps in different areas), or a combination of both.

Future research could advance the literature by more specifically addressing the extent to which universities create and/or redirect income into the areas in which they are located. If, in fact, this matter is resolvable, then the debate over government funding to Canadian universities could be more precisely confronted and other issues, such as the appropriateness of using universities as instruments in regional development policy, could be examined.

## References

Association of Universities and Colleges of Canada (AUCC). 1991. *The Directory of Canadian Universities*. Ottawa: AUCC Publications.

Bathelt, H. and A. Hecht. 1990. "Key Technology Industries in the Waterloo Region: Canada's Technology Triangle (CTT)". *The Canadian Geographer*, 34: 225-34.

Carboni, R.A. 1992. *Planning and Managing Industry-University Research Collaborations*. Westport. CT: Quorum.

Committee on Banking, Finance and Urban Affairs House of Representatives. 1992. *The Role of Urban Universities in Economic and Community Development*. Hearing before: Subcommittee on Policy Research and Insurance. Washington: US Government Printing Office.

Constantatos, C. and E.G. West. 1991. "Measuring Returns from Education: Some Neglected Factors". *Canadian Public Policy*, 17: 127-38.

Cousineau, J.M. and F. Vaillancourt. 1987. "Investment in University Education, Regional Economic Disparities and Regional Development", in W.J. Coffey and M. Polèse (eds.), *Still Living Together: Recent Trends and Future Directions in Canadian Regional Development*. Montreal: The Institute for Research and Public Policy.

Downer, R. 1986. "The Role of Universities in the Development and Transfer of New Technology", in H. Noori (ed.), *Technology Canada: Managing New Technology*. Waterloo: Wilfrid Laurier University.

Found, W.C. 1988. *The Impact of York University on the City of North York 1987-88*. North York: York University.

Geisler, E. and A.H. Rubenstein. 1989. "University-Industry Relations: A Review of Major Issues", in A.N. Link and G. Tassej (eds.), *Cooperative Research and Development: The Industry, University and Government Relationship*. Boston: Kluwer Academic.

Hirschman, A. 1958. *The Strategy of Economic Development*. New Haven, CT: Yale University Press.

Hoover, E. 1971. *An Introduction to Regional Economics*. New York: Alfred A. Kraft.

Luger, M.I. and H.A. Goldstein. 1991. *Technology in the Garden: Research Parks and Regional Economic Development*. Chapel Hill: The University of North Carolina Press.

Massey, D., P. Quintas and D. Wield. 1992. *High-Tech Fantasies: Science Parks in Society and Space*. London: Routledge.

McCready, D.J. 1985. "Economic Impact of Wilfrid Laurier University and University of Waterloo on the Kitchener-Waterloo Region". *Occasional Papers in Business and Economics*. Waterloo: Wilfrid Laurier University.

Moriarty, B.M. 1987. "Research Triangle (1956-1985)". Unpublished Article. Chapel Hill: University of North Carolina.

Myrdal, G. 1957. *Economic Theory and Under-Developed Regions*. New York: Methuen.

Pérroux, F. 1955. "La Notion de Pole de Croissance". *Économie Appliquée*, 1-2: 307-40.

Pletsch, A. 1982. "Core-Periphery Structures and Regional Development Programs in Southern Europe", in A. Hecht (ed.), *Regional Development in the Peripheries of Canada and Europe*. Winnipeg, MB: University of Manitoba.

Psacharopoulos, G. 1989. "Time Trends of the Returns to Education: Cross-National Evidence". *Economics of Education Review* 8: 225-231.

Psacharopoulos, G. and M. Woodhall. 1985. *Education for Development: An Analysis of Investment Choice*. Toronto: Oxford University Press.

*Record* (Kitchener-Waterloo). 1996. "\$200-Million Warning: University Funding Cuts Would Damage Economy of the Entire Area, Officials Say", Saturday, October 21: A1-A2.

Schumpeter, J.A. 1955. *The Theory of Economic Development*. Boston: Harvard University Press.

Statistics Canada. 1992-1993. *1991 Census of Canada*. Ottawa: Minister of Supply and Services.

\_\_\_\_\_. 1987-1988. *1986 Census of Canada*. Ottawa: Minister of Supply and Services.

\_\_\_\_\_. 1983-1984. *1981 Census of Canada*. Ottawa: Minister of Supply and Services.

Tödtling, F. 1995. "The Innovation Process and Local Environment", in S. Conti, E.J. Malecki and P. Oinas (eds.). *The Industrial Enterprise and its Environment: Spatial Perspectives*. Brookfield: Avebury.

Vaillancourt, F. 1995. "The Private and Total Returns to Education in Canada, 1985". *Canadian Journal of Economics* 28: 532-54.

Contact the journal at: [dwserve@nb.sympatico.ca](mailto:dwserve@nb.sympatico.ca)