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**MAKING CANADA THE DESTINATION  
OF CHOICE FOR INTERNATIONALLY  
MOBILE RESOURCES**

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*By Keith Head and John Ries  
University of British Columbia*

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Comments should be addressed to:

Someshwar Rao  
Director  
Strategic Investment Analysis  
Micro-Economic Policy Analysis  
Industry Canada  
5th Floor, West Tower  
235 Queen Street  
Ottawa, ON, Canada  
K1A 0H5

Tel.: (613) 941-8187

Fax: (613) 991-1261

E-mail: [rao.someshwar@ic.gc.ca](mailto:rao.someshwar@ic.gc.ca)

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## EXECUTIVE SUMMARY

This paper examines competition for three types of internationally mobile resources (IMRs)—financial, intellectual, and human capital. We operationalize these concepts as foreign direct investment (FDI), research and development (R&D) activity, and university-educated workers. The analysis identifies the potential benefits to Canada of attracting these resources and reviews the empirical evidence on these benefits. We also provide theoretical and empirical evidence on the determinants of the location choice of mobile resources. Our initial views on each resource are as follows:

- ***Foreign Direct Investment***

Canada has historically attracted a disproportionate share of this resource but its position is steadily slipping. Foreign-controlled affiliates are more productive than domestically controlled ones and pay higher wages. Evidence on spillovers to the host economy exists but is somewhat weak. How Canada fares in the competition for FDI depends on how multinational enterprises (MNEs) respond to continued reductions in trade and communication costs and evolving patterns of comparative advantage. MNEs cluster in particular locations because of common factors (proximity to demand, low-cost inputs, etc.) and perhaps also to access agglomeration economies flowing across firms.

- ***Research and Development***

Canada conducts somewhat less non-governmental R&D than can be expected from its economic size and the R&D intensity of foreign affiliates is less than that of Canadian firms. The case for attracting R&D depends on spillovers that are local in nature. There are strong reasons to believe that R&D confers spillovers and the evidence indicates that these spillovers flow across large distances. The location choice of R&D appears to be poorly understood.

- ***University-educated Workers***

Canada has more individuals with some college education than might be expected based on its economic size but its share of university graduates falls short of our benchmark. Skilled workers seem to internalize much of the benefits of their human capital. The brain drain to the United States does not strike us as alarming at current levels. Indeed, it may not even represent a real cost to Canada if one accounts for the presumed benefits received by the emigrants themselves. Since workers are drawn to good job opportunities, policies promoting economic growth are the key to keeping these workers in Canada.

The location decisions of FDI, R&D, and university-educated workers are jointly determined: success at attracting one resource draws more of each. These dynamics are self-reinforcing and can lead to industry clusters and a national competitive advantage in particular sectors. While the presence of these dynamics motivates policies to foster such clusters, the success of these policies remains highly uncertain. Government policies aimed at promoting clusters may be offset by the actions of rival governments and some locations may lack an intrinsic attractiveness to support a cluster. Low-cost campaigns to inform foreigners about Canada's attractive features probably make sense. What should be avoided are bidding wars in which Canada pays more to the investors it wins than their spillover benefits can justify.

Policy maker viewpoints have shifted substantially from the hostility and fear once directed towards foreign investors and immigrants. This is a good thing. We urge some caution at this point, so as to avoid overshooting in the other direction. Most of the benefits of locating in Canada appear to accrue to the IMRs themselves. Furthermore, most policies that make sense on their own merits will have the side-effect of attracting more IMRs. More research is required before reaching final conclusions on the extent to which Canada should target scarce public resources specifically towards attracting internationally mobile resources.

## 1. INTRODUCTION

Canada's Finance Minister John Manley recently declared, "I want to see us pursue policies that make of Canada a 'Northern Tiger'—a country that is a magnet for investment, for skilled knowledge workers, and for cutting-edge research, science, and innovation." (*Vancouver Sun*, June 20, 2002). This proposal raises two important issues. First, what are the benefits of being a magnet for these resources? Second, what policies should be used to fulfill this vision? The two issues, of course, are inter-related: The net benefits to Canada are conditional on the costs that must be expended to attract these resources. This paper aims to promote understanding of the issues surrounding competition between host nations to attract three types of internationally mobile resources: financial, intellectual, and human capital.

*Financial capital* funds investment in plant and equipment and it includes portfolio and direct investment. We focus solely on foreign direct investment (FDI), that is, investment involving managerial influence by the foreign investor. FDI is defined by the International Monetary Fund as investments where a foreign owner holds at least 10 percent of the stock in the domestic asset. Host countries usually welcome FDI, not just for the associated job creation, but also for the technology and management skills introduced by the foreign owner, usually a multinational enterprise (MNE).

The stock of *intellectual capital* also depends on the decisions of MNEs. They represent one of the main sources of intellectual capital in the form of "blueprints," "brands," and other proprietary knowledge. The R&D activities of foreign-controlled enterprises in Canada constitute one of the most important flows augmenting the stock of intellectual capital. Both the activity of doing research and the patents that emerge from the research process may benefit the economy hosting the research.

*Human capital* comprises the valuable knowledge and skills embedded in people through the processes of education and on-the-job experience. Scientists, doctors, lawyers, and business professionals have developed skills that are essential to economies where the services sector is increasingly displacing traditional sectors like manufacturing and agriculture. In the past, most countries have viewed skilled immigrants primarily as competitors of native-born workers. However, in countries like Canada with an aging population and a scarce supply of some types of skills, a new consensus appears to be emerging in favour of drawing in highly educated workers from abroad and lowering the rate of skilled-workers emigration.

We view current efforts by governments to make their nations attractive to investors and talent as a new stage in the evolution of industrial policy. With varying degrees of fervour, nations have pursued "mercantilistic" trade policies for centuries. The key goal of mercantilism is to expand exports and contract imports. Even when successful, the end result of these policies, accumulated bullion or other reserve currencies has not delivered an improvement in standards of living. Usually, the policies have failed because of retaliation and the basic fact of account balancing: in the long run, one country cannot export unless other countries import.

Commitments to free trade due to the growing importance of the World Trade Organization (WTO) and preferential trading agreements such as the North American Free Trade Agreement (NAFTA) have changed the nature of government intervention. These agreements constrain governments from using import barriers and export subsidies freely to help domestic firms at the expense of foreign competitors (and consumers and taxpayers). Because of these constraints and also probably of a somewhat greater sophistication on the part of policy makers, a new strategy appears to be emerging.

Governments increasingly focus on attracting more resources from abroad, not in the form of gold, but in the form of value-creating capital and labour. This strategy has also become more appealing because these factors seem to be more internationally mobile today than they were in the past. Thus, there appears to be a large pool of “footloose” capital (in financial, intellectual, and human incarnations) that is scanning countries and evaluating the attractiveness of each potential host. Rather than striving to expand exports of “national champions,” industrialized countries now aspire to be the destination of choice for internationally mobile resources (IMRs) regardless of their nationality of origin.

We begin our discussion by positioning Canada in an international context in terms of its current share of internationally mobile resources. This “benchmark” allows us to identify areas where Canada is lagging and leading, and may help to forecast future trends in performance. Section 3 provides a conceptual framework for understanding the location decisions of IMRs. The discussion focuses on the strategic choices of multinational firms. These choices affect the destination and characteristics of foreign direct investment. Moreover, they directly and indirectly influence the location choices of skilled workers. In Section 4, we review the literature examining the evidence on factors that can explain empirically the location choices of IMRs. One finding that emerges from that section is that there are few, if any, policies that attract IMRs without imposing some cost on the host government. Hence, policy makers have a vital need to know whether attracting IMRs is “worth it.” Section 5 considers the net benefits of IMRs for host countries. We identify the various mechanisms through which IMRs raise host-country standards of living and present a review of the relevant empirical literature. At the end of each section, we identify in italics some questions to guide future policy-oriented research. The concluding section summarizes our ideas and draws some tentative policy implications.

## 2. CANADA'S IMR POSITION IN AN INTERNATIONAL PERSPECTIVE

We begin by detailing Canada's position today in terms of its share of financial, intellectual, and human capital. We will assess whether Canada is getting its "fair share" of capital given its size and level of economic development, and will detail recent trends. We recognize that regardless of whether Canada starts at a "high" or "low" level of success in attracting IMRs, arguments may still be made for increasing these levels or for not doing anything. Nonetheless, we believe it is instructive to see where Canada stands and what performance trends are observable.

Our method of benchmarking is fairly simple. We first posit that the most basic determinant of the international allocation of IMRs is the size of the host economy. Without controlling for size variation, comparisons across countries (and, to a lesser extent, over time) would be nearly meaningless. We illustrate this idea and provide a snapshot of Canada's current position in Figures 1, 2, 3, and 4.<sup>1</sup>

Each figure is a scatter-plot using 2000 data (whenever available; in a few cases, recent years or estimates were relied upon) on 24 (out of 25) members of the Organisation for Economic Co-operation and Development (OECD). We excluded Iceland because it is so much smaller than the rest of the sample. The x-axis corresponds to each country's share of the OECD's "Gross National Income" (GNI, formerly known as Gross National Product—GNP). We used purchasing power parity (PPP) exchange rates to express each country's income in a common currency. The use of PPP exchange rates rather than market rates allows us to adjust for international price differences and has the effect of boosting income in countries with price levels that are lower than the United States (such as Canada), and of lowering the GNI of everyone else. In addition, market exchange rates are quite volatile and one would not want to let more or less random variations affect our assessment of relative country sizes. In each figure, the y-axis measures each country's share of a particular IMR. The shares are plotted on a logarithmic scale.

We used the *stocks of inward foreign direct investment* as our measure of mobile financial capital. This data is provided by the United Nations Conference on Trade and Development (UNCTAD). Two caveats are in order. First, most (upwards of 75 percent in recent years) FDI takes the form of acquisitions, not the more sought-after "greenfield" investments that represent newly created establishments. Second, by definition, FDI excludes investments made by domestic firms in their own country. This is an important omission if one wishes to measure the stock of footloose capital residing in a country, since a sizeable portion of its domestic investment might have been done abroad. Hence, it should be considered as part of the pool of internationally mobile capital. However, data on total capital formation by country is sparse and often out of date. Moreover, it would include much investment (like plant expansions and capital replacement) that is probably not very footloose. On balance, FDI stock data is probably the best available measure of internationally mobile capital, but it must be viewed cautiously.

Figure 1 shows that, for the most part, FDI shares are close to GNI shares. The diagonal upward sloping line represents the FDI share required to equal a given GNI share. Countries (labelled with their two-letter ISO codes) above the line have garnered more than their "fair share" of FDI. Canada (the filled in square, labelled "ca") accounts for 3.3 percent of total OECD income, but in 2000 it received 4.5 percent of the OECD-wide stock of inward FDI. Thus, Canada's inward FDI stock is about 39 percent higher than it should be based on the country-size benchmark. Canada does not deviate nearly as much from the benchmark as small European countries like Belgium and the Netherlands. On the flip side, in accordance with popular impressions, both Korea and Japan seem to have received far too little FDI relative to the size of their economies.

**Figure 1**  
**The Distribution of Inward FDI Stocks in the OECD**

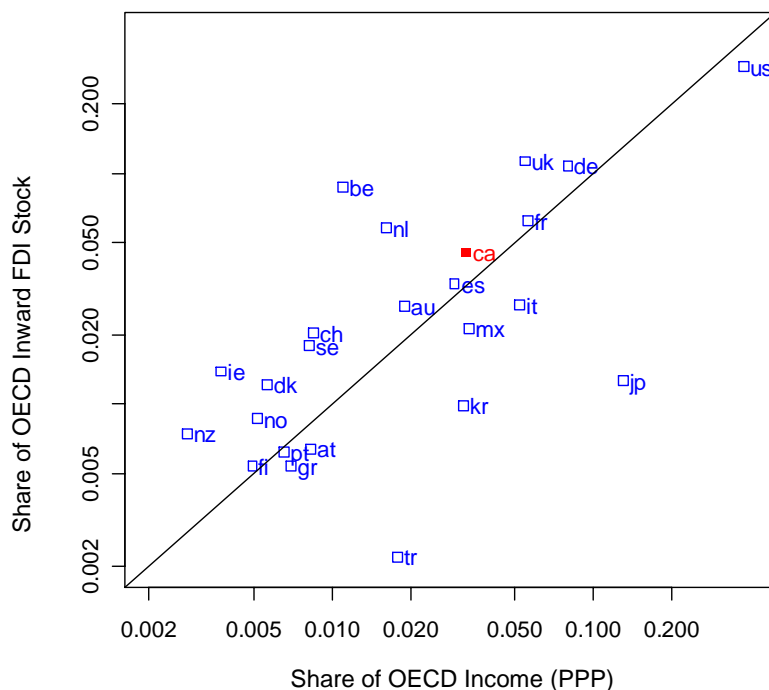
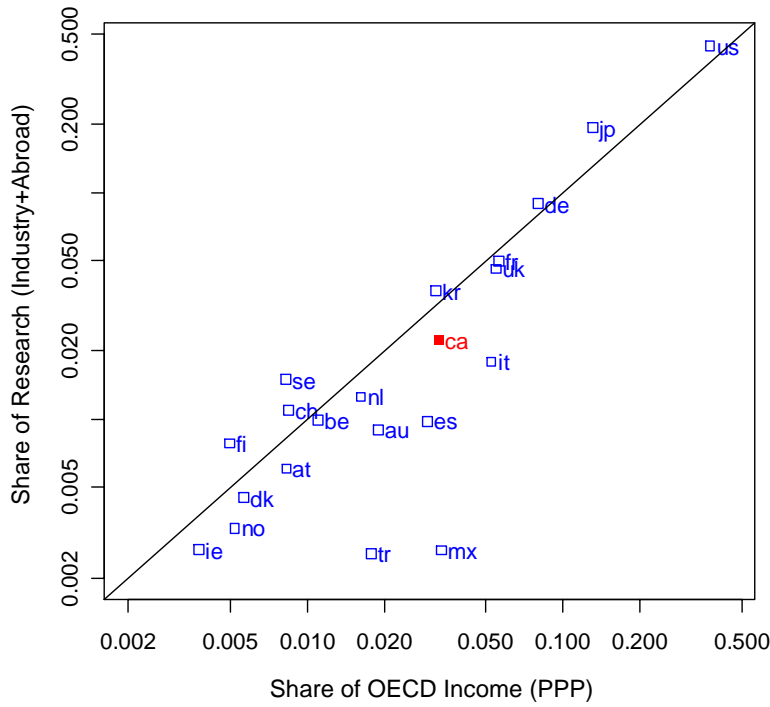


Figure 2 shows that Canada's share of research and development expenditures lies below the 45-degree line corresponding to income shares. The data used here comes from the Report on Science and Technology published by the OECD. We calculated the amount of privately funded R&D in each country as follows. First, we multiplied our GNI numbers by each country's ratio of R&D to GNP. We then multiplied that result by the sum of the percent of R&D funded by "industry" and from "abroad." We excluded government and non-profit sources of R&D because we believe they are not very mobile internationally. This figure reveals that Canada's share of R&D is significantly lower than its income share.

Canada's *under-performance* in attracting R&D, coupled with its FDI *over-performance*, suggests that foreign multinationals investing in Canada are opting to do a disproportionate amount of their research elsewhere. This finding is consistent with the micro-level research of Tang and Rao (2001) discussed later in this paper. We note that most of the OECD joins Canada in obtaining less R&D than its GNI share. This is because the distribution of R&D activity is highly skewed, with the United States, Germany and Japan collectively performing 72 percent of the OECD R&D funded by industry and from abroad.

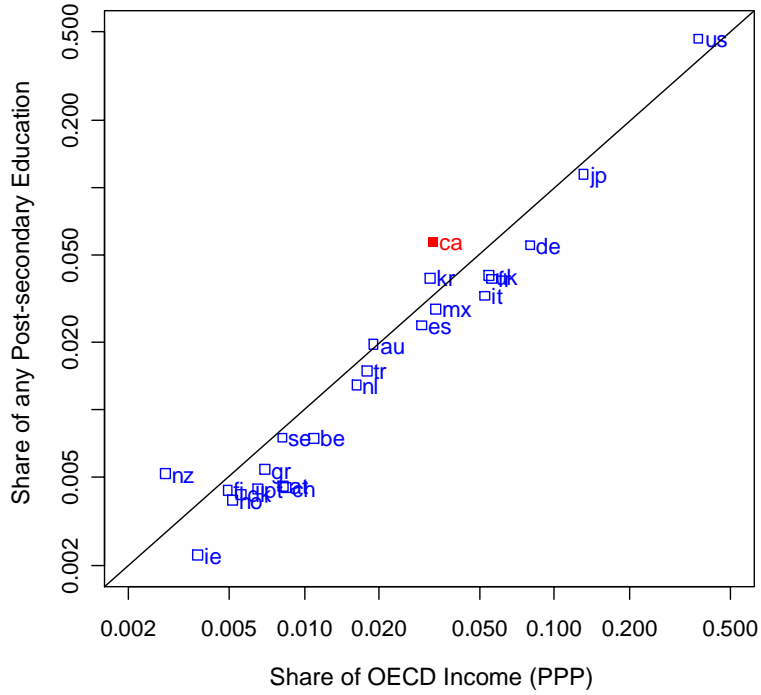
**Figure 2**  
**The Distribution of Industry and Abroad R&D in the OECD**



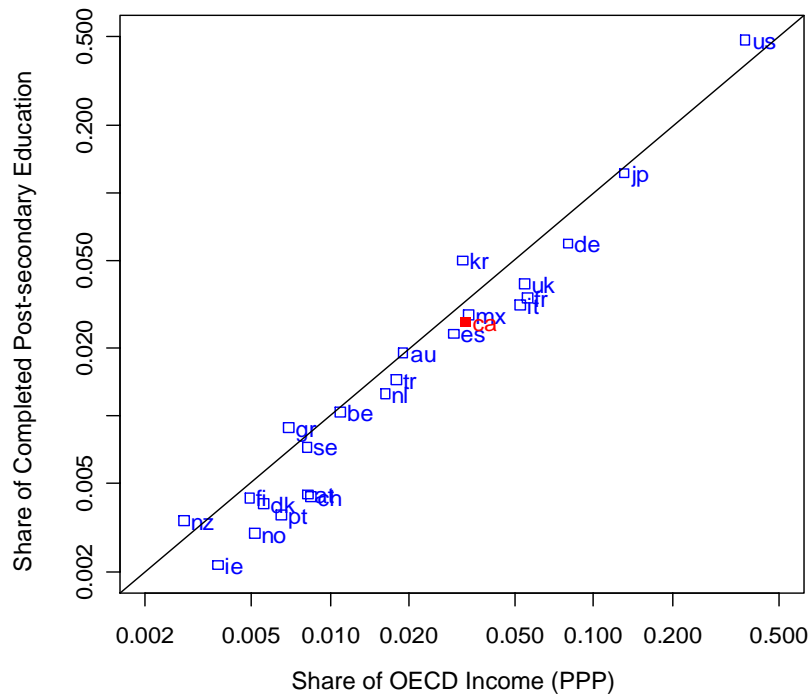
Figures 3 and 4 provide two different perspectives on Canada's position in highly educated workers. The data here come from Barro and Lee's (2000) compilation of education data for a large sample of countries. We make use of two of their classifications. Figure 3 shows each country's share of the OECD 25-and-older population with any "higher" education. Thus, it would cover all education obtained following graduation from high school, including people who pursue diploma programs or drop out of university. By this measure, Canada seems to over-perform handsomely: 5.7 percent of the OECD's highly educated population reside in Canada. This makes Canada look like a real star, although the United States again accounts for a huge share (47 percent) of the OECD total. It is the log scale that makes the U.S. deviation appear less striking than the Canadian one, since Canada has 72 percent more than its GNI share ( $100 \cdot 0.057 / 0.033$ ), whereas the United States has 25 percent more.

Figure 4 shows that Canada's excellence on the educational front mostly disappears when one adopts a more stringent definition (provided by Barro and Lee) of "highly educated." This figure shows each country's share of the OECD 25-and-older population who have completed their post-secondary (or "higher") education. We will use the term university graduate as short-hand to refer to this group although it may not be appropriate for some national education systems. At just 2.6 percent, Canada obtains considerably less than its GNI share. Without wanting to sound pessimist or elitist, we believe it makes more sense to focus on these workers since a complete university education is generally necessary for the types of professionals that we think of as "highly educated." We note that Canada actually under-performs relative to Mexico. This is because Canada's higher percentage of university graduates is not sufficiently high to compensate for Mexico's considerably larger population.

**Figure 3**  
**The Distribution of Post-secondary Education in the OECD**



**Figure 4**  
**The Distribution of University Graduates in the OECD**

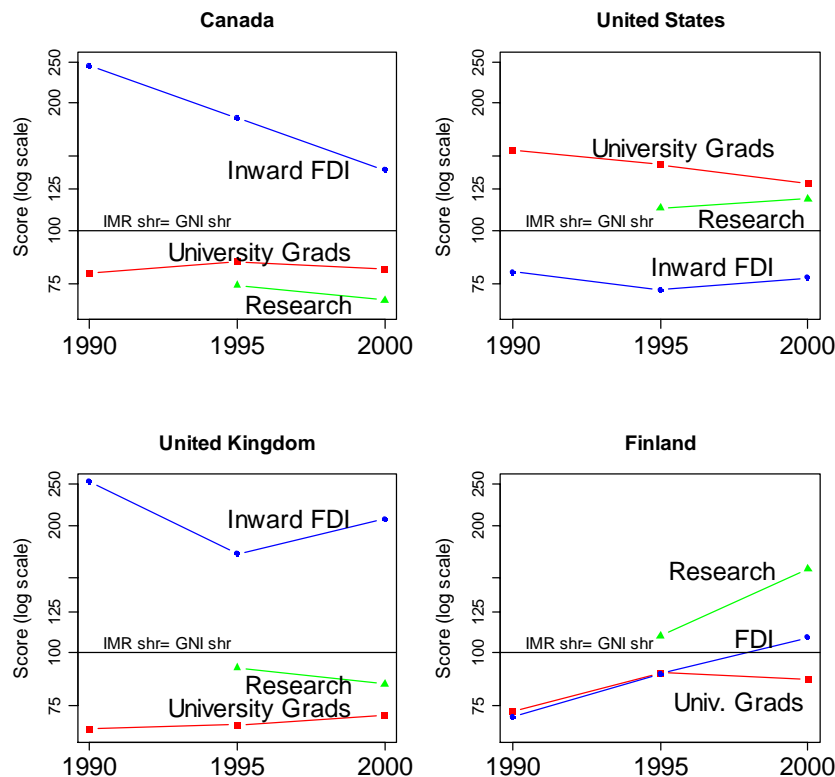




In Figure 5, we consider Canada's performance in attracting each IMR in a longer run perspective. The data for most of these measures are sparse and we rely upon 5-year intervals: 1990, 1995, and 2000. For each country, we develop a "score" derived from our GNI share benchmark. It is calculated as  $100 \times \text{IMR share} / \text{GNI share}$ . Thus, a country that obtains exactly as large a share of R&D as that of gross national income would receive a score of 100. We compare the evolution of Canada's scores with three other interesting cases: the United States, the United Kingdom, and Finland (We would have included Ireland but its over 300 scores for inward FDI would have forced us to use a different scale, limiting visual comparability.) The most salient result is that Canada's over-performance in attracting FDI is rapidly diminishing. In 1990, Canada's score was 245; by 2000, it had fallen to 139. On the R&D front (where we could not find data for 1990), Canada's poor performance fell slightly. For university graduates, Canada can find consolation in the fact that its performance is catching up. The United States receives high scores on both categories where Canada performs poorly. However, it receives a relatively low share of inward FDI. In part, this reflects the fact that many of the world's biggest MNEs are U.S.-based; therefore, when they invest in the United States it does not count as FDI.

The United Kingdom provides an example of a country that has also consistently attracted more than its GNI share of FDI. Unlike Canada's share, the U.K.'s share does not display a pronounced downward trend. Like Canada, the United Kingdom does relatively little research and has relatively few university graduates. Finland, while much smaller than the other three, has attracted considerable notice because of mobile phone maker Nokia's spectacular rise. We may be seeing a Nokia effect in Finland's rising R&D shares. Note that Finland's performance suggests that a country can be an important research site without being a large economy or having a particularly large supply of college-educated workers.

**Figure 5**  
**Comparative Trends in IMR Attraction Scores**



*The Magnitude and Significance of Canada's "Brain-drain" Problem*

There has been much attention given recently to the so-called "brain drain" with a focus on Canadian professionals emigrating to the United States. The concern over the brain drain is predicated on either of two notions: Either emigration is large and not offset by immigration of highly educated workers into Canada, or it is small but represents Canada's "best and brightest," whose departure implies a significant loss to Canadian society.

Recent studies downplay the size of the brain drain. First, there is a net inflow of skilled workers to Canada. According to Human Resources Development Canada (HRDC) and Industry Canada (1999), about 25,000 more skilled workers arrived in the country than departed in 1997. Canada does run a small deficit in net permanent immigrant flows with the United States. However, the numbers are small: only 5,000 skilled workers permanently left Canada to work in the United States in 1997. Of more concern, perhaps, are temporary migrants. The same study reports that, in 1997, between 10,000 and 16,000 skilled Canadians went to the United States on temporary visas. Temporary emigration to the United States has been growing over time as NAFTA has facilitated temporary migration.

The data also indicate that the size of the flow of skilled workers to the United States relative to the new supply of these workers is small, even in occupations showing the largest movements. Wagner (2000) reports Statistics Canada data estimating that over the 1990-96 period, emigration as a percentage of new supply was 5.1 percent for physicians, 2.1 percent for nurses, and 0.6 percent for managers.

Evidence contained in Zhao, Drew, and Murray (2000) indicates that the brain drain to the United States appears easily offset by a brain gain from the rest of the world. This view of a "small" brain drain contrasts with those expressed in DeVoretz and Laryea (1998).

There is some evidence that very high quality professionals are leaving Canada. HRDC and Statistics Canada (1999) discuss a 1995 survey where university graduates moving to the United States report themselves to be at the top of their class. HRDC and Industry Canada (1999) also report that Canadian workers with a Ph.D. and those earning more than C\$150,000 per year have the greatest likelihood of emigration. However, even among the most educated and best paid, the vast majority of individuals born in Canada remain in Canada.

### 3. HOW MNE STRATEGIES DRIVE LOCATION CHOICES OF IMRs

Multinational enterprises are commonly defined as firms that make direct investments in foreign countries. Their overseas activities can involve sales, production, and research and development. They may influence a country's stock of human capital directly through their international staffing decisions, for instance when they assign a manager from headquarters to work for several years at an overseas subsidiary. More importantly, their investment decisions will influence economic activity that may draw educated workers to particular locations. That is, without all the MNE offices in the Toronto environs, the city would almost certainly attract fewer highly-educated workers. These observations suggest that the starting point for determining the location of IMRs is to form an understanding of the strategies of MNEs. In this section, we begin by outlining a conceptual framework for understanding IMR location choices, and then discuss empirical results on what factors influence the most those decisions in practice.

We present a simplified depiction of a multinational enterprise in order to identify the primitive determinants of its location strategy. We begin by considering just two production activities, "U" for upstream and "D" for downstream. The upstream activity produces inputs used by the downstream activity. An important case is where R&D is the upstream activity and production is the downstream one. Imagine a two-country world where a multinational sells to consumers in both markets. It must decide whether to conduct each activity (R&D and production) in one or both locations and where it should locate single-site activities.

We posit three primary strategies that the MNE might adopt and illustrate them in Figure 6. The thin arrows represent flows of intermediate inputs (which might take the form of recipes and designs if U is R&D) from upstream to downstream units, while the thick arrows show shipments of final goods from the downstream stage to final consumers.

The primary strategies depicted in Figure 6 are described below.

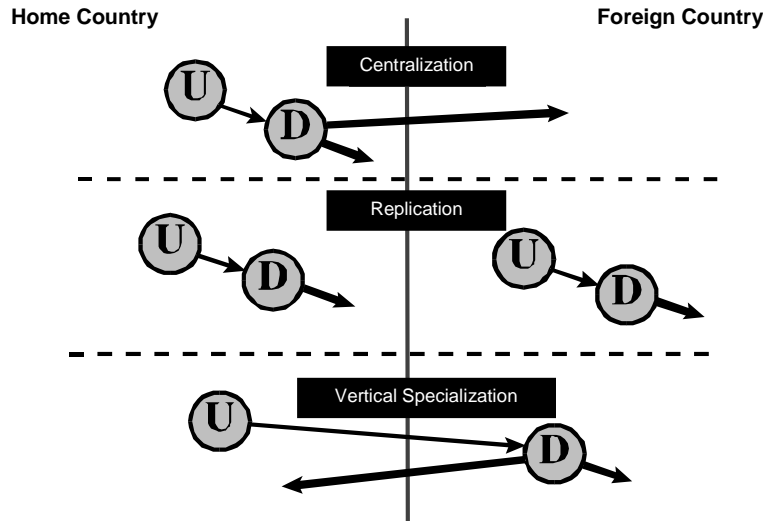
**Centralization:** All activities are concentrated together in one place: the home country. Foreign markets are served by exporting. This strategy is basically an alternative to becoming a multinational firm.

**Replication:** Each national subsidiary of the MNE is a self-sufficient (or "stand-alone") entity. It is independent of the parent firm in the sense that it can carry out all activities without continued input from the parent or subsidiaries in other countries.

**Specialization:** Each national subsidiary specializes in a particular stage of the production stream or in a particular support service. This makes it interdependent with all of the other subsidiaries, from which it imports goods and/or services.

Figure 6 shows how FDI may substitute for trade or complement it. FDI substitutes for trade when an MNE shifts from centralization to replication. However, a movement from centralization to vertical specialization that is accompanied by higher sales due to the rationalization of production can result in trade rising with FDI (complementarity).

**Figure 6**  
**The Three Primary Strategies**



In choosing the optimal structure, the MNE must weigh three different forces that influence the profitability of each strategy: proximity advantages, comparative advantages, and scale advantages.

#### *Proximity Advantages*

Proximity between the provider and user of a good or service is an advantage because it reduces trade costs. In the case of the two-stage MNE depicted in Figure 6, there are proximity advantages associated with having production near consumers and locating R&D near production. Merchandise trade costs are the costs of delivering goods from the location of the maker to the location of the consumer and include freight and border costs (tariffs, custom clearance, etc.). R&D trade involves flows of information and its trade costs will be caused by moving information (technical know-how, “market intelligence,” performance monitoring) from the location where the information was collected or created to the location where this information is used.

#### *Comparative Advantages*

Differences between countries in the abundance and productivity of resources give rise to potential gains from trade. When one country has a lower opportunity cost for producing a particular good than other countries, we say that it has a comparative advantage. Comparative advantages will be most pronounced when there are large gaps in relative skills and resource endowments. The gains from exploiting comparative advantage by dispersing activities to multiple sites depend in part on these country differences and in part on different stages of production having different factor intensities. Thus, the more differentiated are production processes (of goods) and production capabilities (of countries), the greater the gains from exploiting comparative advantages.

#### *Scale Advantages*

When there are fixed costs associated with conducting an activity in a given location, costs will rise if the MNE carries out activities in two different locations. This is due to the loss of plant-level economies of scale. Scale advantages are usually thought to vary across industries due to different degrees of *indivisibility* in the production process. Indivisibilities arise when it is technically impossible to scale

down an operation—lower all outputs and inputs by the same fraction. The typical form of indivisibility is a minimum amount of land, capital, and operating staff required to produce any output at all.

The location of production and R&D depends on the combined influence of each of these advantages. The firm will have to weigh the relative strength of each advantage to reach a final decision on the optimal operation structure. The following lists contain some rules of thumb about conditions that make each of the primary strategies more attractive.

A centralization structure becomes more attractive if:

- there are important plant-level scale economies at both stages;
- proximity advantages are large at the upstream stage;
- proximity advantages at the downstream stage are relatively low;
- the home base is the major market, i.e. foreign countries have low demand for the final product;
- the home base has a comparative advantage in both the upstream and the downstream stages of production.

In contrast, a replication structure becomes more attractive when:

- proximity advantages are high both at the upstream and the downstream stages;
- scale advantages are small: plant-level fixed costs and opportunities for plant-level learning-by-doing are not very large relative to the sizes of markets;
- countries do not have strong comparative advantages.

Finally, a specialization structure makes the most sense when:

- different countries have important comparative advantages at different stages;
- the proximity advantages of all stages are small;
- there are high scale advantages.

This framework allows us to interpret the recent findings of Rugman and Brain (2002) for NAFTA countries that show intra-regional trade increasing relative to inter-regional trade but intra-regional FDI falling relative to inter-regional FDI. Consider the effects of the removal of impediments to trade within NAFTA as a result of treaty provisions. This will favour a centralization strategy relative to a replication strategy, leading to more trade and less FDI within the region.

We can also apply these ideas to Canada. For much of its history as an independent nation, Canada imposed duties on American imports. This made it attractive for American firms to set up subsidiaries in Canada to serve the Canadian market. In some cases, the majority of upstream inputs continued to come from the United States. We refer to the strategy of replicating downstream assembly to avoid trade costs on final goods while centralizing upstream activities at headquarters as “branching.” Indeed, some commentators decried Canada’s economy as suffering from a “branch-plant syndrome.” However, many subsidiaries of U.S. firms located in Canada came to develop their own upstream capabilities. These firms resembled the “replication strategy” depicted in Figure 6.

As duties fell under the Kennedy and Tokyo Rounds from 1966 to 1986, the motivation for replication—and even branching—began to decline. With the complete removal of tariffs under the 1988 Canada-United States Free Trade Agreement (FTA), Canada made the final step into an era where U.S. MNEs would no longer have an incentive to locate production in Canada just to “jump” over tariff hurdles. The consequences of this new reality have not fully manifested themselves yet.

For Canada, one gloomy potential outcome of lower trade costs is that firms will centralize activities in the United States. Krugman (1980) established that, all else being equal, a combination of scale and proximity advantages will lead to a disproportionate number of manufacturing firms selecting the country with the larger demand. He termed this theoretical prediction the “home-market effect.” Moreover, his analysis reveals that a reduction in trade barriers will increase the large country’s share. The reason is that lower trade barriers give firms less incentive to serve small markets with local factories. Rather, they can minimize total trade costs by concentrating production in the larger market (the United States) and exporting to the smaller market (Canada). In the context of our depiction of MNEs, Krugman’s home-market effect corresponds to the centralization strategy. Both upstream and downstream activities will be located in the larger market in order to minimize trade costs if comparative advantage considerations are negligible.

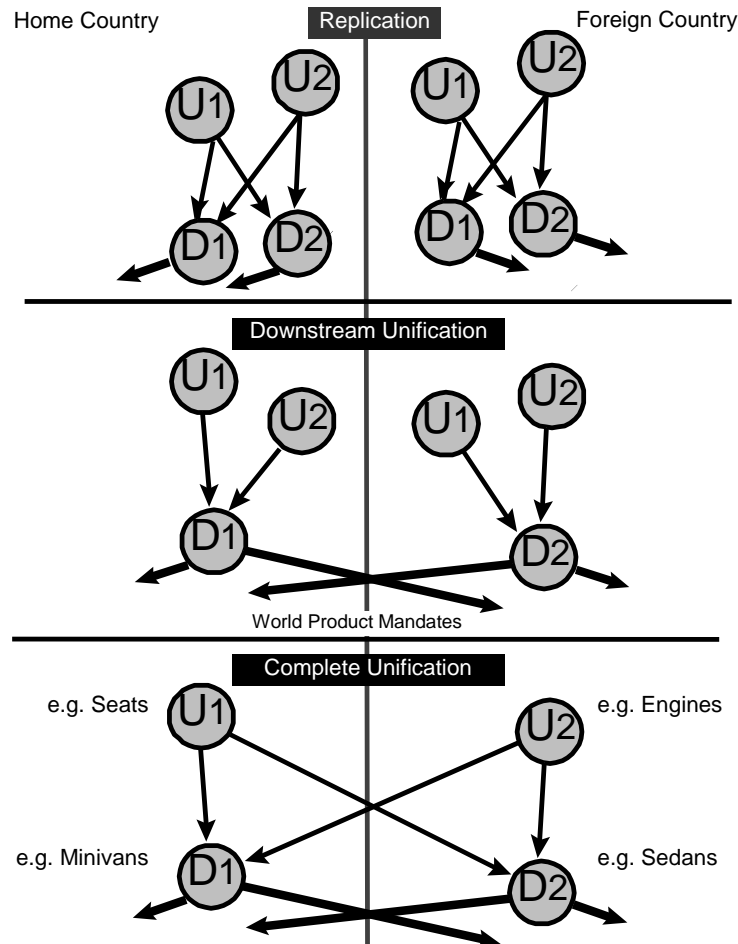
A more optimistic scenario for the consequences of the removal of trade barriers can be gleaned from an examination of the auto industry, which achieved complete unification much before other sectors as a result of the 1965 Canada-United States Auto Pact. Prior to the Auto Pact, Canadian subsidiaries of the Big Three produced a full range of cars for sale in Canada. Now, each model is produced in a single country and exported to the other. In effect, each factory has a North American “mandate” for a particular model. Moving to this integrated system allowed for major reductions in fixed costs as model-specific overhead was no longer duplicated. There was also something of a movement toward the vertical specialization strategy depicted in Figure 6. Canada has become a substantial net exporter of finished cars while it tends to be a net importer of many parts. For some reason, GM, Chrysler, and Ford seem to view Canada as possessing a comparative advantage in assembly. However, this advantage is not so strong as to consolidate all assembly in Canada. There remains a proximity advantage in terms of low transport costs of keeping some assembly close to American consumers.

In order to understand the regional product mandates that were introduced following the Auto Pact or the more recent phenomenon of “world product mandates,” we need to augment our stylized figure to include more than one final good. Instead of just a single downstream activity, imagine a firm that assembles two final products: D1 and D2. The firm intends to sell both products in each country. Each product is manufactured as a combination of the same general types of inputs. We will depict just two of them, U1 and U2.

Figure 7 illustrates several possible multinational structures for this two-input, two-output, two-country case. For concreteness, we suggest examples for the inputs: U1 could be seats, and U2 engines; and for outputs: D1 minivans, and D2 sedans. Alternatively, we might have cathode ray tubes and flat glass being U1 and U2, and televisions and computer monitors being D1 and D2. It is also possible to consider higher levels of generality. For instance, U1 might be critical components and U2 could be R&D. The choice of two inputs and two final goods is not intended to reflect actual firms but rather to illustrate some possible location strategies.

In the first frame, we see another version of the replication strategy. Subsidiaries are self-sufficient both in terms of supplying their own inputs and in terms of offering a complete menu of locally produced final goods to consumers. Following a reduction in tariffs, especially one concentrated on final goods, firms have the opportunity to move to the next frame in which they unify downstream activities and present each subsidiary with a *mandate* to sell its single output in both markets. These world product mandates are seen as desirable by policy makers.

**Figure 7**  
**Cross-border Integration and ‘World Product Mandates’**



The question arises why the firm should stop at downstream unification. The same trade reforms and improvements in communication and transportation that made downstream unification appealing also operate on upstream products and processes. Recognizing this, many firms continue to the third frame in Figure 7—complete unification. A thorough internationally unified strategy involves specialization by the home country in U1 and D1 and reliance on the foreign country for both input U2 and final good D2. A practical consequence of this strategy is very high volumes of intra-firm trade, something that corresponds well to actual trade data. Some policy makers might prefer to limit unification to the downstream products. This may be due to a desire to create more autonomous entities. It may also reflect the idea that if U2 is R&D, each government is then anxious to keep that activity in its own country.

The goal of confining unification to downstream activities is probably not realistic. The same reductions in trade costs that make downstream unification attractive will tend to benefit upstream unification. An exception is when a firm uses “just-in-time” inventory methods that make it advantageous to continue to produce all manufactured inputs locally. Regardless of its attainability, we do not think it worthwhile for governments to encourage firms to adopt partial unification (frame 2 in Figure 7) rather than complete unification. Complete unification offers the potential to exploit more gains from trade and to realize more scale economies than when upstream activities are replicated in each country.

One implication of our framework is that it will be difficult for Canadian subsidiaries to continue to be important components of foreign-based multinational enterprises as trade barriers decline. This is because transportation and communication costs are, if anything, lower than before and, combined with scale economies, they will militate against multi-site replication. Thus, Canada will have to attract MNE investments by offering *comparative advantages* for the production of particular inputs and final goods. Furthermore, preferential trade arrangements with the United States aid Canada in taking advantage of its prime geographic asset: proximity to the US\$10 trillion market.

Another phenomenon that has attracted attention recently is the notion of “industry clusters”—the phenomenon of same-industry firms locating in geographical proximity. Our model of MNE location does not incorporate potential interactions between the location strategies of different firms. However, there are two opposing forces at work that create interactions between the location decisions of firms that we will term “competition effects” and “agglomeration economies.” The first creates centrifugal forces that cause the dispersion of economic activity, while the second generates centripetal forces that promote the formation of industry clusters.

When firms locate near each other, competition effects are strong. The reason for this is that, since firms likely share nearly identical factor and trade costs when located together, price competition is vigorous. This contrasts with firms located apart where distance costs give each firm an advantage in serving nearby consumers. Head, Mayer, and Ries (2002) develop a model that identifies competition effects in a study of the generality of Krugman’s home-market effect.

Agglomeration economies are positive spillovers generated by firms locating in geographic proximity. Recognition of their importance goes back to Marshall (1920) who identified three sources of agglomeration that subsequent research has formally modelled. First, agglomeration of downstream producers can result in lower-cost intermediate inputs as greater demand and sales allow input suppliers to move down their average cost curves. Second, geographic proximity may lead to knowledge spillovers between firms in the same industry. With rapidly developing technologies and management practices, firms are “learning organizations” that access information by co-locating with key competitors and suppliers. Finally, labour may invest in specialized skills in some locations, or skilled workers may migrate to areas where firms belonging to a particular industry are concentrated in order to increase their employment opportunities. Agglomeration economies imply that the more same-industry firms that choose to locate in an area, the more attractive that area becomes to subsequent investors.

Agglomeration economies have important implications for promotion policies in that they generate dynamic gains as a result of a successful policy. Consider a government that has attracted new investors to a particular location. Now that location has become even more attractive by virtue of the higher concentration of firms in the area. Agglomeration economies give rise to “virtuous circles” where success begets more success, magnifying the effects of promotional policies.



## 4. EVIDENCE ON THE LOCATION OF IMRs

In this section, we review the literature on the determinants of location choice of internationally mobile resources. We consider FDI first, followed by R&D, and then migrants.

### Foreign Direct Investment

There is a large empirical literature that investigates the factors influencing the location of foreign direct investment. We will focus on the role of market access and government policy in attracting investment.

There are two broad categories of investment promotion by government. One involves negotiations between the government and a single foreign investor. An MNE might announce that it is interested in establishing a plant in one of a set of locations. Local governments then bid against each other in an effort to attract the investment. Large automobile assembly operations have been particularly coveted. Davies (2002) provides a tabular summary of the incentives that have been offered so far. In 1993, Mercedes received US\$300 million in land, employment subsidies, and tax relief from the State of Alabama. A few years earlier (1988), Toyota had received incentives valued at US\$325 million from Kentucky. The now defunct Hyundai plant in Quebec garnered C\$110 million in 1989. These subsidies represent a sizeable amount relative to the firm's own investment (more than 100 percent of the \$250 million that Davies reports for Mercedes) and they are large relative to the number of employees (\$160,000 per job for Mercedes, \$92,000 for Hyundai, and \$108,000 for Toyota).

No studies have yet quantified the importance of such individually tailored incentive offers. The basic problem for empirical work is that the details of the "winning bid" are generally learned from press-releases. However, we are rarely informed about the characteristics of the bids made by other states that were not chosen. Hence, we cannot compare two otherwise equal states and find out the increment to the probability of attracting the investment generated by higher incentives. It is worth noting that the Honda investment in Ohio received very little in the way of incentives (less than \$4,000 per job).

The other type of investment promotion involves establishing a favourable treatment for all investors. Any new investment, whether domestically or foreign-owned, would qualify. These incentives include low taxes, capital and labour subsidies, and free-trade zones eliminating or postponing import duties. Other activities include promotional efforts aimed at conveying information to investors about the attributes of potential locations.

Estimating the magnitude of the FDI-detering effect of taxes is difficult. While firms want to maximize after-tax profits and thus want to locate in low-tax jurisdictions, they also may seek the infrastructure, public safety, and other amenities that tax dollars buy. Thus, it is important that studies control for locational characteristics such as the infrastructure that governments fund with tax revenues. If studies fail to control for these characteristics, tax effect estimates will be upwardly biased. A second issue is tax treatment by the home government; MNEs may have the earnings of their foreign affiliates taxed in their home country. With foreign tax credits and home taxes that are higher than foreign taxes, the later may not be binding.

Hines (1996) investigates tax rates in U.S. states and the tax sensitivity of foreign investment for two types of investors—those of countries that tax foreign affiliate earnings but offer tax credits for foreign taxes paid (tax-credit countries), and those of countries that exempt foreign affiliate income from

home tax liabilities (exemption countries). Investors from exemption countries should be more sensitive to state tax levels and Hines' estimates bear this out. Using state fixed effects to control for state characteristics, he finds very strong sensitivities of FDI to state taxes among investors from tax exempt countries: a one-percentage point increase in state taxes is associated with 9-11 percent less investment by investors from exemption countries relative to investors from tax-credit countries. Grubert and Mutti (1991) and Hines and Rice (1994) use U.S. Bureau of Economic Analysis (BEA) data on the activities of U.S. multinationals for 1982 and also find significant tax effects. Grubert and Mutti find that a reduction in the host-country average tax rate from 20 to 10 percent would increase U.S. investment by 5.5 percent. Hines and Rice obtain stronger results, perhaps owing to their larger sample of host countries; they find that a 1-percent increase in after-tax returns corresponds to 2.3 percent more U.S. FDI. Mintz (2001), using a model of investment, concludes that eliminating Canadian withholding taxes on income paid to U.S. investors would lead to more FDI. Moreover, the earnings generated by new capital expenditures and employment would more than offset the loss of the withholding tax.

Other studies focus on the location decisions of individual investors. Beaulieu, McKenzie, and Wen (2002) control for government expenditures and find that taxes influenced the location choices of firms in 21 Canadian manufacturing industries over the 1970-97 period. Papke (1991) controls for state expenditures on fire and police protection and finds that U.S. states with higher taxes receive less new investment (however, she does not evaluate FDI separately). Head, Ries, and Swenson (1999) study 760 Japanese greenfield investments in the United States during the 1980-92 period. They find that state income taxes lowered the likelihood of receiving an investment. However, studies by Woodward (1992) on Japanese investments in the United States, Coughlin, Terza, and Arromdee (1991) on overall FDI in the United States, and Wheeler and Mody (1992) on U.S. FDI abroad fail to find a significant tax effect.

Head and Mayer (2002) examined Japanese investment decisions in Europe and found that the results were sensitive to controls. With a control variable for the English language, there did not appear to be a significant corporate tax effect. But the English language dummy variable was positive and significant, indicating a strong residual attractiveness for Ireland and the United Kingdom. At least part of that might be attributable to their relatively favorable corporate tax regimes. Head, Ries, and Swenson (1999) also find that unitary taxation—a system where taxes are calculated as a proportion of worldwide company profits that exposes firms to double taxation—also significantly deterred Japanese investment. Overall, we conclude from this evidence that FDI may be very sensitive to taxes, but it is difficult to obtain accurate estimates of the magnitude of the effect.

Head, Ries, and Swenson (1999) examine a number of other state policies aimed at attracting investors. They find that labour subsidies offered by 15 states had a significant positive effect on Japanese investments, but capital subsidies entered insignificantly. The availability of foreign trade zones—designated areas that allow for duty-free imports—increased the likelihood of receiving an investment. However, the existence of a promotion office in Japan did not generate more investment. This latter finding contrast with that of Woodward (1992), who finds a significant positive effect from the presence of promotion offices.

Head, Ries, and Swenson quantify the effects of foreign trade zones and labour subsidies using simulations. They estimate the direct and indirect effects of these policies through “experiments” where particular states unilaterally eliminate incentives. The direct effect reflects the decrease in employment associated with the removal of a policy and the indirect effect comes from the lower agglomeration caused by these policies. They estimate that the permanent unilateral removal of foreign trade zones would have more than halved the number of investments received by a state. The elimination of labour

subsidies would have reduced Japanese affiliate employment by 20 percent in Indiana, a state that provided generous subsidies.

To calculate the full impact of FDI promotion policies, we must also consider indirect job creation. The large automobile investments of Toyota in Kentucky and Mercedes in Alabama are assembly operations that rely on intermediate input suppliers. The arrival of a large automobile assembler usually attracts subsequent investments—Smith and Florida (1994) find that the presence of an assembler is a major determinant of the location of Japanese auto supplier investments in the United States. Head, Ries, and Swenson (1995, 1999) find that Japanese firms tended to choose states that had been previously selected by other Japanese manufacturers, especially those in the same industry or *keiretsu*. The geographic pattern of U.S. establishments in the same industry was also influential.

The evidence shows that Japanese firms tend to agglomerate. Subsequent studies, such as Head and Mayer (2002) and Bobonis and Shatz (2000), also reveal a strong tendency to agglomerate for Japanese investments in Europe and for investments from other nations in the United States. What is not known is the underlying source of this agglomerative tendency. It might reflect spillovers between firms; that is, there might be true agglomeration *economies*. Alternatively, firms might be responding to some common source of attraction. Head and Mayer (2002) investigate one such source: the access to large markets of different regions in Europe. They postulate that by controlling for “market potential” in each location, the common cause of location choices might be removed. However, their estimates show a continued strong role for agglomeration at the industry level even after controlling for industry-level demand. This may be seen as support for the spillover view, but there are other possible interpretations.

These estimates indicate that investment promotion was an important factor in the attraction of Japanese investments by U.S. states. Two caveats are in order before interpreting these results as support for investment promotion. First, the indirect effects of incentive policies will be largest when there are a large number of new investors relative to previously established investments. There was very little Japanese investment in 1980 and policies put in place at the time had a strong influence on the eventual geographic distribution of firms. In contrast, when the geographic pattern of an industry is already entrenched, government investment promotion policies may lure some new investments, but it is unlikely to significantly alter the overall geographic distribution of firms. Second, incentives offered by different governments largely offset each other. This can give rise to a prisoners’ dilemma where a cooperative agreement to refrain from promotion may be optimal but individual governments have an incentive to defect from such agreement.

*Q4.1.1 Why did Ireland become so popular a location for foreign direct investment? Some point to taxes, others to location, and others to cultural or linguistic factors. What were the relative contributions of each and to what extent can other countries replicate Ireland’s success in attracting FDI?*

*How important is effective public administration for facilitating FDI? Some argue that Ireland’s Industrial Development Authority was instrumental in Ireland’s success. What lessons can be learned from this agency?*

*Q4.1.2 In 1979, Honda chose Ohio, a center of auto parts manufacturing, for its first assembly factory in the United States. Since then, more recent plant location decisions by Toyota (Kentucky), Nissan (Tennessee), BMW (South Carolina), and Mercedes (Alabama) have exhibited a clear southward trend. Is the Great Lakes region, including Ontario, losing its competitive advantage in car*

*assembly and manufacturing in general? Does this shift reflect population demographics, state incentive policies, or something else?*

*Q4.1.3 Have investment promotion efforts of Canadian provinces been successful in attracting FDI?*

*Q4.1.4 How do MNEs allocate resources across affiliates? How can managers of Canadian affiliates improve their chances of winning world product mandates?*

## **The R&D Location Decisions of Multinationals**

There is limited research on the size and geographic allocation of R&D activities by multinational enterprises. First, data is not readily available. Second, the tax consequences of multinational enterprise R&D depend on a large number of inter-related factors—the income taxes of home and host countries, R&D allocation rules required by tax authorities, and the levels of dividend and royalty withholding taxes. Hines tackles this complex problem in three studies relying on U.S. Bureau of Economic Analysis surveys of U.S. multinationals. Hines (1993) finds that the R&D intensity of U.S. parents with affiliates in high-tax countries is lower than that of parents with affiliates in low tax-countries. His 1994 study reveals that high host-country taxes induce MNEs to conduct R&D at home, while his 1995 study indicates that higher royalty withholding tax rates are associated with reduced royalty payments to the parent firm.

Data on the international activities of Swedish multinationals have also been used to study R&D location decisions. Fors (1998) employs a panel of 244 Swedish multinationals to investigate the determinants of foreign affiliate FDI. He finds that firms conduct R&D in countries where they produce. This is consistent with the findings of Lall (1980) and Pearce (1989) who study U.S. firms. One explanation for these results is that affiliate R&D is targeted to adapting products and processes for foreign markets. Fors also finds that the affiliates of R&D-intensive MNEs are more likely to do R&D in-house, and more R&D is done in R&D-abundant host countries.

Analysis of R&D activity also requires an understanding of the environment for the protection of intellectual property. Strong intellectual property protection raises the returns to innovation and induces more investment. MNEs may be drawn to locations that protect intellectual property. However, strong protection restricts the flow of knowledge spillovers, a consequence that may be undesirable for host governments.

*Q4.2.1 What determines the location choices of MNE R&D facilities in Canada? How important is R&D agglomeration? What influence has the presence of research universities?*

*Q4.2.2 As mentioned previously, the tax rate applied to earnings of foreign affiliates depends on the tax policies of the home and host governments. By how much does an increase in Canadian R&D tax incentives lower the effective cost of R&D for U.S. and Japanese affiliates operating in Canada?*

*Q4.2.3 Do modern communication technologies allow for greater dispersal of R&D activities, i.e. less pressure for centralization of R&D at headquarters?*

*Q4.2.4 Is public R&D a complement or a substitute to private R&D?*

## **Highly Educated Migrants**

This section focuses on the emigration decisions of Canadian professionals as opposed to those of immigrants to Canada. The reason is that the brain drain has been a major policy issue in Canada over the past decade and an empirical literature has developed in light of the attention it has received. Presumably, the same factors that draw Canadians to the United States may also be those that would attract educated workers to Canada.

It is obvious that job market opportunities should be a major reason for the migration of educated workers. HRDC and Statistics Canada (1999) describe the results of a survey of university graduates that contain questions on the reasons for moving to the United States. Graduates cite better job availability and higher salaries as the principal reasons for emigrating. Only a small percentage mentions lower taxes in the United States.

Two studies use a regression analysis to examine the decision of Canadians to emigrate. Wagner (2000) uses information from the United States Population Survey to identify Canadian-born U.S. residents and he investigates the factors underlying the decision to migrate. His estimation is based on information about 182,276 Canadian households, 1,259 of which were residing in the United States and the remainder in Canada. He estimates the probability of staying in Canada based on household characteristics with a focus on relative tax rates in the two countries. DeVoretz and Iturralde (2000) compile similar information but have a smaller sample: 1,339 skilled Canadians living in Canada and 78 skilled Canadians living in the United States.

Both studies find that the likelihood of emigrating increases with the income gain associated with moving to the United States. DeVoretz and Iturralde use simulations to determine that the income difference must be very large (C\$46,000) before it has a sizeable effect on the likelihood of emigration. They also find that the young are most likely to migrate while the middle-aged are the least likely, and that the probability of remaining in Canada dropped from 1990 to 1996.

Wagner's results indicate that lower taxes significantly attract Canadians to the United States. He considers the effects of differences in tax liabilities for different households as well as differences in incomes. Wagner estimates that if Canadian and U.S. taxes were identical, there would have been 10 percent fewer university graduates migrating to the United States. If taxes *and* incomes were identical, migration of university-educated workers would have decreased by 41 percent. This suggests that taxes do affect migration but differences in gross income are larger and therefore matter more.

In our view, the number of skilled workers leaving Canada is small and there are no obvious policy tools that Canada could use to reduce this flow. Income differences matter. Since Canadian policy aims to increase economic growth and thereby raise incomes, it is already directed at the most important source of the problem. Tax reduction has also been implemented in Canada and research indicates that this will serve to reduce the outflow of human capital.

*Q4.3.1 Why do immigrants choose Canada? What features of Canada deter potential immigrants?  
Are relative tax rates important?*

*Q4.3.2 How can data on TN visas (NAFTA temporary work authorizations) be used to understand the movements of skilled workers in North America?*

- Q4.3.3 For some time, the Canadian government has expressed a desire to attract a flow of immigrants of about 1 percent of the existing population or about 300,000 per year. Why has actual immigration fallen short of this target? Does it reflect the pool of potential immigrants or the staffing of consulates, or both?*
- Q4.3.4 Canada recently decided to open a consulate in the State of Punjab in India. Should consulate placement be used to target highly educated immigrants?*
- Q4.3.5 One area where highly skilled workers appear to be most mobile internationally is professional sports. The National Hockey League is home to players from many countries with U.S.-born players a minority. In European football, restrictions on foreign players were overturned and it was recently reported that more players on Senegal's national team play in France than members of the French national team. A small number of cities (London, Milan, Madrid) have attracted the bulk of the world's talent. What can we learn from the mobility of athletes that might help us anticipate future mobility patterns by other "superstar"-dominated professions (surgery, academic research, performing arts, etc.)?*

## 5. THE BENEFITS OF ATTRACTING IMRs

The case for government intervention to attract IMRs depends in large part on whether IMRs generate significant spillovers that are local in nature. Spillovers arise when the social returns to an activity exceed its private returns. When positive spillovers are present, there are two ways government intervention may promote welfare. First, shifting a greater share of a fixed stock of worldwide resources into the host economy raises welfare, albeit at the expense of other countries. Second, since the private market conducts “too little” of an activity when that activity generates positive spillovers, government policies that increase the stock of IMRs in the world may be welfare-enhancing (though not necessarily for the country that bears the associated costs).

If, in fact, IMRs generate spillovers that flow over large distances, then the government faces a dilemma. On the one hand, there is an incentive to attract these IMRs to ensure that the local economy enjoys the benefits of accompanying spillovers. However, if promotion activities are costly, it may be optimal to allow the IMRs to operate in neighbouring countries and benefit by receiving spillovers that cross national boundaries.

In what follows, we will review the empirical literature investigating positive spillovers associated with FDI, R&D, and educated workers. When discussing this literature, we will cite evidence on the geographic scope of spillovers whenever possible.

### **Social Returns to FDI**

Direct investment can serve as a means through which domestic agents access knowledge residing abroad. The foreign investor may be a prominent multinational enterprise with significant accumulated knowledge. This knowledge is more likely to be available to the local economy if the MNE conducts R&D in the local affiliate rather than at its headquarters. These ideas suggest that FDI promotes innovation and growth, especially if local affiliates engage in R&D. MNEs might transfer knowledge to workers. On-the-job training will increase the stock of human capital and promote labour productivity. Finally, policies that encourage mobile skilled professionals to reside in a particular nation expand the knowledge base of that nation.

The empirical literature generally supports the view that FDI benefits host countries. FDI has been associated with increases in employment, capital stock, economic growth, productivity and wages. We now present a review of this literature.

The effects of FDI on employment are often the first thing host governments mention as they attempt to justify the generous incentives they offer. In addition to employment at the plant itself (from 1,000 to 5,000 employees in auto plants, but generally substantially less in other factories), there may be indirect job creation due to agglomeration effects. Secondary investment by related firms creates indirect jobs and might also result in technology upgrading among suppliers. Increased economic activity can result in job creation for suppliers of tertiary services. Net job creation depends, of course, on labour market conditions in the host region. If full or near full employment prevails, additional foreign investment will simply shift workers from other firms. Thus, the job-creation benefits of FDI would be highest in regions with high unemployment. Unfortunately, those areas tend to be ones that lack the agglomeration benefits sought by investors. Consequently, it is often a “hard sell” to convince MNEs to create jobs where they would actually be most likely to contribute to economic welfare.

FDI may or may not contribute to the domestic capital stock. On the one hand, domestic investment may be insufficient to attain the equilibrium capital stock level and FDI may be a means to increase the capital stock. On the other hand, FDI might simply “crowd-out” domestic investment. Two studies show that FDI does lead to increases in the capital stock. Hejazi and Pauly (2002) consider a panel of 15 industries in Canada over the 1983-95 period and find that FDI is associated with higher gross fixed capital formation, which indicates that FDI can play a role in augmenting the capital stock. Borensztein, De Gregorio, and Lee (1998) study 69 countries from 1970 to 1989 and also find a positive relationship between FDI and the capital stock. It is important to keep in mind that an increase in capital stock may raise gross *domestic* product but not gross *national* income. This occurs if MNEs capture the abnormal returns to investment as profits that they can repatriate. Again, the case for host-country gain depends on some positive spillovers to domestic factors.

Researchers have investigated the effects of FDI on productivity using growth equations where a country’s output growth is “explained” by the growth of its factor inputs and a residual capturing total factor productivity. There is evidence that FDI increases total factor productivity if this residual is positively correlated with FDI. Borensztein, De Gregorio, and Lee find that FDI raises total factor productivity, a result corroborated by de Mello (1999) who studies 32 countries over the period 1970-90. Gera, Gu, and Lee (1999) use a cost-function approach and 2-digit industry data for Canada over the period 1973-92 to estimate the impact of FDI on production costs. They find that, on average, FDI contributed 0.5 percent per year to total factor productivity growth in Canadian industry.

Another strand of the literature uses firm-level data and compares productivity and wages of domestically controlled and foreign-controlled manufacturing establishments. Rao and Tang (2000) find that total factor productivity is 16 percent higher in foreign affiliates than in domestically controlled firms. This finding is complementary to earlier results by Globerman, Ries, and Vertinsky (1994) showing that labour productivity is higher in foreign-controlled plants than domestically controlled ones.

Girma, Greenaway, and Wakelin (2001) study firms in the United Kingdom and find that U.S. foreign affiliates have higher productivity than their domestic counterparts. Japanese affiliates, however, are not more productive. Doms and Jensen (1998) use a large sample of establishments to conclude that foreign-owned firms are more productive than their average domestic counterpart in the United States. However, their study reveals that the U.S.-located establishments of U.S. multinationals are actually more productive than the average foreign-controlled establishment. Thus, non-multinational U.S. establishments lag in their productivity.

The high productivity of foreign-controlled firms implies that they are creating more output per unit of input. The benefits of high productivity may be shared by the foreign owners in the form of higher profits and by domestic workers in the form of higher wages. The studies of Globerman, Ries, and Vertinsky for Canada, of Doms and Jensen for the United States, and of Girma, Greenaway, and Wakelin for the United Kingdom all find that foreign-controlled plants pay higher wages than domestically owned ones and the magnitude of the premium is in the order of 20 percent. One issue raised by this result is that MNEs may be “cream-skimming,” that is finding the best workers (highest education, experience, ability, etc.). Then, they pay them high wages but these wages need not be much higher than they would have been if these workers had remained at domestic establishments. In other words, existing research has not yet shown what would happen to the wage of a randomly selected worker at a domestic plant if he were reassigned to a foreign-owned plant.



A recent study by Tang and Rao (2001) identifies technology transfer as more important than foreign affiliate R&D in explaining the high productivity levels of foreign affiliates in Canada. They observe that foreign-controlled firms have lower R&D intensities than Canadian-controlled firms. However, these affiliates import substantial amounts of technology (net imports totalling C\$2.1 billion in 1997). The degree to which these imports provide positive spillovers to other firms in the Canadian economy has yet to be estimated.

There is mixed evidence about the fact that foreign-controlled firms confer positive spillovers on domestically owned firms. Globerman (1979) uses industry data and finds that the productivity levels of domestically owned firms in Canada rise with the share of sales going to foreign affiliates operating in the same industry. Blomstrom (1986) detects the same relationship in Mexican industries. Globerman's and Blomstrom's results should be interpreted with caution as they do not establish a causal relationship. Specifically, it may be that MNEs are attracted to high-productivity industries. Studies identifying productivity spillovers based on time-series information tend not to find a relationship. Aitken and Harrison (1999) examine Venezuela and find that increases in foreign investment are associated with *lower* productivity in domestically owned plants. Girma, Greenaway, and Wakelin (2001) examine the relationship between the growth of industry FDI and productivity in the United Kingdom and also do not find a statistically significant relationship.

Any discussion of the effects of FDI must recognize that the majority of new FDI is in the form of acquisitions. The welfare effects of acquisitions may be different than those of greenfield investments. First, acquisitions do not create a new firm or factory. Second, acquirers may not achieve the productivity levels of new ventures since they inherit the existing capital stock and its accompanying work force. Both may be of an older "vintage" and not embody the latest technology and education.

The literature on mergers, surveyed recently by Andrade, Mitchell, and Stafford (2001), almost always finds that acquisitions raise the stock price of "target" firms, a result consistent with the expectation of increased productivity. However, a perplexing finding for this literature is that *all* the stock price gains accrue to the target firm; the acquiring firm's stock often falls around the announcement of the merger.

Stock market event studies tell us that Canadian shareholders are likely to benefit when foreign MNEs purchase Canadian firms. They also forecast rising profits. But it has proven difficult to verify this forecast. Andrade, Mitchell, and Stafford (2001) report that the profits of merging firms tend to be abnormally high relative to the industry prior to the merger and that they rise slightly afterwards. They argue that the evidence supports the idea that these gains in profits are mainly due to greater efficiencies and are not redistributions from other stakeholders (domestic firms, the community, unions, etc.). Thus, the domestic merger literature focused on U.S. data presents results suggesting that foreign acquisitions of Canadian firms are, in the main, a good thing for Canadians but the evidence is not overwhelming.

We know of only one study that examines the productivity effects of international acquisitions: Aitken and Harrison (1999) find a positive relationship between increased foreign equity participation and productivity in plants in Venezuela. In light of the importance of international acquisitions, this is an area that merits further investigation.

Cross-industry information reveals possible spillovers in terms of higher wages in domestically controlled firms. Aitken, Harrison, and Lipsey (1996) and Feliciano and Lipsey (1999) find that wages paid in an industry by domestically controlled firms in the United States rise with the share of foreign-controlled plants in the industry. Again, the direction of causality is questionable. MNEs may be attracted

to industries that employ highly skilled, highly paid workers. However, Girma, Greenaway, and Wakelin (2001) do not find wage spillovers when controlling for industry effects while producing estimates based on time-series information.

Overall, the empirical literature reveals that foreign-controlled firms are more productive and pay higher wages. Evidence of spillovers to domestically controlled firms is, however, mixed. In our view, more research is necessary before reaching the conclusion of a large welfare gain associated with additional FDI.

*Q5.1.1 Are the long-run economic benefits of attracting major investments such as auto assembly factories large in relation to the outlays made by state governments like Kentucky and Alabama to attract them? Answering this question will require both an estimation of the extra investment generated by attracting an initial assembly plant and a calculation of the social benefits per job created.*

*Q5.1.2 What are the benefits to the host country when a foreign affiliate wins a world product mandate? Does it lead to higher growth in sales, skilled employment and R&D?*

*Q5.1.3 Ireland has seen rapid growth in per capita income such that by many measures, it has surpassed the United Kingdom. What credit can Ireland's success in attracting FDI take for this substantial improvement in standards of living?*

*Q5.1.4 Most investment in Canada and indeed most FDI worldwide takes the form of mergers and acquisitions. Do acquisitions confer the same benefits on the host economy as do new establishments ("greenfield" investments)?*

## **Social Returns to Research and Development**

It is unlikely that innovators will capture the full benefits of their inventions. Knowledge created through R&D may be transmitted by mobile workers and transferred to related firms and industries. Reverse engineering and imitation are also sources of social returns that exceed private returns to R&D. As discussed earlier, the key question regarding government efforts to attract R&D concerns the geographic scope of these spillovers. Accordingly, our survey of the literature focuses on studies investigating cross-border flows of R&D spillovers.

Bernstein (1994) investigates international R&D spillovers in 11 Canadian and U.S. industries. He estimates that the U.S. R&D capital stock bestows large direct spillovers on Canadian productivity. In addition, domestic and foreign R&D are complements, implying that foreign R&D leads to additional domestic R&D. Bernstein finds that, in many Canadian industries, at least half of the observed growth in total factor productivity is attributable to R&D spillovers from the United States. Coe and Helpman (1995) evaluate total factor productivity for 22 developed countries over the 1971-90 period and find that international R&D promotes domestic productivity. For Canada, the elasticity of own-R&D to total factor productivity in 1990 was estimated at 0.234 while the elasticity of foreign R&D was 0.075.

Keller (2002) uses data on 14 OECD countries for the years 1970-95 to study R&D spillovers. He finds that the R&D of G5 countries (United States, United Kingdom, Germany, France and Japan) raises productivity in other countries but that the effect diminishes with distance. He estimates that

spillovers are halved with every 1,200 kilometers of distance between countries. Feldman's (1999) survey provides a summary of the evidence on the geographic scope of knowledge spillovers.

Overall, this literature suggests that countries can gain access to R&D knowledge without hosting R&D. Keller's work, however, suggests that knowledge dissipates as it travels over distances. Thus, a dollar's worth of R&D at the source is worth less than a dollar in another country. Of course, it is costless when financed by foreign countries. Thus, there is some appeal to free-riding on the technological efforts of U.S. firms in the Great Lakes states, whose R&D still provides strong benefits to Eastern Canada according to Keller's results.

The free-riding proposition requires that a nation have the transmission channels and absorptive capacity to access the knowledge spillovers. Both FDI and imports have been identified as transmission channels. Coe and Helpman (1995) find that imports are a mechanism through which the knowledge embodied in foreign R&D capital stock is transmitted. Hejazi and Safarian (1999) find an important role for FDI. Moreover, it is obvious that a critical amount of home-country investment in knowledge is also required to benefit from foreign R&D spillovers.

*Q5.2.1 Do "border effects" impede the flow of knowledge between proximate locations in Canada and the United States? In particular, for a given distance, are spillovers larger within nations than between them? One way to answer this is by looking at cross-border citations of patents.*

*Q5.2.2 Are foreign affiliates the conduit through which R&D abroad is transferred to Canada? Are these spillovers larger in industries where foreign affiliates are prominent?*

*Q5.2.3 Does the degree to which R&D spills over national borders vary by industry? If so, should Canada focus on attracting R&D in industries where these spillovers are small?*

*Q5.2.4 Finland has shot up the OECD rankings in both R&D and per capita income. Are these two phenomena linked? How much is the rise of Finland attributable to the success of Nokia? Can and should that firm's success in moving from resource-based activities to communications be emulated by firms in Canada?*

*Q5.2.5 Empirical work has found that R&D in one country raises productivity in neighbouring countries. What influences the size of this spillover? Specifically, do countries have to possess critical levels of their own R&D in order to absorb foreign R&D spillovers?*

## **Social Returns to Educated Workers**

It is almost mantra these days to preach the importance of having a highly educated workforce. There are a number of channels through which skill development raises welfare. First, higher education raises individual productivity. This makes a country more attractive as a location for knowledge-intensive economic activities. Countries with a highly trained workforce will have a comparative advantage in research and development and high technology industries.

Individuals may only partially capture the returns to education. Their knowledge may flow to others in society and provide positive externalities. Moreover, high technology industries may be characterized by imperfect competition and the existence of economic rents (above-normal profits).

Canada gains when it attracts (or maintains) highly skilled workers only if the returns to education exceed those captured by the individuals themselves.

A small body of literature has attempted to estimate the social returns to education. The approach adopted by researchers has generally been to estimate the returns to education by looking at the wages of individuals. The basic method is to regress wages on individual characteristics such as the individual's years of schooling and include a variable measuring the average level of schooling in the area (often city or metropolitan area). The coefficient on the individual's education represents the private returns while the coefficient on the area's average education represents the social returns. This is the approach adopted by Rauch (1993). Moretti (2000) considers the effect of an increase in the supply of college graduates on wages after controlling for individual characteristics. Topel (1999) uses cross-sectional international data on education and labour productivity to estimate social returns.

An important issue in this literature is that the level of education is an endogenous variable partly determined by unobserved individual characteristics. The classic issue is that people with "higher ability" are the ones that pursue higher education and those who garner high wages. Thus, failure to take into account this endogeneity leads to over-estimates of the private returns to education. Likewise, there may be factors in a community that generate higher wages and educational levels and therefore correlation between the two is not necessarily causal. Moretti (2000) and Acemoglu and Angrist (1999) use instrumental variable techniques to deal with these endogeneity issues.

Whether or not one uses instrumental variables matters a great deal for the magnitude of the estimated social return of an additional year of schooling. The OLS estimates are 5 percent in Rauch, 8 to 13 percent in Moretti, and 7 percent in Acemoglu and Angrist. Estimates obtained by Acemoglu and Angrist using instrumental variable techniques are typically less than 1 percent and not statistically significant. Moretti, using instrumental variables and time-series information on individuals, finds that a percentage point increase in the supply of college graduates in a city raises the wages of high-school drop-outs by 1.9 percent, those of high-school graduates by 1.6 percent, and those of college graduates by 0.4 percent, with the estimates generally significant.

Some have argued that the brain drain is costly to Canada because of subsidized public education. The argument is that the subsidy is "lost" when educated workers emigrate to another country. We would not consider the education subsidy to Canadians that move to the United States as lost welfare for Canada if the emigrant's welfare is counted as part of Canada's welfare. However, both "native" Canadians and foreigners receive subsidized higher education in Canada. DeVoretz, Ma, and Zhang (2002) have documented that many foreigners are educated in Canada then move to the United States or back to their home country. Canada probably does not want to subsidize the education of foreigners if they plan to leave Canada to work.

The emigration of professionals may lower welfare by reducing the tax base. A small number of income earners account for a large share of tax revenues—in 1998, the top 2.1 percent of earners in Canada paid 26.7 percent of federal taxes. Therefore, the loss of even a small number of high-income earners can have a serious impact on government revenues.

A recent study shows large welfare losses associated with immigration. Davis and Weinstein (2002) infer that immigration in the United States has led to the deterioration of U.S. terms of trade and standard of living. It seems unlikely that Canadian policies to attract (or keep) educated workers would have a similar effect on welfare. First, highly educated workers are a small share of overall immigration. Second, Canada is a small country that would appear unlikely to affect world prices. The Davis and

Weinstein study is very recent but it has already attracted the attention of the *Economist* magazine. One of its implications is that Canada actually benefits at the expense of the United States when Canadians migrate to that country.

*Q5.3.1 The terms-of-trade mechanism proposed by Davis and Weinstein merits further scrutiny. Does it apply to Canada and, if so, what does it tell us about the welfare impact of immigration?*

*Q5.3.2 What do Canadian data tell us about the private versus social benefits of university education?*



## 6. CONCLUSION

There are several reasons why Canada might want to abstain from policies designed to attract IMRs. First, there might not be any tools available for attracting them. Second, they might have negative externalities for the domestic economy or at least no positive spillovers. Our survey of the research suggests that there are indeed policies that can be used to attract IMRs and that the presence in Canada of additional FDI, R&D and university graduates would likely generate benefits for Canadians in addition to those appropriated by MNEs or by the workers themselves. The case is not yet overwhelming in terms of the magnitude of such benefits or their statistical robustness. However, there is next to no evidence of adverse effects of IMRs. Hence, we would cautiously endorse some pursuit of IMRs. What form should that support take?

For Canada's federal and provincial governments, the most aggressive approach to attracting IMRs would be to engage vigorously in the "auctions" for the most sought-after IMRs. Bidding wars to attract individual investments have received some well-deserved criticisms. The economic case for subsidizing investment is based on under-investment in the presence of positive externalities. In cases where the MNE is committed to a fixed amount of investment and the only issue is location, it may be argued that subsidies are not serving to improve allocational efficiency. Instead, they simply transfer wealth from government (taxpayers) to private companies. This competition is largely a zero-sum game that governments should resist from engaging in.

Davies (2002) has challenged the above view by arguing that there is good reason to believe that local jurisdictions do not internalize all the benefits of inward investments. Rather, there are, for instance, spillovers to Ohio when investors choose Ontario and vice-versa. Reasoning from this premise, Davies argues that the actual amount of incentive activity might be too small, not too big. He further argues that subsidies to garner investment may help direct investors to the location where they would provide the greatest benefits, just as auctions in general help those that value an item most to obtain this item.

We are not ready to advocate that Canadian host governments enter bidding wars, but Davies' study does suggest that we need more work, especially empirical, on the outcomes of auctions for IMRs. A second approach would be to move towards a lower tax regime for all. This is, of course, highly contentious in Canada. In our view, the evidence on the benefits of IMRs and the ability of low taxes to lure them to Canada is just not strong enough to justify a major change in fiscal policy. There may well be good reasons to lower personal or corporate taxes. The gains from attracting IMRs can add to such reasons but should not constitute the only or even the primary motivation.

One area where it strikes us that tax policy has not been very effective is R&D tax credits. Canada currently provides very generous tax treatment for R&D. Indeed, a "Member's Briefing" (#277-99) by the Conference Board of Canada trumpets that Canada's R&D tax incentives are the most favourable of all countries compared. However, as noted in our benchmarking section, Canada still does much less private R&D than its share of OECD income would predict. Anecdotal evidence suggests that tax incentives may be offset by inefficient and lengthy audit and approval processes. Hence, we conclude that even more generosity towards R&D would not be an effective use of tax funds. Instead of a more generous tax treatment, the energy should be focussed on identifying why there is an R&D shortfall.

The framework we developed to analyze MNE strategies yields important insights for Canada's IMR strategy. Lacking a large internal market or significant tariff barriers in manufacturing, Canada cannot expect MNEs to continue to locate here solely to access the Canadian market. Rather, Canada's sustained attractiveness will have to come from developing comparative advantages. This may be fostered in part by improving the education system to increase Canada's share of university graduates, particularly in areas with business applications. Comparative advantage also arises from firm-level activities aimed at building expertise and launching innovations. Such activities seem to flourish in clusters. This would seem to indicate a "pro-cluster" array of government policies. It is not obvious to us what exactly this would entail. Clusters form in mysterious ways and many would-be clusters will not succeed in establishing themselves. For example, the University of Prince Edward Island might hope to use its prominence in marine bioscience to provide the foundation for a cluster in related industries. However, the small consumer markets in Atlantic Canada may doom to failure attempts to promote the formation of a cluster there. Our view is that much more needs to be known about cluster formation before anything other than a "do-no-harm" policy is justified.

Our framework for MNE strategy also pointed towards the importance of Canada's proximity advantage in terms of serving the U.S. market. The next round of WTO talks, following up on the Doha meeting, is supposed to take another look at anti-dumping policies. Right now Canada is an active user of such policies but it is also a frequent victim of U.S. policy. We suggest that Canada prod the WTO towards policies that sharply limit the ability of importing countries to use anti-dumping and countervailing duties to keep out "unfair" imports. The gain in terms of more secure access to the U.S. market might be very helpful in attracting FDI to Canada.

These policy recommendations may sound rather timid. However, our review of the literature leads us to conclude that the gains from attracting IMRs are not large enough to justify allocating large amounts of scarce financial resources and policy-development effort to this goal. Any policies aimed at keeping IMRs in Canada should not prevent Canadian firms from realizing gains associated with outward direct investment such as improved access to new markets and specialized inputs. A "do-no-harm" policy, combined with a continued drive towards excellent university research and education, seems like the best approach to attracting internationally mobile resources to Canada. Research on the issues pertaining to global competition for IMRs should, of course, continue.



## NOTE

1 Here is the list of ISO acronyms for OECD countries used in Figures 1 to 4:

AT : Austria	FI : Finland	NL : Netherlands
AU : Australia	FR : France	NO : Norway
BE : Belgium	GR : Greece	NZ : New Zealand
CA : Canada	IE : Ireland	PT : Portugal
CH : Switzerland	IT : Italy	SE : Sweden
DE : Germany	JP : Japan	TR : Turkey
DN : Denmark	KR : Korea	UK : United Kingdom
ES : Spain	MX : Mexico	US : United States



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