

WILEY



Canadian Economics Association
Association canadienne d'économie

Innis Lecture: Canadian Policies for Broad-Based Prosperity

Author(s): Daniel Trefler

Source: *The Canadian Journal of Economics / Revue canadienne d'Economie*, Vol. 41, No. 4 (Nov., 2008), pp. 1156-1184

Published by: [Wiley](#) on behalf of the [Canadian Economics Association](#)

Stable URL: <http://www.jstor.org/stable/25478320>

Accessed: 31/03/2014 14:09

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at
<http://www.jstor.org/page/info/about/policies/terms.jsp>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.



Wiley and Canadian Economics Association are collaborating with JSTOR to digitize, preserve and extend access to *The Canadian Journal of Economics / Revue canadienne d'Economie*.

<http://www.jstor.org>

Innis Lecture: Canadian policies for broad-based prosperity

Daniel Trefler *Rotman School of Management,
University of Toronto*

Abstract. Canadian policy makers operate in the fog of myth, a myth that has been repeated so often it is mistaken for truth. According to this myth there is only one path to prosperity, and if we are to successfully travel this path, first charted by Americans, then we must abandon our most disadvantaged. We must sacrifice our core Canadian values of community and caring on the altar of competitiveness. Yet the facts of the last three decades scream out against this myth. Over that time Canada's per capita GDP fell by almost 20% relative to the United States. And this sacrifice of prosperity did not make us a more caring society. Instead, it depleted our fiscal resources by a staggering \$68 billion per year and left us without the wherewithal to take care of our most disadvantaged. In this paper I debunk the myth that there is a trade-off between a prosperous society and a caring society. In place of the myth I offer up a cohesive picture of what ails Canada and how we can cure it.

Politiques canadiennes pour une prospérité pour tous. Les architectes de la politique au Canada opèrent dans le brouillard d'un mythe, un mythe qui a été tellement répété qu'on le prend souvent à tort pour une vérité. Selon ce mythe, il n'y a qu'une voie vers la prospérité, et si l'on veut voyager avec succès sur cette voie, cartographiée d'abord par les Américains,

This Innes talk summarizes what I have learned about promoting prosperity from my six years as a member of the board of the Ontario Task Force for Competitiveness, Productivity and Economic Progress. The Task Force is chaired by Roger Martin, dean of the Rotman School of Management, and its research is directed by Jim Milway of the Institute for Competitiveness and Prosperity (ICP). Roger and Jim have been generous enough to give me carte blanche in the use of their ideas. The ICP research material can be found at www.competeprosper.ca. While much of the specific research presented here is drawn from the ICP, I have benefited enormously from interactions with my colleagues at the Canadian Institute for Advanced Studies (CIFAR), who have taught me that prosperity depends on innovation, and innovation is fostered by appropriate institutions. Finally, I thrive on my daily interactions with Canadian social scientists coast to coast: information is generated by individuals, but knowledge is generated by communities. Canadian social scientists are my community. Email: dtrefler@rotman.utoronto.ca

Canadian Journal of Economics / Revue canadienne d'Economie, Vol. 41, No. 4
November / novembre 2008. Printed in Canada / Imprimé au Canada

0008-4085 / 08 / 1156-1184 / © Canadian Economics Association

on doit abandonner nos plus désavantagés à leur sort. On doit sacrifier nos valeurs de base de communauté et de compassion sur l'autel de la compétitivité. Or les expériences des dernières décennies s'inscrivent en faux contre ce mythe. Au cours de cette période, le PIB per capita au Canada a chuté de 20% par rapport à celui des Etats-Unis. Et ce sacrifice de prospérité n'a pas accru le niveau de compassion. Au contraire, nos ressources fiscales ont chuté de \$68 milliards par année, et nous ont laissé moins capables de nous occuper des plus désavantagés. Dans ce texte, l'auteur s'attaque au mythe qu'il faut faire un choix entre une société de prospérité ou une société de compassion. Pour remplacer ce mythe, il met en place un diagnostic cohérent des maux qui affligent le Canada et des moyens pour les guérir.

1. Introduction

Canadians may dream that this country will one day be among the best places in the world in which to live, best both in terms of prosperity *and* in terms of caring for our most needy. Yet there is a sense that the dream is slipping away. We are not becoming more caring and, the resource economy aside, economic indicators of our international standing are steadily deteriorating. What is perhaps most frustrating about this situation is that policy makers and the electorate act as if the situation is beyond anyone's control. This article will argue that Canadians can control their future: there is a set of coherent policies that can place Canada among the most prosperous and the most caring countries in the world.

Canada's biggest problem is that it under-invests in its innovative capacity, and this in turn undermines Canada's current and future prosperity. Canada under-invests in its children, under-invests in its students, under-invests in its workers, and actively discourages its firms from investing in themselves. Canada needs to reorient its current piecemeal government policies towards a systematic set of policies that encourage students, workers, and firms to invest in their future innovative capacity.

When the subject of policies for prosperity comes up, there is usually considerable push-back. It is argued that such policies help the rich and divert resources from programs targeting the most disadvantaged. I will argue strenuously that there does not have to be a trade-off between a prosperous society and a society that takes care of its least advantaged. Properly designed programs that help people invest in themselves – for instance, programs for children and teens – not only help today's disadvantaged but also reduce tomorrow's at-risk population. I will provide many concrete examples of policies that can promote prosperity while at the same time creating a more caring environment.

The outline of the paper is as follows: sections 2 and 3 summarize the main reasons why Canada needs to abandon its expensive reactive policies in favour of proactive policies that will generate the broad-based prosperity of tomorrow. Sections 4 to 6 document the multiple ways in which Canada under-invests.

Sections 7 to 10 explain why these under-investments occur and offer a coherent policy response.

2. Canada's position: a mixed message

Compared with other nations, Canada is one of the richest countries in the world. Among large OECD countries, Canada's GDP per capita of \$44,100 places it second only to the United States.¹ We also do extremely well in the World Bank's Human Development Index.

On the other hand we have only a modest performance in subnational comparisons. Toronto, our richest city, ranks only 13th among non-U.S. cities as measured by the OECD, while Montreal does not even make the top 25. Dublin, Stockholm, and Oslo all do better than any Canadian city. Table 1 shows the top 50 cities in the world as measured by the OECD (2006a). The left panel lists non-U.S. cities. When we add in the United States (right-hand panel) we see that the 12 richest cities in the world are located in the United States.

In making international comparisons of non-economic outcomes Canadians are rightly hesitant to compare our country with the United States. The United States may have the most dynamic economy of the world's larger, rich countries, but what country would want to be compared to one that lives with infant mortality rates that are almost three times as high among blacks as among whites and, indeed, higher than rates in countries as poor as Jamaica?² However, we are heavily integrated into the U.S. economy and have no choice but to compete against American firms, so the United States provides a natural benchmark for the performance of our businesses and economy.

Figure 1 compares Canada's largest provinces with the 14 U.S. states that have a population at least half that of Ontario's. (We will refer to these 14 U.S. states as the 'peer' states.) The median income among these states is \$49,900, 15% above Ontario's and 35% above that of Quebec. Many Canadians are resigned to these numbers, pointing out that the United States has always been richer, so that there is nothing that can be done about it. But has the United States always been richer? In 1977 Ontario and Massachusetts were dead even in terms of GDP per capita. Today, Massachusetts generates 43% more income per capita than Ontario does and 69% more than Quebec does.

Figure 2 shows GDP per capita for Canada and the United States since 1981. Back in 1981 the gap was only \$3,000. Today the gap is \$8,800 and is continuing to inch up.

- 1 U.S. GDP per capita is \$52,900. These numbers are for 2006 and are in PPP-adjusted 2006 Canadian dollars. Large countries are those with a population of at least 10 million. The richest OECD countries with populations of between 4 and 10 million are Norway, Ireland, and Switzerland (all richer than Canada) and Denmark and Sweden (a little poorer than Canada).
- 2 In 2004, infant mortality (deaths under 1 year of age per 1,000 live births) was 13.8 among U.S. blacks, 5.7 among U.S. whites, 13.6 in Jamaica and 5.3 in Canada. Note, though, that Canadians should be cautious about throwing stones: infant mortality was 16.1 in Nunavut.

TABLE 1
Canada's Cities Do Less Well

Non-US Cities					US Cities				
International Rank	Non-U.S. Rank	Metropolitan Region	Country	GDP per capita	International Rank	U.S. Rank	Metropolitan Region	Country	GDP per capita
13	1	London	UK	46,200	1	1	San Francisco	USA	4,200
18	2	Paris	France	42,700	2	2	Washington	USA	5,100
23	3	Dublin	Ireland	38,900	3	3	Boston	USA	4,400
26	4	Vienna	Austria	37,600	4	4	Seattle	USA	3,200
28	5	Stockholm	Sweden	36,700	5	5	Minneapolis	USA	3,100
29	6	Stuttgart	Germany	36,400	6	6	New York	USA	18,700
30	7	Milan	Italy	35,600	7	7	Denver	USA	2,300
31	8	Lyon	France	35,200	8	8	Philadelphia	USA	5,800
31	9	Munich	Germany	35,200	9	9	Dallas	USA	5,700
33	10	Sydney	Australia	35,000	10	10	Atlanta	USA	4,700
33	11	Brussels	Belgium	35,000	11	11	Houston	USA	5,200
33	12	Oslo	Norway	35,000	12	12	San Diego	USA	2,900
36	13	Toronto	Canada	34,900	13	13	Chicago	USA	9,400
37	14	Helsinki	Finland	34,000	14	14	Los Angeles	USA	12,900
38	15	Frankfurt	Germany	33,600	15	15	Detroit	USA	4,500
39	16	Copenhagen	Denmark	33,500	16	16	Baltimore	USA	2,600
40	17	Zurich	Switzerland	33,400	17	17	Cleveland	USA	2,100
41	18	Rome	Italy	33,100	18	18	Portland	USA	2,100
42	19	Ranstad-Holland	Netherlands	32,900	19	19	St. Louis	USA	2,800
43	20	Melbourne	Australia	32,700	20	20	Phoenix	USA	3,700
44	21	Vancouver	Canada	32,000	21	21	Pittsburgh	USA	2,400
45	22	Turin	Italy	32,000	22	22	Tampa Bay	USA	2,600
46	23	Auckland	New Zealand	31,200	23	23	Miami	USA	5,400
47	24	Hamburg	Germany	30,900					
48	25	Tokyo	Japan	29,300					
49	26	Montreal	Canada	29,100					
50	27	Madrid	Spain	29,000					

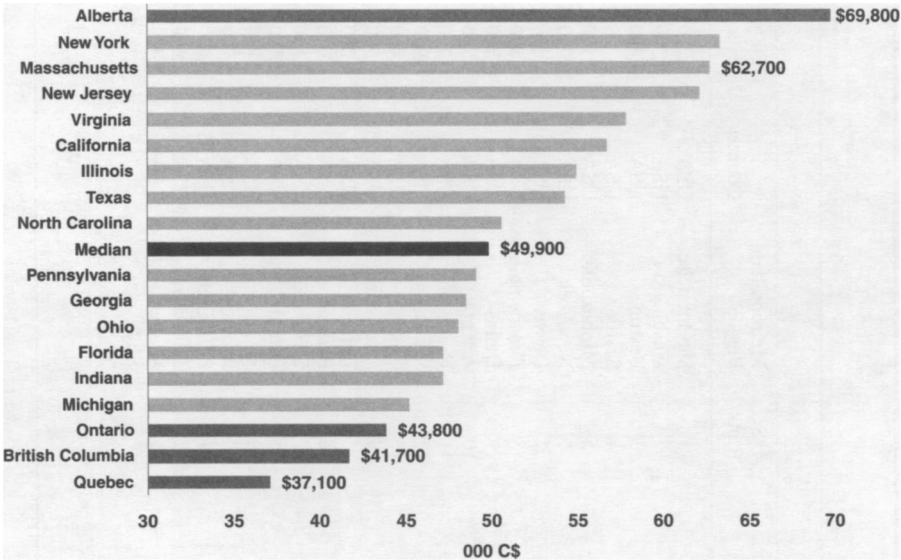


FIGURE 1 Ontario and Quebec have a significant prosperity gap with the largest U.S. states

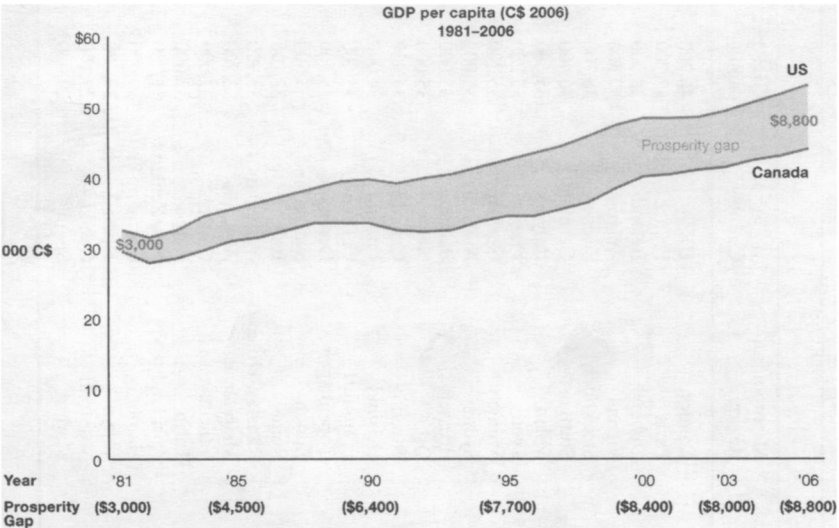


FIGURE 2 Canada's prosperity gap has widened

While not rich compared with the United States, we are hardly poor. Unfortunately, our wealth comes from working harder rather than smarter. Per capita GDP can be high for two reasons: because many citizens are working or because working citizens are productive. In Canada we have many working citizens,

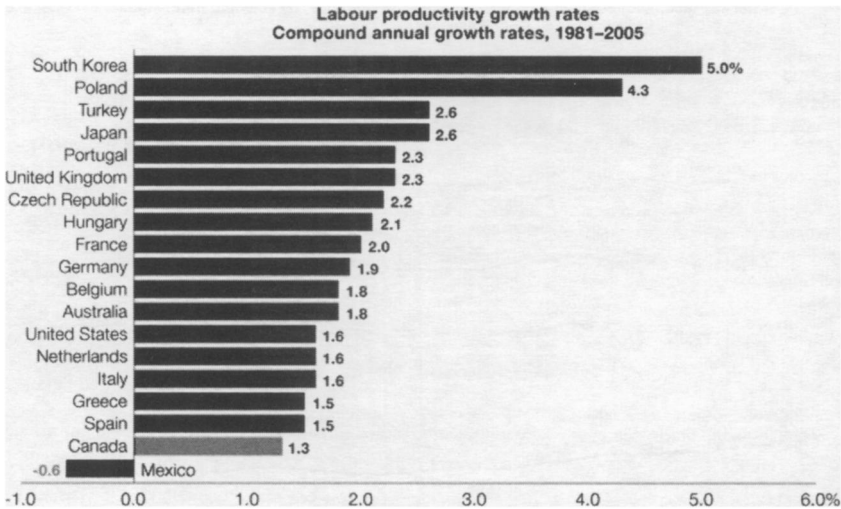


FIGURE 3 Canadian productivity growth has trailed badly

but they are not productive. Thus, our per capita GDP growth is higher than our labour productivity growth. Figure 3 shows that our 1981–2005 labour productivity growth was among the worst in the OECD. In fact, only Mexico did worse.^{3,4}

Canada's lagging economic performance might be considered acceptable had we been able to sustain our social programs, but this has not been the case. In 1980, Canadian households in the 20th, 50th, and 80th percentiles of the income distribution were all richer than their U.S. counterparts. The 50th and 80th percentiles are now poorer. And particularly disturbing is the fact that, whereas our 20th percentile householders once had \$4,800 more than their U.S. counterparts, they now have only \$1,350 more. See figure 4.⁵

To summarize, the United States has not always been richer than us. During the 1980s we decided to forgo some of the prosperity that was being generated south of the border in favour of a more caring, giving society. The problem is that this trade-off was an illusion. Canada is now much less prosperous than the United States, but there is no evidence that we have achieved a more compassionate society. The real choice Canada made was simply to be poorer.

3 Data are from OECD.STAT and are based on the series GDP per capita, US \$, current prices, current PPPs. Another reason why our per capita GDP growth has been stronger than our labour productivity growth is the oil boom.

4 How strong has our per capita GDP growth been? During the 1981–2006 period, the average annual growth rate of per capita GDP was 4.3% for Canada. In the same period the EU15 grew at 4.7% per year, with the Netherlands (4.9%), the United Kingdom (5.2%), Spain (5.5%), Norway (6.4%), Ireland (7.1%), and Korea (8.1%) leading the OECD charge. These countries are either catching up quickly with Canada or have passed Canada.

5 Data are from Canada's *Survey of Labour and Income Dynamics* (SLID) and the U.S. *Current Population Survey* (CPS). See Institute for Competitiveness and Prosperity (2007b).

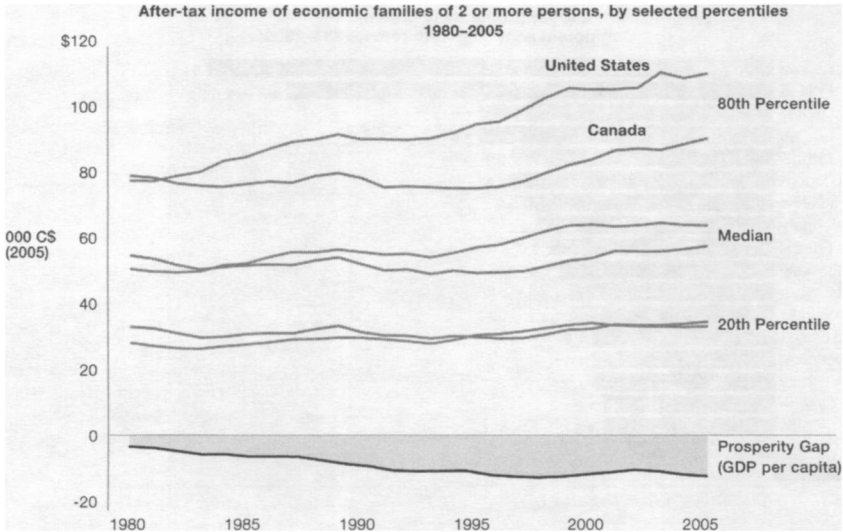


FIGURE 4 Canada's income advantage is deteriorating even for the poor

3. What the future can bring

Suppose that our prosperity gap, the difference in GDP per capita between Canada and the United States, had stayed at its 1981 level of \$3,000 instead of growing to its current \$8,800 level. In other words, suppose that we could raise Canadian per capita GDP by \$5,800. This is not an impossibility. After all, that is the way it was in 1981, as figure 2 shows. That level of per capita GDP would mean that a lot of Canadians were earning more money – and paying more in tax, about \$68 billion more.

The government could do a great deal each year with that extra \$68 billion. Here are some suggestions (see figure 5): We could meet our Kyoto commitments at a cost of \$4.0 billion, as outlined in a report commissioned by the David Suzuki Foundation and the World Wildlife Federation (Tellus Institute 2002, viii). We could fill the \$6.5 billion health care shortfall identified in the Romanow report. We could earmark \$4.1 billion for the early childhood education program proposed by Senator McCain and Dr. Mustard of the Canadian Institute for Advanced Studies (CIFAR). We could climb out of our infrastructure pothole for \$6.0 billion per year (as proposed by the Canadian Council of Professional Engineers 2005). We could increase public funding of grades K–12 by 20%, at a cost of \$6.7 billion. We could even give a 50% increase in government income supports to the poorest 5% of the population, at a cost of only \$3.7 billion. See the appendix for detailed cost calculations.

This spending program will appeal to those who are most interested in what might be referred to as a 'social agenda.' Even after this social-agenda spending,

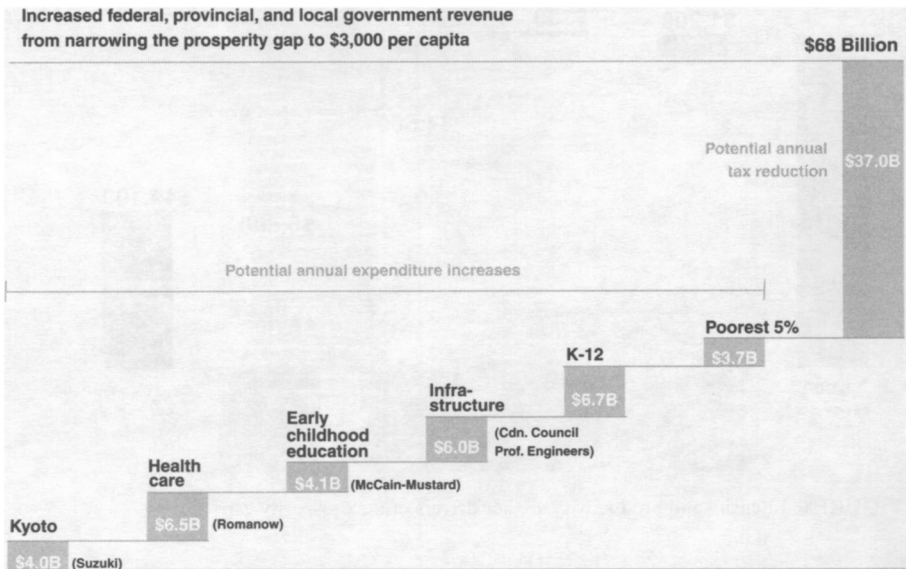


FIGURE 5 Realizing prosperity potential affords higher public benefits

we would still have \$37 billion left each year from our original \$68 billion annual windfall. Turning to ‘business agenda’ items, \$37 billion is coincidentally the amount that the federal government collects in corporate taxes. We would thus have the fiscal room to engineer a large corporate tax cut.

The importance of closing the prosperity gap cannot be overstated: It would allow us to sidestep the perceived trade-off between prosperity and caring that has set politicians of the right (with their business agenda) against politicians of the left (with their social agenda).

4. Sources of the prosperity gap

Competitiveness policy in this country is based on superstition rather than data, opinion rather than fact, and ideology and media spin rather than critical analysis. This is very different from countries such as the United Kingdom, where all government policy is subject to evidence-based assessments by trained civil servants.

During my six years at the Ontario Task Force for Competitiveness, Productivity and Economic Progress I have had the opportunity to see evidence-based evaluations of the most common explanations of Canada’s prosperity gap: a low dollar, a high dollar, lazy workers, overtaxed workers, high corporate taxes, large corporate handouts, and so on. As it turns out, there is no single cause of the

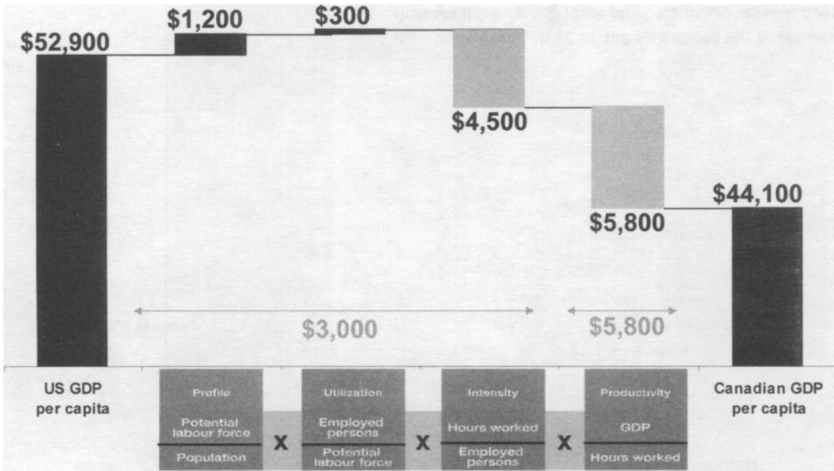


FIGURE 6 Intensity and productivity are key drivers of the prosperity gap

growing prosperity gap. Rather, it is the result of a combination of factors, often avoidable ones.

A good starting point is the work of John Baldwin and his colleagues at Statistics Canada (Baldwin, Maynard, and Wells 2000). They have broken down the prosperity gap into two factors, labour inputs and productivity.

$$\begin{aligned}
 \text{Prosperity} &= \frac{\text{GDP}}{\text{Population}} \\
 &= \frac{\text{Hours Worked}}{\text{Population}} \times \frac{\text{GDP}}{\text{Hours Worked}} \\
 &= (\text{Labour Inputs}) \times (\text{Productivity})
 \end{aligned} \tag{1}$$

I turn first to the role of labour inputs as measured by hours worked.

5. Labour inputs and the hours-worked gap

Labour inputs can be broken into three components: (1) *profile*, or the share of the population that can work, (2) *utilization*, or employment as a share of those that can work, and (3) *intensity*, or hours worked per employed person. See the bottom of figure 6. In this figure, a dollar value is put on each of these components of prosperity. The bar on the left is U.S. prosperity. The bar on the right is Canadian prosperity. The difference in the heights of the two bars is \$8,800. In between these two bars are smaller bars corresponding to the three labour-input components. Compared with the United States, Canadians are more likely to be of working

age, so the *profile* aspect contributes \$1,200 to closing the gap. On the *utilization* side, working-age Canadians are also more likely to be employed, which closes the gap by another \$300.⁶

The big news is on the *intensity* side. Employed Canadians work fewer hours than their U.S. counterparts and this contributes \$4,500 to the prosperity gap. We work 157 hours a year less than our U.S. counterparts or about 3 hours a week less. Yet this seemingly small difference has large GDP implications.

It is only natural that as an economy becomes richer its people work fewer hours. However, this is not what has happened in Canada, where hours worked have not changed much since 1981. Instead, a big part of what has happened is that more and more Canadians are working part time. In 1981 about 9% of Canadians worked part time; now almost 14% do. In contrast, U.S. part-time work has remained steady at about 11% of the workforce. Further, a third of Canadian part-timers want to work more hours, double the U.S. proportion (see Institute for Competitiveness and Prosperity (ICP) 2006b, 2007a). If we were to reduce the incidence of part-time work to U.S. levels, the gap in hours worked between Canada and the United States would shrink by almost a third (31%) and this would eat away dramatically at our \$4,500 prosperity gap.⁷

Here is more evidence that we have made no trade-off between prosperity and taking care of our most disadvantaged: Canada's working poor are putting in just as many hours as their U.S. counterparts or, if not, they are looking for jobs that offer longer hours, like those that Americans have. If anything, we have become less caring of our working poor.

6. Productivity and the investment gap

All three labour-input factors combined account for \$3,000 of the prosperity gap. From figure 6, this means that most of our prosperity gap is a productivity gap. The Ontario Task Force for Competitiveness has reviewed a large number of factors linked to the productivity gap and has come up with a framework that quantifies the relative importance of each. See figure 7. While imperfect in many ways, I believe this framework is extremely useful.

6.1. Spatial agglomeration or clusters

It is often argued that Canada is at a disadvantage because we lack the spatial agglomerations or 'clusters' that exist in the United States. For example, Canada

6 Profile can be further decomposed into a participation rate (which closes the gap by \$900) and an employment rate (which increases the gap by \$600). The net effect is \$300. These numbers are generated by holding wages constant and changing the composition of the Canadian labour force to match that of the U.S. labour force.

7 One explanation of the rise of part-time work is the Canada-U.S. Free Trade Agreement. Trefler (2004a) shows that this explanation is wrong. It appears that the explanation lies in the fact that part-time work rose dramatically during the 1981 and 1992 recessions and failed to return back to pre-recession levels. See Institute for Competitiveness and Prosperity (2006b, exhibit 11).

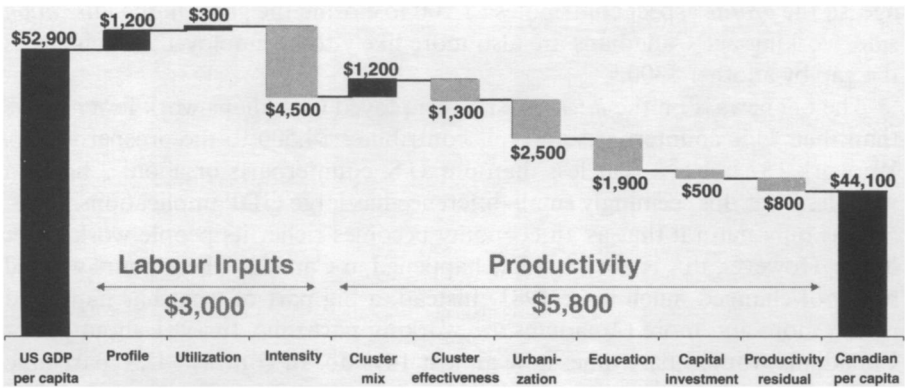


FIGURE 7 Several components of productivity are weak

does not have a financial services cluster comparable to New York's or a health sciences cluster such as Boston's. To investigate beyond anecdotal evidence we have taken Michael Porter's definitions of clusters and applied them to Canada.⁸ We find that employment in clusters relative to total employment is actually higher in Canada than in the United States. Particularly large employers are financial services, automotive, metal manufacturing, and publishing and printing, among others. Since wages are higher within clusters than outside clusters, large cluster employment means higher GDP per capita. As a result, Canada's high-cluster employment raises our per capita GDP by \$1,200 relative to that of the United States.⁹

Business people are typically very surprised when presented with this positive result. They point to the fact that Canada is not as deep as the United States in high-tech clusters (information and communications technologies, aerospace, medical devices, pharmaceuticals, and biotechnology). However, these clusters account for a mere 1.9% of U.S. employment and 1.6% of Canadian employment. So, even if we could raise our employment in these clusters to the 1.9% level, it would generate only 38,000 jobs and increase Canada's GDP by an insignificant 0.1%.

Unfortunately, within each cluster U.S. wages are 9% higher than Canadian wages. This reflects the lower productivity within Canadian clusters and costs us \$1,300 per capita. Taken together, Canada has a good mix of clusters (+\$1,200), but this is offset almost one-for-one by the lack of productivity in our clusters (-\$1,300). The net cluster effect is a wash. This is shown in figure 7, which has the same format as figure 6, except that the \$5,800 productivity gap is now broken down more finely into six subcategories. Two of these, cluster mix at +\$1,200 and cluster effectiveness at -\$1,300, deal with clusters.

8 Porter has identified 41 clusters or spatial agglomerations in the United States. See Institute for Competitiveness and Prosperity (2002, 2008).

9 See the appendix for details of how this number was calculated.

6.2. Urbanization

Canada has a low level of urbanization compared with the United States. Since rural areas are poorer than urban ones, Canada's low level of urbanization lowers the nation's GDP per capita. A simple calculation based on the correlation of urbanization and per capita GDP across states and provinces suggests that our lower level of urbanization reduces our per capita GDP by \$2,500.¹⁰ Lower levels of urbanization in part reflect a rural preference on the part of Canadians. As such, the \$2,500 is the price Canadians happily pay for this preference.

However, there is another perspective on this. The city-country balance may be being distorted by government policies. It can be argued that, since cities have been under-funded for the last 20 years relative to the countryside, taxpayers are effectively subsidizing the rural lifestyle, thus encouraging people to live in areas of low productivity. The reasons for our lower levels of urbanization likely reflect a mix of a rural preference and distorting government policies.

6.3. Education

Canadians are well educated by international standards. And we insist on a solid, publicly funded educational system that is accessible to even our most disadvantaged. Canadian high-school drop-out rates are declining. Among Canadians aged 25 to 34, 11% drop out of high school compared with 13% of Americans.¹¹ Unfortunately, we carry with us a legacy of high drop-out rates and low university enrolments among older Canadians, 15% of whom are high-school drop-outs compared with 12% of older Americans. Of Canadians of all ages, 23% have a university degree compared with 29% of Americans.

If we had the same level of educational attainment as in the United States, while holding fixed our level of earnings by educational attainment, Canada's GDP per capita would be \$1,900 higher. This may sound like a transitory problem, which will work itself out as less-educated Canadians retire. Unfortunately, it is only the tip of the iceberg. I will argue below that deficiencies in our educational system will continue to be a major contributor to the productivity gap.

6.4. Investment

Canada invests dramatically less per worker than do most other OECD countries (see below). A simple macro-model simulation suggests that had we invested as much as our U.S. counterparts did in machinery and equipment, then our per capita GDP would have been \$500 higher. As we will see, this is a conservative estimate, because under-investment in capital goes hand-in-hand with under-investment in innovation.

¹⁰ See Institute for Competitiveness and Prosperity (2003a) for a discussion of the methodology.

¹¹ Source: Author's calculations based on the 2006 Canadian Census and the 2006 U.S. CPS.

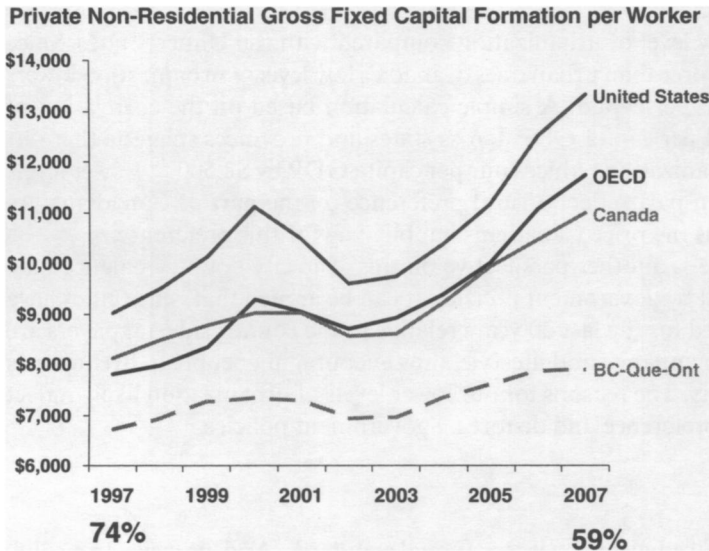


FIGURE 8 Canadian businesses under-invest in supporting their workers

6.5. *Residual productivity*

The part of productivity that cannot be explained by the above factors is referred to as residual productivity. From the second-last bar of figure 7, residual productivity accounts for \$800 of the productivity gap.

6.6. *Summary*

Figure 7 describes the results of one approach to breaking out the many sources of Canada's productivity gap. There are other ways of doing this, including a standard decomposition into the contributions of labour, capital, material inputs, and residual productivity. However, our approach allows us to go easily to the next and bigger question: why do we under-invest in clusters, in cities, in education, and in physical capital?

7. Why Canadian firms under-invest

If Canadian workers are to be productive, they must be supported with complementary investments in capital. Yet Canada systematically under-invests in capital. Figure 8 (based on Banerjee and Robson 2007) shows that U.S. firms invest \$13,300 per worker, whereas Canadian firms invest only \$11,000. For each dollar U.S. firms invest to support their workers, Canadian firms invest only 82 cents. For each dollar OECD firms invest to support their workers, Canadian firms invest only 94 cents.

When we crudely net out the resource sector by looking at average investment rates for British Columbia, Quebec, and Ontario (thereby excluding Alberta), it is apparent that there is an even larger gap, and it continues to grow relentlessly. What was already a big gap in 1997 – 74% of U.S. levels – had become an embarrassing gap of 59% by 2007. See figure 8.¹² In short, our firms go only half as far as U.S. firms do in supporting their workers. It is not surprising that Baldwin and Gu (2007) suggest that most of the Canada-U.S. labour productivity gap may be attributable to Canadian under-investment in capital.

And why are Canadian investment rates so low? One answer is startling: the Canadian tax system, more than almost any other tax system internationally, seems intentionally designed to discourage investment. This has nothing to do with the level of taxation: we know that there is little connection between the size of government in the economy and economic performance. Rather, the problem arises from the structure of taxation. Canada is a world leader in inefficient, dumb taxation.

Different taxes have different implications for the economy. Taxes on investment are highly inefficient because, by discouraging investment, they make workers less productive. They simply kill the goose that lays the golden egg. For example, Finance Canada estimates that a sales tax on capital goods of \$1 creates a \$1.30 inefficiency in the economy; it costs society more than it delivers to the government. In contrast, a \$1 consumption tax (such as the GST) costs society only 10 cents. Every country that wishes to promote its productivity should understand that it must raise government revenues from consumption taxes, not investment taxes. Canada has not figured this out.

The fact that Canada is a world leader in dumb taxation is brought home by the extraordinary work of Jack Mintz and co-authors (Mintz 2007; Chen, Mintz, and Tarasov 2007). Consider figure 9. The horizontal axis is the size of government as measured by tax receipts as a share of GDP. When we look across countries, it is obvious that there is no link between the size of government and economic performance. Many rich countries such as Sweden and Denmark have governments that are twice as large as the U.S. government. The vertical axis measures the marginal effective tax rate on business investment (METR). METR is not the statutory tax rate on capital; rather, it measures the present discounted value of the tax obligations that arise from investing \$1.

Sweden, which is one of the highest-taxed jurisdictions on the planet, has one of the lowest METRs around. The left-leaning Swedes have figured out that capital investments should not be taxed. The result: a prosperous nation. In contrast, Canada has one of the highest METRs. The result: lagging prosperity. Canada is beginning to recognize this fact. The phase-out of the capital tax – a

12 Baldwin and Dixon (2008) confirm this crude observation about natural resources. They find that between 1961 and 2002 the capital stock in mining doubled in the United States, but grew seven-fold in Canada.

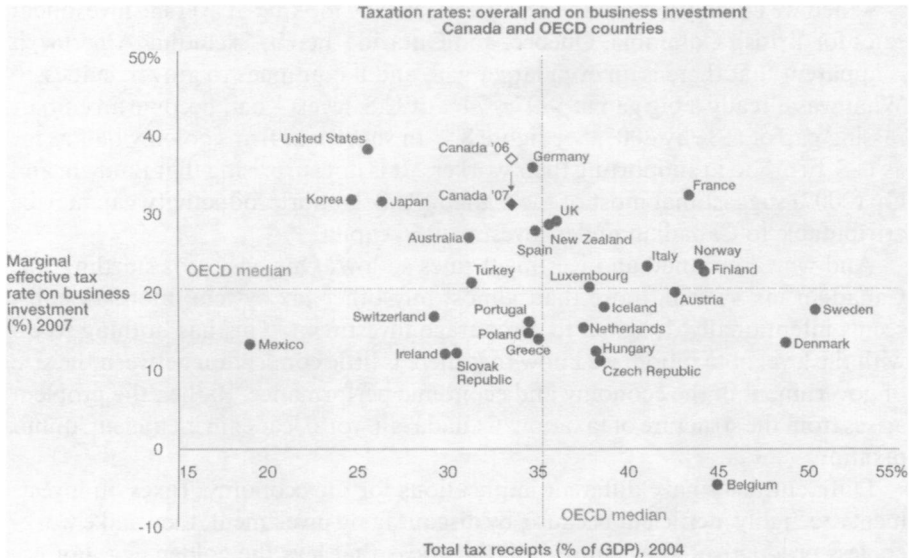


FIGURE 9 Business investment taxes in Canada are among the world's highest

tax that 'rewards' successful companies by taxing their asset base – is bringing down Canada's METR, but it is happening very slowly.¹³

Figure 9 is compelling because it accords with microeconomic studies of investment and taxes, but it also raises a big question: why are many of the high-METR countries so rich? The United States is the prime example. The answer is that METRs affect prosperity via their effects on investment, but taxes are only one of several determinants of investment. Investment has multiple demand and supply components. Taxes reduce the supply of funds for investment, but countries with high savings rates – such as Japan – are able to sustain high levels of supply despite high taxes. In contrast, Canada has low savings rates. Also, some countries have a high demand for investment funds. The United States, for example, has such a high level of demand for investments in information and communications technologies (ICTs) that this demand has not been choked off by high METRs. In contrast, Canada has a low demand for ICT. In fact, for every dollar American firms invest, we invest only 54 cents.¹⁴ Many commentators have stated that investments in ICT are a barometer of how productive and innovative a firm is. See Sharpe (2005) and Bartel, Ichniowski and Shaw (2007).

13 Canada has a large number of tax policies that discourage investment. Provincial capital taxes, Ontario's provincial sales tax (which generates 40% of its revenues from taxes on intermediate goods such as capital purchases), slow federal and provincial rates of depreciation on equipment (the CCA), and a decision to lower consumption taxes rather than to lower investment taxes all contribute to unacceptably high METRs.

14 See the figure in the on-line appendix linked to this article at the CJE journal archive, <http://economics.ca/cje/en/archive.php>.

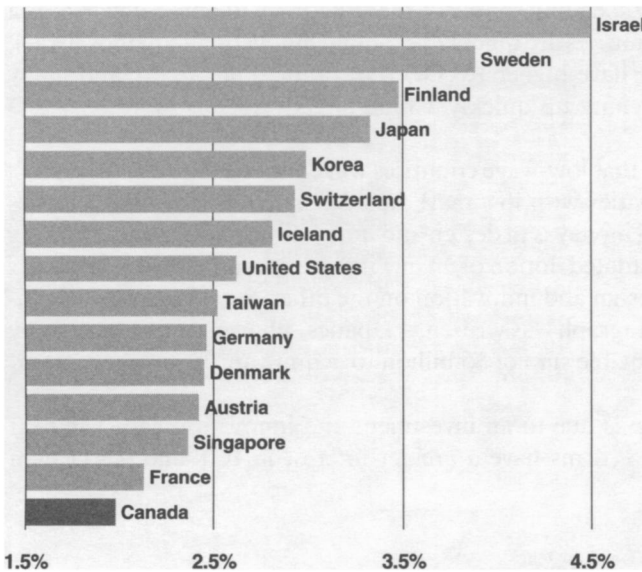


FIGURE 10 R&D expenditures as a percentage of GDP are low in Canada

The innovation numbers tell a similar story of low Canadian demand for ICT.¹⁵ Figure 10 displays R&D spending as a share of GDP. Among the 15 countries with the world's highest R&D shares, Canada is dead last. And other countries, such as China and India, are hard on our heels.

A comparison between Canadian and US R&D reveals that the R&D gap is not due to the absence of government or university R&D, where we have done very well. It is almost entirely due to the fact that Canadian businesses do very little R&D.¹⁶ For each dollar U.S. firms spend, ours spend only 65 cents. In the late 1990s it looked as if Canada might catch up to the United States, but R&D expenditures in this country have collapsed in recent years despite record corporate profitability (International Monetary Fund, 2008, 30).¹⁷

15 Innovation is such an important firm-level activity that it deserves special treatment. Years of research at CIFAR shows that innovation is the primary driver of long-term productivity growth and hence is the proximate cause of why there are prosperity leaders and laggards internationally. See Helpman (1998, 2004).

16 Again, see the figure in the on-line appendix.

17 From a policy perspective, it would be nice if low levels of R&D were simply a tax issue. Unfortunately, Canadian R&D tax incentives for small and medium-sized firms are overly generous, according to the OECD (2006b). For larger, foreign-owned firms there is a tax issue. When these firms repatriate profits to the United States, the Canadian R&D tax credits are clawed back 100% by the U.S. government. Canadian R&D incentives for these large firms end up as a transfer of income from the Canadian government to the U.S. government. A number of executives in U.S.-owned Canadian companies have told me that the Canadian R&D incentives thus have no impact on their R&D decisions.

Unless we take R&D spending seriously, the situation will only get worse, as a number of low-wage countries are quickly becoming innovation dynamos. Israel, Taiwan, and Singapore have higher R&D/GDP ratios than we do, and many other countries are catching up quickly. China already spends more on R&D than we do.

We must not assume that low-wage countries will continue to follow Ricardo's advice and stay in activities with low mark-ups. Many firms in these countries understand that the real money is in design and innovation, and they are working their way around the outdated notion of an inevitable trade-off between low costs on the one hand and design and innovation on the other. See Martin (2006). Indeed, on the day this paragraph was written, a Japanese pharmaceutical company paid the nearly unimaginable sum of \$5 billion to acquire an *Indian* pharmaceutical company.

Our productivity gap is due to an investment and innovation gap. The next question is: why do U.S. firms have a greater interest in ICT and R&D than Canadian firms do?¹⁸

8. Innovation ecosystems and the implications for sophisticated corporate strategy

Any answer to this question of low demand for ICT and R&D must be consistent with rational choice theory. That is, the answer cannot be that Canadian businesses are systematically making mistakes. Canadian businesses must be assumed to be making the right private decisions in response to the signals they receive.

An obvious explanation of why Canadian businesses are making the right private decisions about investment, but the wrong public ones, appeals to the well-known R&D externality (Griliches 1992). Specifically, the social returns to R&D are much higher than the private returns. This externality is the foundation of much of modern growth theory (e.g., Helpman 2004) and is equally important for understanding long-term Canadian growth.

The R&D externality leads to multiple equilibria – some with high levels of R&D and some with low levels. A long history of unsophisticated Canadian corporate culture shielded by high tariffs has acted as an equilibrium focal point that draws firms to the equilibrium with low levels of R&D.¹⁹

18 One partial explanation is that a low dollar made Canada a low-wage destination for U.S. manufacturing, while making the purchase of machinery and equipment very expensive. We effectively became the Mexico of the North. Another partial explanation is that Canadian firms found better opportunities abroad, which is consistent with the increase in our outward FDI. However, in the last seven years Canada has sold more of its corporate assets to foreigners than any other country in the world (both relative to the size of our economy and in absolute terms). Obviously, foreign investors have found Canada to be an attractive place to invest.

19 On the role of culture, institutions, and policies for economic outcomes, see the collection of papers by CIFAR members that appears in Helpman (forthcoming).

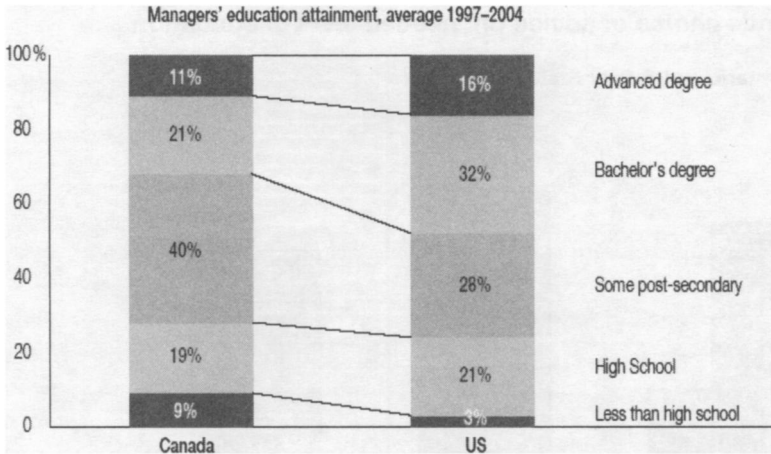


FIGURE 11 Managers are less well educated in Canada

A more informal and intuitive exposition is the following one that I give my MBA students. There are three reasons why Canadian corporate strategy is less sophisticated than its U.S. counterpart: the low educational attainment of Canadian managers, the lack of pressure and support that is provided in spatial agglomerations (or clusters), and the small size of the Canadian market.

8.1. *The educational attainment of Canadian managers*

Figure 11 shows the average educational attainment of managers in Canada and the United States. Fewer than one in three Canadian managers has a university degree. In contrast, almost half of U.S. managers have a university degree, many of them advanced degrees. Not only are Canadian managers less well educated but they do not seem to appreciate the value of an education. In extensive surveying done by the Institute for Competitiveness and Prosperity (ICP), the most pronounced difference we found between Ontario and U.S. peer-state managers was in attitudes towards education.

One question posed was: 'If you had to give advice to a young person about the level of education they should have, which one of the following would you advise them to achieve?' While it was almost unheard of for an American manager to recommend less than a university degree, fully one-quarter of Ontario managers responded that a high-school diploma was good enough. See figure 12 and ICP (2003b, 36). Canadian managers live in a marketplace where education is not important because innovation is not important.

8.2. *Spatial agglomeration and innovation*

When the Ontario Task Force for Competitiveness, Productivity and Economic Progress started up six years ago we were convinced that Canada's problem lay

Respondent's choice of advice on needed level of education

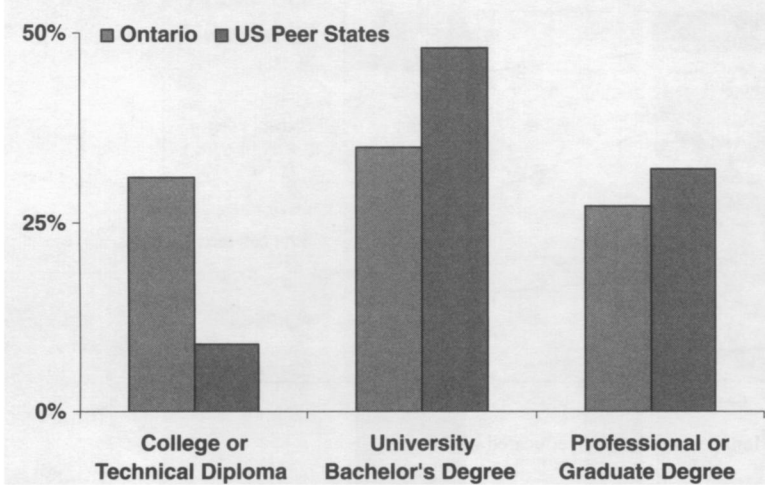


FIGURE 12 Canadian managers value education less

in a lack of well-developed clusters. In the language of economists, a cluster is a group that generates local externalities. Michael Porter's (1990) famous diamond is one way of categorizing these local externalities (see also Porter and the Monitor Company 1992).

Roger Martin uses very different terminology, which I find useful: clusters generate pressure and support. *Support* deals with positive externalities. For example, pools of highly educated and specialized workers facilitate the flow of tacit knowledge. The supportive role of skilled workers (and labour pooling more generally) has been examined extensively by my colleagues Will Strange (Rosenthal and Strange 2003, 2004) and Gilles Duranton (Duranton and Puga 2001; Combes and Duranton 2006). My colleague Ajay Agrawal has explored the supportive role of local tacit knowledge transfer (Agrawal, Kapur, and McHale, forthcoming). Another example of support is when suppliers of specialized inputs provide local firms with information not only about best practices elsewhere, but also about unexploited potential applications. Specialized suppliers include engineering firms and financial service providers.

Pressure is provided both by intense local competition and by sophisticated consumers who are constantly placing new demands on local firms for innovative designs and processes. Firms survive this pressure by having local support that facilitates the development of unique products and processes. The net effect of pressure and support in clusters is the drive for innovation.

Many Canadian businessmen have observed that U.S. clusters are more intense and productive places in which to do business. This is mirrored in the fact that the highest-end U.S. clusters pay much higher wages than do their Canadian

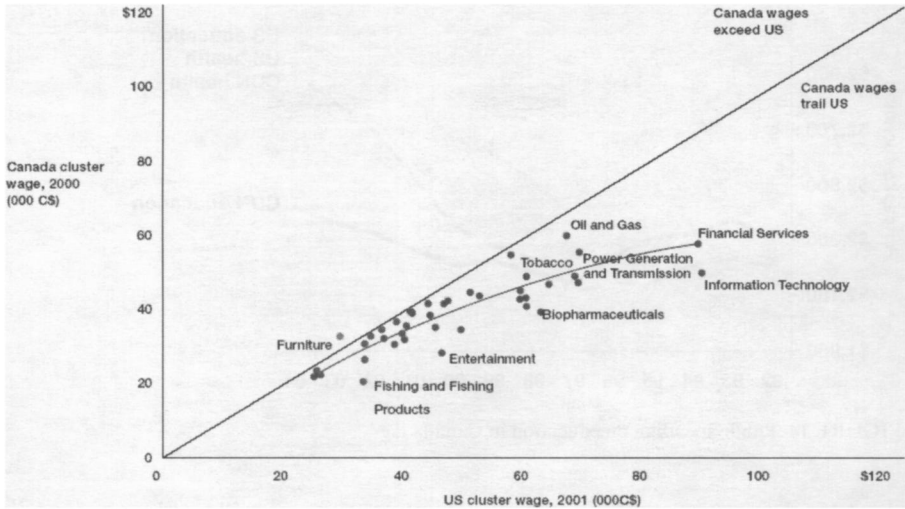


FIGURE 13 Canada under-performs in high wage clusters

counterparts. Figure 13 illustrates this. It plots U.S. cluster wages against Canadian cluster wages for each of Porter's 41 clusters. For the lower- and mid-range-paying clusters, wages are the same whether the cluster is in Canada or in the United States. However, in the highest-paying clusters, such as financial services, IT, and pharmaceuticals, wages in peer-state clusters are much higher than in Canada (ICP 2005).

Patent data also provide insights into the impact of reduced pressure and support on innovation. It is remarkable that Canadian companies are unique in the OECD in failing to develop patent portfolios. With the exception of Research in Motion (the developers of the Blackberry), no Canadian company has a significant patent portfolio, not even Nortel. When we compare Canada and the United States in terms of annual patent output, we find that U.S. clusters produce 19.6 patents per 10,000 employees, whereas Canadian clusters produce only 5.8 patents per 10,000 employees.²⁰ Some of this patent gap is due to the fact that there is a greater U.S. presence in 'patent-intensive' clusters. However, even when we compare within clusters, the United States still produces more than twice as many patents per employee than does Canada. Weak clusters generate a low demand for innovation. It should therefore come as no surprise that Canadian firms do not develop patent portfolios.

8.3. Market size, international trade and innovation

Another reason for our low demand for innovation is market size. Innovation requires heavy set-up costs. If the market size is not large enough to generate

²⁰ See the figure in the on-line appendix.

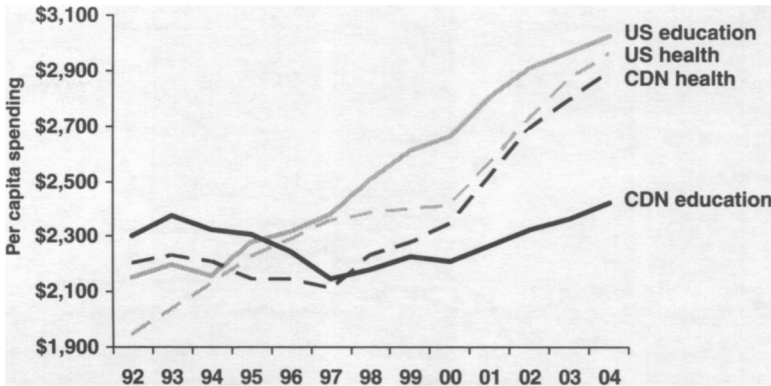


FIGURE 14 Public spending on education in Canada lags

the sales that can cover these set-up costs, then the costs will not be incurred.²¹ Lileeva and Trefler (2007) have shown that the improved access to the U.S. market that resulted from the Canada-U.S. Free Trade Agreement had major effects on Canadian firms that started to export as a result of the U.S. tariff cuts. These firms increased their adoption rates of advanced manufacturing technologies and raised their innovation rates. As a result, their productivity grew by 10–15%.

Despite the importance of market size for innovation, Canada continues to be a fragmented federation of provinces with multiple regulatory environments that send a unified message to business: We don't need your innovation. Despite recent initiatives such as TILMA – the Alberta-B.C. Trade, Investment and Labour Mobility Agreement – and a federal push for harmonization, we are not doing nearly enough to reduce intra-provincial barriers to trade that stymie innovation.

9. Education

There are many bright spots in Canada's education system. We do well on international tests of student performance in high school, and we have the world's highest rate of post-secondary educational attainment. But there is a darker side to our education policy that we are reluctant to acknowledge.

There is a belief in Canada that we fund our education system generously. This is patently false and is a myth that needs debunking. Consider figure 14. The solid lines are Canadian and U.S. per capita public expenditures on education. In 1992, Canada spent more per capita than the United States. Since then, U.S. per capita

21 On market size and innovation, see Sutton 1998) and Acemoglu and Linn (2004).

public expenditures on education have risen steadily, so that by 2004, for each dollar the United States spent, Canada spent only 83 cents. Canada has since increased its public spending, but so has the United States, so that as of 2007 the gap has remained unchanged. Interestingly, this spending shortfall is similar in size to our prosperity gap.

The standard reason given for our educational under-funding is our health care system: budget resources have simply been eaten up by health care spending. Yet the United States has been raising public health care spending as fast as Canada. See the dashed lines in figure 14. We have not been forced to under-invest in education; we have chosen to under-invest.

There was a time when Canada did believe in quality education. Despite what the public may think, we no longer do. We have made a choice not to invest in our future workforce. This is tantamount to turning our backs on innovation and global competitiveness.

9.1. *Canary in the coal mine: universities*

From the perspective of the productivity gap, the share of Canadians with a university degree can be thought of as the canary in the coal mine because university attainment rates are the most important proximate driver of productivity. In 2003–4 Canadian universities awarded 5.75 degrees per 1,000 people, which is only 81% of the comparable U.S. figure.²² The percentage drops to 63% for masters and first professional degrees. Yet university degrees are precisely the type of educational attainment that matters most for prosperity.

At the macro level, university degrees are highly correlated with the level of per capita GDP and innovative activity (such as patenting). At the micro level, firms with more university-educated workers have better management practices and higher productivity (Bloom and Van Reenen 2007) and their management practices achieve higher productivity by encouraging innovative activities (Bloom and Van Reenen 2007; Bartel, Ichniowski, Shaw 2007).²³

At the heart of Canada's post-secondary education problem lie two culprits: under-funding and the failure to reward excellence. It is thus important to note that figure 14, which shows public spending only, is a major understatement

²² See the figure in the on-line appendix.

²³ When I present these facts about Canada's less-than-stellar university attainment numbers, it is often pointed out to me that we are number one internationally when those graduating from both universities and community colleges are summed up. And indeed, there are some great community colleges in this country, such as Ryerson in Toronto, which has recently been re-designated a university. But not all community colleges are equal, and this fact is apparent in the data. In particular, within the OECD the proportion of the population with a university degree is highly correlated with the level of per capita GDP (0.38). In contrast, the proportion of the population with a community college degree is uncorrelated with the level of per capita GDP (0.04). This makes sense. The kinds of program offered at community colleges are absolutely essential for any modern economy, but it is hard to believe that a dearth of plumbers, accountants, and other such occupations is the cause of our *growing* productivity gap with the United States. In contrast, we have good theories to explain why a dearth of university-educated workers would affect, via innovation, both the level and growth rate of per capita GDP.

of U.S. funding of university education. Private plus public spending on post-secondary education is 50% higher in the United States than in Canada (see ICP 2006a, 13). Massachusetts now spends three times more than Ontario on post-secondary education. Not only does this affect the number of Canadians able to complete a university degree, it also has dire consequences for the quality of education. Between 1993 and 2005, the student-faculty ratio in the United States declined slightly for both private and public universities. In contrast, the Canadian student-faculty ratio rose from 18.8 to 24.4 (see ICP 2008, 41). Not surprisingly, in carefully matched samples of university students, Canadian students are much more likely than their U.S. counterparts to report low levels of engagement and less academic challenge (see ICP 2006a, 32).

It is not just a question of funding levels; it is also a question of how those funds are used to reward excellence. Despite the fact that the federal government has pumped a very generous \$10 billion in research funds into Canadian universities, we are still not world leaders in many areas. Part of the problem, as Aghion et al. (2007) have shown, is that while there is a crystal-clear relationship between university funding and university performance (including patenting), the relationship is strongest when the funding formula allows for the discretion to reward excellence.

Unfortunately, university funding in Canada is politically directed and has the goal of ensuring that all universities are treated equally – that is equally badly. The major source of federal social science funding (SSHRC) provides a good example of this. SSHRC funding across provinces is almost exactly proportional to provincial populations, despite the fact that Canada's major research centres are concentrated in just a few provinces.

In Canada our policy is that mediocrity – rather than excellence – will be encouraged. Ironically, had we chosen to reward excellence instead, we would now have the prosperity needed to properly fund post-secondary education even in our poorest regions.

9.2. *Digging deeper: K–12*

A population with a high proportion of post-secondary graduates is essential for growth. The Rae Commission on higher education (2005) recommended that we aim for a post-secondary attainment rate of 70% in the population. The usual reaction to such a high target is that there are simply not enough capable teens in the country to meet it.²⁴ This type of argument is nothing short of an insult to our most disadvantaged.

We now have two decades of research proving that investments in education that start as early as pre-school and continue into the teen years yield enviable long-term financial rates of return for society. They also prepare youth for university. The hard science for this (referred to as 'biological embedding' by researchers

24 See the debate surrounding Côté and Allahar (2007).

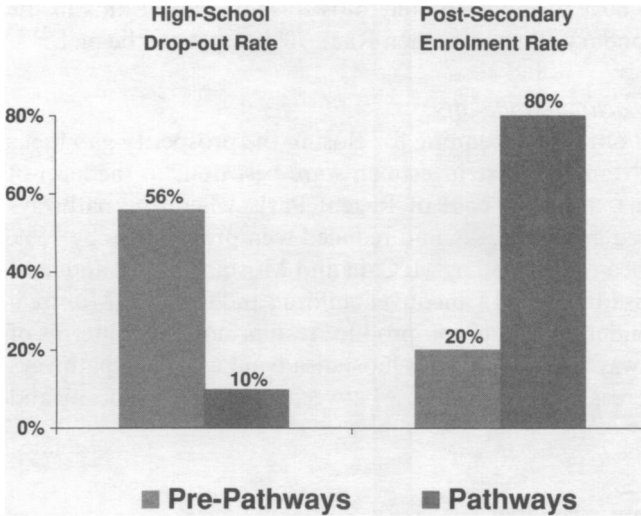


FIGURE 15 The pathways program in Regent Park

from CIFAR) is reviewed in Treffler (2004b) and cannot be presented here. However, let me offer up just two examples.

Using data from the U.S. Panel Study of Income Dynamics (PSID), Carneiro and Heckman (2003) have looked at a group of very smart children and asked why some attend a post-secondary institution while others do not. Among these bright children, 80% of those from rich families attend university, while only 60% of those from poor families attend. However, once we incorporate rudimentary controls for upbringing (e.g., whether the child was raised in a broken home), the attendance difference disappears. Upbringing does matter.

The lesson is that we can boost the number of qualified students entering university by taking a *pathways* approach. The supply of qualified teens who demand a university degree depends on the investments we make in these teens *before* university. Being ready for university is a pathways process of positive reinforcements, which starts with being 'ready to learn' in grade one, continues with proficiency in the 'New Basic Skills' in grade twelve and CEGEP, and ends with the desire and ability to complete a post-secondary degree. We must make sure that each child starts on the right pathway and is kept on that pathway throughout adolescence.

One example of such a program is in Regent Park, Toronto's poorest neighbourhood, one dominated by recent immigrants and notorious for its crime rates. Before the pathways program was established, the high-school drop-out rate was 50% and the post-secondary enrolment rate was 20%. See figure 15. Regent Park's pathways program was designed to carefully track kids that would otherwise fall through the cracks. At a total cost of \$4,000 per child (including about \$1,000 for post-secondary education costs), the program reduced high-school drop-out rates from 50% to 10% and raised post-secondary enrolment rates from 20% to

80%. If \$4,000 can put 80% of the absolutely most disadvantaged kids in the country into a post-secondary education, then Rae's 70% target can be met.²⁵

9.3. *The pathways approach: no trade-offs*

The education policies I am recommending for closing the prosperity gap focus on investing in people. Many of these investments are best done at the level of community interventions, as in the case of Regent Park, where the pathways program has also reduced crime by 50% and reduced teen pregnancies by 75%. Similar programs have been suggested by McCain and Mustard (2002) and have been implemented for disadvantaged Vancouver children and troubled Montreal teens.²⁶ These recommendations, then, can produce results, not only in terms of prosperity, but in many ways that benefit our most disadvantaged. The pathways approach shows that there is no need to choose between a prosperous society and a caring one.

10. Cities and investments in children

One last attempt at debunking the trade-off myth: Canada's prosperity gap is an urban gap. There is virtually no difference in GDP per capita between Canadian and U.S. rural areas but a significant difference in metropolitan ones.²⁷ We under-invest in cities.

Discussions about improving conditions in our cities tend to focus on two elements: fiscal reform and infrastructure. What is ignored is cities' greatest asset – people. The primary urban infrastructure investments should be human capital investments, and we know that these are most cost effective when directed at young people. This takes on an added dimension in light of the fact that, in Canada's increasingly poor urban environments, one child in seven lives in poverty.²⁸

Early childhood development programs are all about enabling communities. That is, they involve interventions that are targeted at the community level in pre-schools, schools, and community centres. For families with young children, these child-centred institutions are the places where most community interactions take place. As a practical matter, then, money invested in children is money invested in communities.

Three benefits accrue to cities that make community-based investments in children. First, they make the community a more desirable place to live, thereby avoiding urban decay, such as the United States has experienced, and that now

25 Data are from Boston Consulting Group (2007). I might add that, according to conservative estimates by the Boston Consulting Group, the Regent Park program had a financial return on investment of 9.4%.

26 Much of this implementation has been done by CIFAR scholars, including Michelle Tremblay, Clyde Hertzman, and Dan Orford. A survey of this work appears in Keating and Hertzman (1999).

27 See the figure in the on-line appendix.

28 This figure is for Ontario. See *Income Trends in Canada*, Statistics Canada Cat. No. 13F0022XCB.

also plagues our cities. Second, they provide the long-term benefit of equalizing skills in the population, thereby reducing inequality. Long-term strategies that alleviate poverty and inequality are left, right, and centre in the battle to uphold the core Canadian values of community and caring. Third, they help combat crime, and crime is a key factor in the demise of neighbourhoods. As we now know, crime often starts off as aggression in young children (see Trefler 2004b for a review). It is best dealt with in pre-schools and early elementary grades.

So investments in children contribute to the quality of life in our cities. But why is this important for productivity growth? Quality of life matters to business location decisions, especially for the advanced, knowledge-based businesses that Canadian cities need to attract. These businesses are based on people, not places, and so are extremely footloose. They migrate to where the people are, but not just to any city. These businesses need the kind of talent that is attracted to vibrant, low-crime urban centres. Community-based investments in education at all levels contribute greatly to the quality of life that this mobile talent pool values so highly. There is no trade-off between prosperity and caring cities – one reinforces the other.

11. Conclusions

Canadian policy makers have been operating in the fog of myth. They believe that there is only one path to prosperity and that in order to follow that path we must abandon our most disadvantaged. Nothing could be further from the truth. Over the last three decades Canada has seen its prosperity erode relative to that of the United States. Yet this sacrifice of prosperity has not allowed us to better serve our most needy. We have sacrificed \$68 billion annually in tax revenues, revenues that could have been spent meeting our Kyoto obligations, eliminating our health care deficit, funding early childhood programs, fixing our crumbling infrastructure, improving transfers to our poorest 5%, and raising K–12 funding. Even with this vast program improvement, we would still have been left with exactly enough to *completely* eliminate federal corporate taxes. Instead, our 20th, 50th, and 80th percentiles have gone from being richer than their American counterparts to being as poor or poorer.

We have sacrificed prosperity, but we have not become more caring. We have consistently under-invested in our people and we have consistently discouraged firms from investing in themselves. We need to do an about-face and encourage investments that increase our future innovative capacity.

Appendix

A.1. Calculations behind figure 5

Section 3 presents several numbers. (1) The \$68 billion in taxes is generated as follows: In the times series, each 1% increase in GDP is associated with a

0.36 increase in all levels of government revenues (excluding CPP). If GDP increases by \$5,800 per capita, then total GDP increases by \$189 billion and government revenue increases by \$68 billion ($= 0.3583 \times \189). (2) The Romanow number is from Romanow (2002, 69). Romanow actually recommends a funding increase of between \$4.4 and \$6.5 billion, and I have used the higher of these two numbers. (3) McCain and Mustard (2002, 39) recommend that Ontario ramp up spending by \$1.65 billion. Since Ontario accounts for 37% of Canada's population, the Canadian recommendation is for \$4.5 billion ($= \$1.65/0.37$). (4) The Canadian Council of Professional Engineers estimates that there is a \$60 billion infrastructure deficit. Allocating \$6 billion a year would allow us to retire this deficit in 10 years, so I have used \$6 billion. (4) According to Statistics Canada (www43.statcan.ca/02/02c/02c_001_e.htm), in 2001/2, \$58.1 billion of public funds was spent on education, of which 58% went to elementary and secondary schools; that is, \$33.7 billion was spent. The number I use is \$6.7 billion, which is 20% of \$33.7. (5) Frenette, Green, and Milligan (2007) calculate that the 4th to 6th percentiles of the income distribution receive \$4,538 per person. (Those in lower percentiles presumably receive slightly more, but I ignore that here, as it is unlikely to change the calculations by much.) About 1.65 million Canadians are in the bottom 5th percentile, so a 50% increase in transfers would cost $\$4,538 \times 1.65 \times 0.50$, or \$3.7 billion, which is the number I use.

A.2. Calculations behind figure 7

(1) Let w_{i0}^{CA} be the wage in industry i if it is not in a cluster (financial services in Yellowknife) and let w_{ic}^{CA} be the wage if in a cluster (financial services in downtown Toronto). Let s_i^{CA} and s_i^{US} be the share of cluster employment in industry i in Canada and the United States, respectively. Then $s_i^{CA} w_{ic}^{CA} + (1 - s_i^{CA}) w_{i0}^{CA}$ is the average Canadian wage, and $s_i^{US} w_{ic}^{CA} + (1 - s_i^{US}) w_{i0}^{CA}$ is the average Canadian wage had we had a U.S.-style composition of cluster employment. Part of the calculation of cluster mix is based on the difference between these two averages. This yields a \$1,500 benefit to Canada.

(2) It is often claimed that the United States skims the cream from our clusters. For example, the most design-intensive aspects of building the ROM and the AGO took place in New York and San Francisco, respectively. Likewise, key financial issues go to U.S. firms and so on. When we dig deeper into clusters, we do not find any evidence supporting the claim that this is important in the big scheme of things. When we look at the situation industry by industry, we find that detailed differences within clusters explain only \$300 of the productivity gap.

Combining effects (1) and (2) yields $\$1,200 = \$1,500 - \$300$. This is what appears in figure 7.

References

Acemoglu, Daron, and Joshua Linn (2004) 'Market size in innovation: theory and evidence from the pharmaceutical industry,' *Quarterly Journal of Economics* 119, 1049–90

- Aghion, Phillipe, and Mathias Dewatripont, Caroline Hoxby, Andreu Mas-Colell, and Andre Sapir (2007) *Why Reform Europe's Universities?* (Brussels: Bruegel)
- Agrawal, Ajay, Devesh Kapur, and John McHale (forthcoming) 'How do spatial and social proximity influence knowledge flows? Evidence from patent data,' *Journal of Urban Economics*
- Baldwin, John, J.P. Maynard, and S. Wells (2000) 'Productivity growth in Canada and the United States,' *Isuma* 1, 119–24
- Baldwin, John R., and Jay Dixon (2008) 'Infrastructure capital: what is it? Where is it? How much of it is there?' *Canadian Productivity Review*, Research Paper Catalogue No. 15-206-X-No. 016
- Baldwin, John R., and Wulong Gu (2007) 'Long-term productivity growth in manufacturing in Canada and the United States, 1961 to 2003,' *Canadian Productivity Review*, Research Paper Catalogue No. 15-206-X-No. 15
- Banarjee, Robin, and William B.P. Robson (2007) *Give Canadian Workers the Tools to Do the Job! Why Canada Needs More Robust Capital Investment* (Toronto: C.D. Howe Institute)
- Bartel, Ann, Casey Ichniowski, and Kathryn Shaw (2007) 'How does information technology affect productivity? Plant-level comparisons of product innovation, process improvement, and worker skills,' *Quarterly Journal of Economics* 122, 1721–58
- Bloom, Nicholas, and John Van Reenen (2007) 'Measuring and explaining management practices across firms and countries,' *Quarterly Journal of Economics* 122, 1351–408
- Boston Consulting Group (2007) *BCG Assessment of Pathways to Education: Executive Summary* (Toronto: Boston Consulting Group)
- Canadian Council of Professional Engineers (2005) 'Brief to the Standing Committee on Finance Regarding the Federal Government's Pre-Budget Consultation Process,' Ottawa
- Pedro Carneiro and James Heckman (2003) 'Human capital policy,' NBER Working Paper No. 9495
- Côté, James E., and Allahar, Anton (2007) *Ivory Tower Blues: A University System in Crisis* (Toronto: University of Toronto Press)
- Duanjie, Chen, Jack Mintz, and Andrey Tarasov (2007) 'Federal and provincial tax reforms: let's get back on track,' in *CD Howe Backgrounder* 102 (Toronto: C.D. Howe Institute)
- Duranton, Gilles and Pierre-Philippe Combes (2006) 'Labour pooling, labour poaching, and spatial clustering,' *Regional Science and Urban Economics* 2006, 1–28
- Duranton, Gilles, and Diego Puga (2001) 'Nursery cities: urban diversity, process innovation, and the life-cycle of products,' *American Economic Review* 91, 1454–77
- Florida, Richard L. (2004) *The Rise of the Creative Class* (New York: Basic Books)
- Frenette, Marc, David Green, and Kevin Milligan (2007) 'The tale of the tails: revisiting recent trends in Canadian after-tax income inequality using Census data,' *Canadian Journal of Economics* 40, 734–64
- Griliches, Zvi (1992) 'The search for R&D spillovers,' *Scandinavian Journal of Economics* 94, S29–S47
- Helpman, Elhanan (2004) *The Mystery of Economic Growth*, (Cambridge, MA: Harvard University Press)
- ed. (1998) *General Purpose Technologies and Economic Growth* (Cambridge, MA: MIT Press)
- ed. (forthcoming) *Institutions and Economic Performance* (Cambridge, MA: Harvard University Press)
- Institute for Competitiveness and Prosperity (ICP) (2002) 'A view of Ontario: Ontario's clusters of innovation,' ICP Working Paper No. 1
- (2003a) 'Missing opportunities: Ontario's urban prosperity gap,' ICP Working Paper No. 3

- (2003b) 'Striking similarities: attitudes and Ontario's prosperity gap,' ICP Working Paper No. 4
- (2004) 'Strengthening structures: upgrading specialized support and competitive pressure,' ICP Working Paper No. 5
- (2005) 'Realizing Canada's prosperity potential,' ICP Davos Report on Canada 2005
- (2006a) 'Rebalancing priorities for Canada's prosperity,' ICP Report on Canada 2006
- (2006b) 'Time on the job: intensity and Ontario's prosperity gap,' ICP Working Paper No. 9
- (2007a) 'Agenda for Canada's prosperity,' ICP Report on Canada 2007
- (2007b) 'Prosperity, inequality, and poverty,' ICP Working Paper No. 10
- (2008) 'Setting our sights on Canada's 2020 prosperity agenda,' ICP Report on Canada 2008
- International Monetary Fund (2008) 'Canada: 2008 Article IV consultation – Staff report; staff statement; and public information notice on the executive board discussion,' IMF Country Report No. 08/69, February 2008.
- Keating, Daniel P., and Clyde Hertzman (1999) *Developmental Health and the Wealth of Nations: Social, Biological, and Educational Dynamics* (New York: Guilford Press)
- eds (forthcoming) *Institutions and Economic Performance* (Cambridge, MA: Harvard University Press)
- Lileeva, Alla, and Daniel Trefler (2007) 'Improved access to foreign markets raises plant-level productivity . . . for some plants,' NBER Working Paper No. 13297
- Martin, Roger L. (2006) 'What innovation advantage?' *BusinessWeek*, 16 January 2006
- McCain, Hon. Margaret Norrie, and J. Fraser Mustard (2002) *The Early Years Study, Three Years Later* (Toronto: CIAR)
- Jack M. Mintz (2007) 'The 2007 tax competitiveness report: a call for comprehensive tax reform,' in *C.D. Howe Institute Commentary* 254 (Toronto: C.D. Howe Institute)
- Organization for Economic Co-operation and Development (2006a) *Competitiveness Cities in the Global Economy* (Paris: OECD)
- (2006b) *Economic Survey of Canada, 2006* (Paris: OECD)
- Porter, Michael E. (1990) *The Competitive Advantage of Nations* (New York: Free Press)
- Porter, Michael E., and The Monitor Company (1992) *Canada at the Crossroads: The Reality of a New Competitive Environment* (Ottawa: Business Council on National Issues and Minister of Supply and Services)
- Rae, Bob (2005) *Ontario: A Leader in Learning – Report & Recommendations* (Ontario: Ministry of Training, Colleges and Universities)
- Romanow, Roy J. (2002) *Building on Values: The Future of Health Care in Canada – Final Report* (Ottawa: Commission on the Future of Health Care in Canada)
- Rosenthal, Stuart S., and William C. Strange (2003) 'Geography, industrial organization, and agglomeration,' *Review of Economics and Statistics* 85, 377–93
- (2004) 'Evidence on the nature and sources of agglomeration economies,' in *Handbook of Urban and Regional Economics*, Vol. 4, ed. J. Vernon Henderson and Jacques-François Thisse (Amsterdam: Elsevier)
- Sharpe, Andrew (2005) *What Explains the Canada-US ICT Investment Intensity Gap?* (Ottawa: Centre for the Study of Living Standards)
- Sutton, John (1998) *Technology and Market Structure* (Cambridge, MA: MIT Press)
- Tellus Institute (2002) 'The bottom line on Kyoto,' prepared for David Suzuki Foundation and World Wildlife Fund.
- Trefler, Daniel (2004a) 'The long and short of the Canada-U.S. Free Trade Agreement,' *American Economic Review* 94, 870–95
- (2004b) 'Looking backward: how childhood experiences impact a nation's wealth,' mimeo