TD Bank Financial Group

Special Report

November 10, 2009

TD Economics
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A NEW NORMAL: CANADA'S POTENTIAL GROWTH DURING RECOVERY AND BEYOND

EXECUTIVE SUMMARY

With Canada's economy expected to have returned to positive growth in the third quarter, the focus is shifting to what is to come in the post-recession era. It is critical to recognize that things will not simply return to how they were. Looking to this "new normal," a pivotal issue is then at what pace the Canadian economy can expand on a trend basis – the so-called "potential" rate of growth. Potential growth can be thought of as trend pace for an economy's long-run growth or the "spine" around which actual growth fluctuates. In this special report, we forecast Canada's potential growth rate over the next decade and discuss its implications.

This longer-term "cruising speed" of the economy is set to slow from about 3% per year on average over the past two decades to about 2% per year in 2009-19. More specifically, we forecast a slump in Canada's average annual potential growth to 1.6% over 2009-2012 (the near-term "recovery" phase) with a return to only an average of 2.1% across 2013-2019 (the "long-term").

Being driven by supply-side factors rather than sources of demand, the growth of potential output depends on changes in the labour force and in productivity. In this report, we project potential growth as the sum of contributions from labour force growth, skills development, capital investment, quality of capital, public infrastructure and technological progress (with "technology" broadly defined to incorporate organizational advances). In this framework, productivity growth (the output per hour worked) is the sum of the latter four elements.

Slump in near-term

In the near-term, the restructuring challenges for major sectors, resulting in displaced workers and obsolete production capacity, will slow potential growth substantially. Nonetheless, Canada's resilient financial system and relatively flexible labour market will nix substantial drags from lingering effects of the global credit crisis on potential growth.

Since the Canadian economy is presently operating below its potential (a negative "output gap"), the Canadian economy will grow at rates exceeding the pace of potential during recovery, as excess capacity is absorbed.

Muted long-term outlook

Nonetheless, in the long-term, average growth should equal the long-run pace of potential – although actual growth rates may exceed or undershoot potential growth in any given period. Indeed, given its price stability mandate, the Bank of Canada should be expected to conduct monetary policy in order to maintain growth that closely corresponds to potential.

Over the long haul, an aging population will slow labour force growth, and Canada's potential growth will increasingly rely on productivity. We do see some cause to expect an acceleration of productivity over the mid-to-late part of the coming decade. Owing mainly to heightened capital investment and a cessation of "technological" regress, we expect productivity to achieve an average annual 1.6% clip during 2012-2019 – better than the paltry 1.1% annual pace during 2001-2007, but still well below the boom of the late-1990s.

As a buoy for longer-term productivity growth, the outlook is promising for capital investment and a shift towards higher-tech goods. Government efforts to cleave the marginal effective tax rates on capital will spur the capital component of productivity growth. Strengthened infrastructure spending will also provide a boost to productivity, but, while renewal is needed, the proposed infrastructure projects do not appear likely to deliver the high-externality "network" impacts of the 1960s infrastructure rollout.

However, we do not see a compelling case for a major productivity resurgence, given Canada's poor record on innovation. Slumping expenditures on research and development and low investment in high-tech capital by Canadian businesses appear the prime culprits for Canada's lack of innovation and overall slowing of productivity growth. Our projection assumes abatement of these trends, but not

a full-scale reversal.

Studies point to lower relative educational attainment by Canadian managers, an immature venture capital sector and imperfect competition in key sectors as major gaps in Canada's capacity to innovate. Present graduation rates also indicate that Canada is falling behind peer economies in educating a technically-skilled labour force.

Sobering implications

As already noted, a roughly 2% average annual growth rate over 2012 to 2020 represents a substantial slowing from Canada's 3.0% average growth rate over the past two decades and even from the 2.6% annual clip during 2001-2007.

Our forecast implies that per capita output will grow at a slowing pace, implying proportionately fewer new resources per person with which to support higher living standards. While labour force growth will receive a temporary boost from postponed retirement, this cannot sustain. Canada's population will increase more rapidly than will the labour force grow – likely beginning in 2013 or 2014. Although productivity growth will improve during 2012-2019, we do not anticipate sufficient productivity growth to off-set the demographic deadweight on the growth per capita output, which results from a pace of labour force growth that is less than the population growth rate.

This presents a "new normal" for the budgets of households and governments, as well as the returns on domestic capital investment.

In particular, governments cannot count on economy-wide, long-term nominal income growth much above 4%. Obviously, aggregate tax revenues can only grow above the pace of nominal income growth by seizing a larger share of nominal income. Current federal and provincial deficits must be addressed: curtailing growth in spending is essential, but, even if governments see no other option than a heightened tax share, they must resist pressure to retreat from those tax reforms that encourage productivity-improving investments.

Growth in aggregate corporate profits for domestically-focused firms will be restrained by the growth rate of the economy, and household income similarly cannot outpace economy-wide growth over the long haul. Investors must increasingly look abroad for better returns, but high-growth emerging markets will be volatile and more risky. Lastly, households cannot continue to borrow at rates exceeding income growth and prospective asset appreciation. On an aggregate basis, continued debt growth, concurrent with stagnating personal disposable income (PDI), increases the debt/PDI of the household sector, implying heightened household vulnerability and credit risk.

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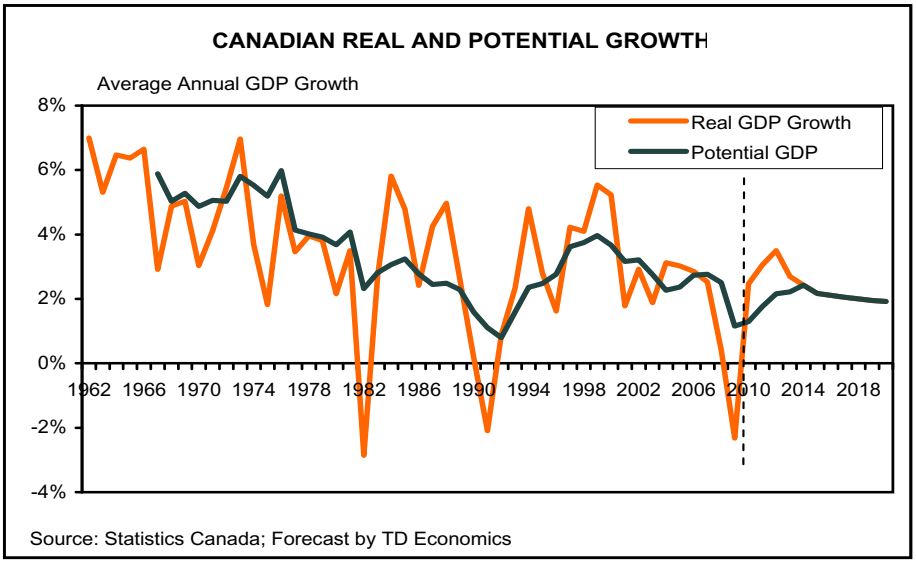
A NEW NORMAL: CANADA'S POTENTIAL GROWTH DURING RECOVERY AND BEYOND

With Canada's economy expected to have returned to positive growth in the third quarter, the focus is shifting to the management of recovery and tackling the longer-term challenges ahead. As Canadian policymakers gaze well into the future, a crucial issue is at what pace the Canadian economy can expand on a trend basis – the so-called "potential" rate of growth. Potential growth can be thought of as the "spine" around which actual growth fluctuates. Accordingly, over a longer term horizon, the actual rate of expansion in an economy tends to converge on its potential rate of growth.

In this special report, we provide a forecast of Canada's potential growth rate over the next decade and discuss its implications. Based on our calculations, the longer-term "cruising speed" of the economy is set to slow from about 3% per year on average over the past two decades to about 2% per year in 2009-19. Much of the slowdown will be front-end loaded on the next few years, partly reflecting the legacy of the recent recession. However, potential growth will remain much slower beyond 2012 relative to its pre-2008 pace. Even adjusting for a trend slowdown in population growth over the next decade, gains in real GDP per capita – a proxy for living standards – are projected to rise by an annual average of about 1% through 2019, half the 2% pace chalked up over the previous two decades.



Source: Statistics Canada; Forecast by TD Economics

GROWTH RATE OF POTENTIAL OUTPUT AND CONTRIBUTIONS OF COMPONENTS

	2001 - 07	2008	2009	2010	2011	2012	2009 - 11	2012 - 15	2016 - 19
Growth of Potential Output	2.6	2.5	1.2	1.3	1.8	2.2	1.6	2.3	2.0
Productivity Growth	1.1	0.8	0.2	0.0	0.2	0.9	0.3	1.6	1.7
Growth in Labour Hours	1.5	1.7	1.0	1.3	1.6	1.2	1.3	0.7	0.3
Per Capita Potential Growth	1.6	1.4	0.3	0.5	1.0	1.4	0.8	1.5	1.3

See Annex 2 and p.16 for detailed growth accounting

Source: Statistics Canada; Adjustments and Forecast by TD Economics

HIGHLIGHTS

- **Potential output represents the level of production that an economy can sustain without spiking inflation. Potential growth is a "speed limit" for an economy's long-run growth.**
- **We forecast a slump in Canada's average annual potential growth to 1.6% over 2009-2012 (a near halving of its historical pace) with a return to only an average of 2.1% across 2013-2019.**
- **This presents a "new normal" for the budgets of households and governments, with annual nominal income growth looking to average around 4%.**
- **In the near term, the restructuring challenges for major sectors will slow potential substantially.**
- **Over the long haul, an aging population will slow labour force growth and Canada's potential growth will increasingly rely on productivity.**
- **Infrastructure spending will boost productivity, but a major productivity resurgence is unlikely, given Canada's poor record on innovation.**
- **Slumping business expenditures on R&D and low high-tech investments appear the prime culprits for Canada's lack of innovation and slowing productivity growth.**

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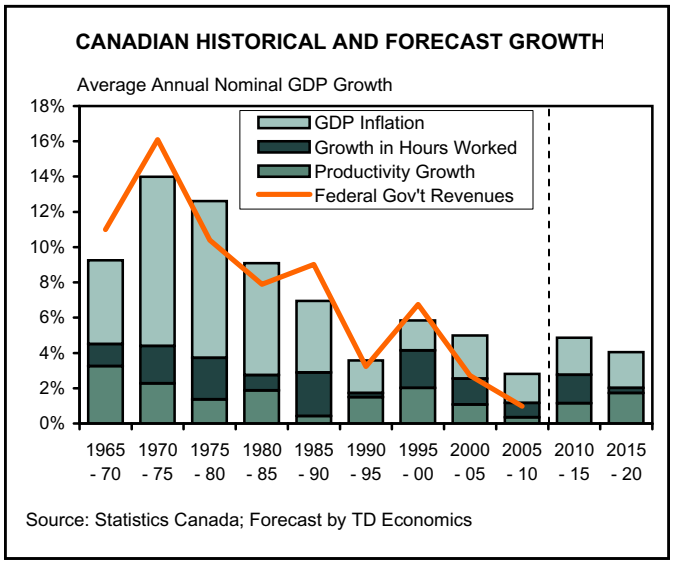
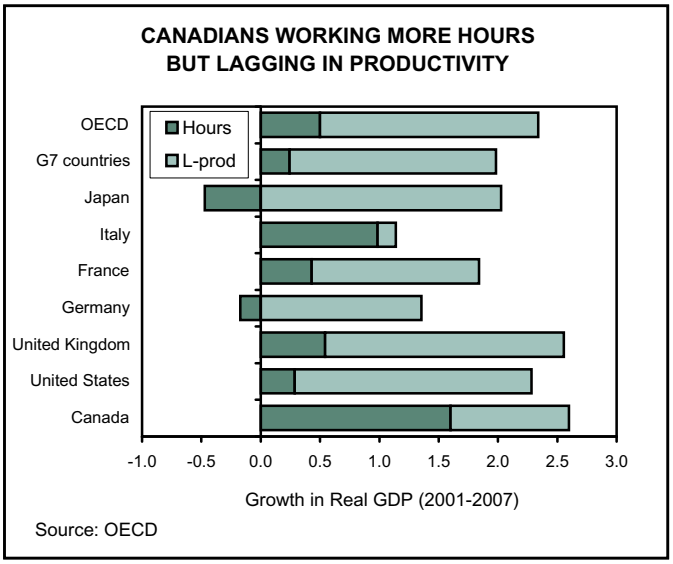
Canada is not alone in facing this trend towards slower growth, since much of it is tied to the impact of the aging population on growth in the labour force. On the plus side, we see some cause for a moderate lift in labour productivity gains – another major driver – towards the latter-half of the decade, owing to the substantial near-term re-investment in public infrastructure and a rebound in private-sector capital expenditures. However, without attention to Canada's languishing performance in technological innovation, a renewed emphasis on building a highly-skilled workforce, and a reduction in the regulatory barriers to competition, productivity growth will continue to stagnate relative to our international peers.

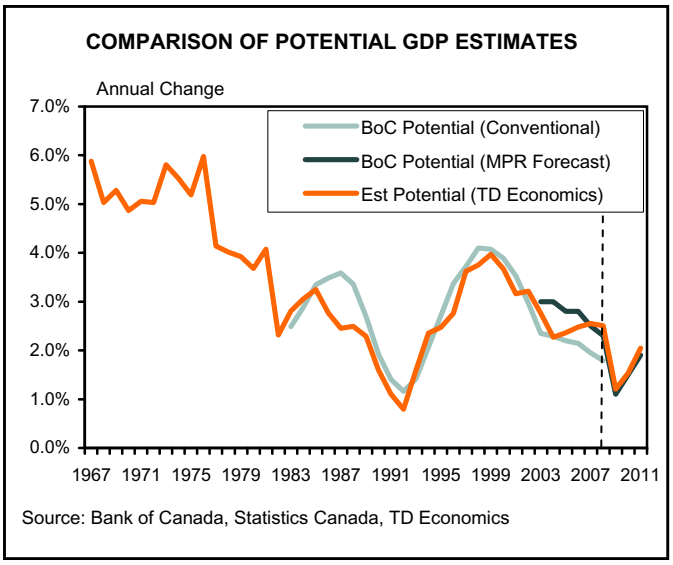
Why does potential growth matter?

An economy's "potential" is often characterized as the amount that can be produced when capital and labour are fully employed. Since the level of potential output tends to rise over time, the potential growth rate effectively represents the speed limit of the economy. However, more precisely, potential GDP is defined as the level at which an economy operates without generating accelerating inflation. The economy can perform above its potential in the short-to-medium term, but accomplishes this heightened output by employing labour and capital beyond their optimum levels. This "excess demand" places upward pressure on economy-wide price growth and can de-anchor inflation expectations. To use a metaphor, a driver can press a motor to go faster than its optimum, but, faced with frictions and firing on all pistons, it "over-heats" by doing so. The opposite dynamic occurs when the economy operates below its potential.

From a monetary policy perspective, the estimated difference between the economy's potential output and its actual







operating level is referred to as the "output gap", and is an important measure of the amount of slack (or lack thereof) in the economy. The challenge facing central bankers is that potential output is unobservable and, thus, difficult to estimate. Since the overnight interest rate is a blunt monetary policy tool with a staggered impact, central banks use the "output gap" as a gauge in order to best time interest rate hikes and "leash" inflation before it accelerates.

As we detail in Annex 1, the Bank of Canada provides a conventional measure of the "output gap" using statistical methods applied to historical data (as above, our historical estimates roughly correspond with those of the Bank), as well as publishing forecasts of near-term potential growth in their Monetary Policy Report. As in all forecasting, there is a substantial confidence range about projections. Indeed, the realized pace of potential (inferred from the "output gap") may differ significantly from the Bank's initially forecast

pace. The Bank therefore operates on a prudential potential forecast that attempts to minimize the inflationary consequences and macroeconomic volaility from any policy error.

Forecasts of an economy's growth potential are also relevant for long-term planning. For instance, the path of economic growth will impact the government's tax base and future revenues. Since governments are responsible for long-term program expenditures, accurately projecting future revenues is essential to formulating budgets in the present. While governments will run deficits during cyclical downturns, future growth will determine the sustainability of debts incurred in the present. Economic growth is also a key driver of the earnings and hence stock-market values of domestically-oriented companies. As well, average household income determines the long-run price of housing. Therefore, capital gains on residential real estate are inexorably tied to the pace of household income growth.

Most importantly, while there are admitted problems with GDP as a measure of well-being (for instance, it ignores depletion of natural capital, as well as neglects distributional issues), it does provide a measure of aggregate income. While money cannot buy happiness, income growth certainly provides more resources to spend on improving well-being in tangible ways. Improvements in standards of living are certainly correlated with economic growth – whether across countries and over time. However, economic growth must be viewed on a per capita basis in order to have a meaningful representation of the relative income available. The slower is potential growth relative to the growth rate of the population, the less are improvements in the domestic output per person that can be used to improve standards of living. Slower per capita potential growth means the "economic pie" expands more slowly.

How do economies grow?

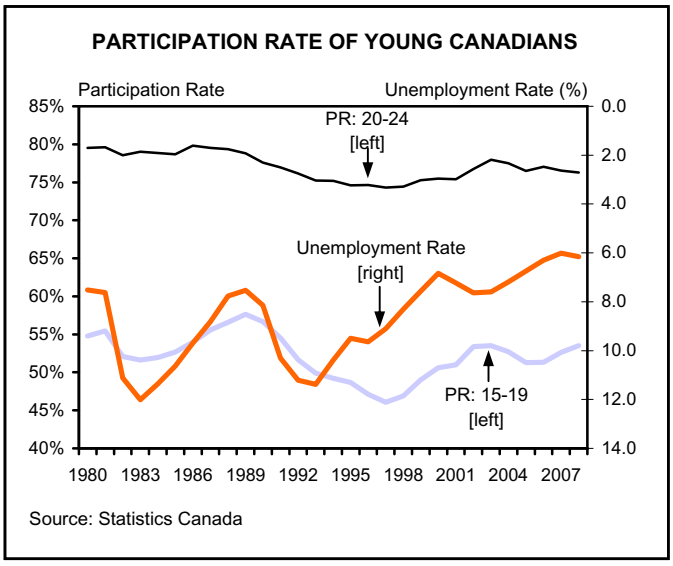
In contrast to near-term GDP growth forecasts, which focus on the components of aggregate demand[i], projections of potential growth are based on the components of long-run aggregate supply. Over the medium-to-long term, there is a critical distinction between the demand for goods and services and the capability of the economy to supply that output. In order to grow over the longer haul, an economy must add to its productive capability, either by increasing the amount of labour, increasing the stock of capital or advancing technologies that facilitate production.

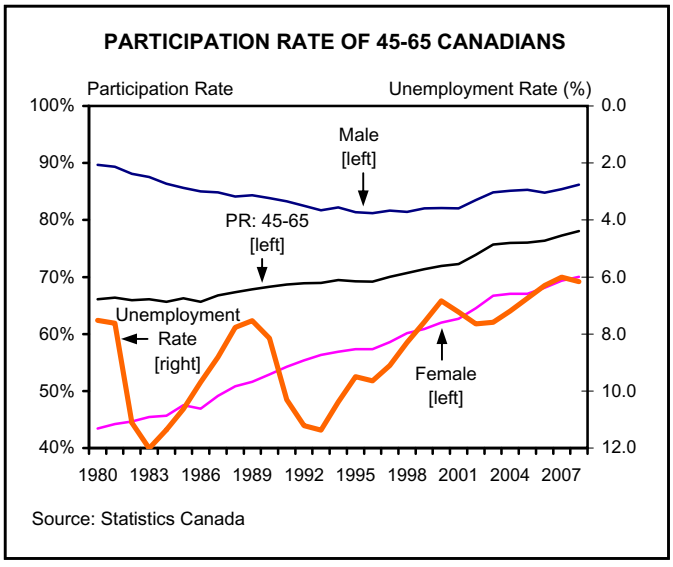
Potential GDP growth can be disaggregated into two broad components: gains in hours worked and gains in labour productivity (i.e., output per hour worked). The importance of productivity as driver of growth has been well-documented.[ii] Higher productivity means that a given level of output can be generated using fewer hours of labour, or, alternatively, more output can be produced by working the same number of hours. Since individuals generally value having time away from work, higher productivity enables a better work-life balance.

Growth in hours worked primarily follows the growth in the labour force. In turn, the growth of the labour force is

i That is, the sum of consumption, investment, government purchases, and net exports (exports minus imports).

ii For a canonical review, see:
Jorgenson, D.W. "Productivity and economic growth" in *Fifty Years of Economic Measurement: The Jubilee Conference on Research in Income and Wealth*, 1990.
For a Canadian perspective, see:
Sharpe, A. "Three Policies to Increase Productivity Growth in Canada" in *A Canadian Priorities Agenda*, J. Leonard, C. Ragan and F. St.-Hilaire (eds.), 2007.





a product of such demographic factors as changes in working age population and labour-market participation rates. As well, since not all individuals in the labour force are working, the trend (or structural) unemployment rate must be factored into the equation.

The aggregate participation rate is particularly sensitive to demographic trends. Younger workers have lower participation as many undertake schooling; participation rates are highest for prime-aged (25-55) workers; and participation is lower among older workers, reflecting a higher share of retirees at more advanced ages. However, social changes, structural trends and cyclical economic conditions can all influence participation rates. For instance, across developed economies, increasing participation rates by prime-aged women have been a major driver of labour force growth. As well, the returns to education relative to the foregone near-term wages will influence youths' years in school. A "tight" market for low-skilled workers (such as generated by a resource boom) can thereby discourage schooling, resulting in heightened participation by younger workers. For older workers in developed economies, longer life expectancy, major losses in retirement savings and the end of mandatory retirement would all contribute to heightened participation rates.

Labour productivity is the main source of long-run growth. To quote one prominent economist, "Productivity isn't everything, but, in the long-run, it's almost everything."[iii] In general, labour productivity describes how labour effort is translated into output. While the concept of productivity is straight-forward, in actuality there are many moving parts.

Productivity can be broken down further into a number of elements:

1. The amount and type of capital available to workers for each hour worked;
2. The skill level (or "human capital") of workers;
3. Public infrastructure that facilitates production; and
4. Other, less observable factors such as technological progress, organizational structure, managerial effectiveness, and quality of economic institutions.

(In Annex 2, we assess potential growth through this more detailed and technical accounting of productivity.)

Today, there is general consensus on the public policies which promote growth in developed economies. These include low and stable inflation, balanced government budgets over the long-term, low taxation on capital investment, regulations that promote competition, incentives for private-sector research and development, investment in basic research, access to high-quality education, and world-class infrastructure. For Canada, a crucial challenge is to remove the barriers that inhibit equal economic opportunities for immigrants and for Aboriginal people. Underlying these policies must always be a well-designed set of institutions. As we discuss in the text box (p.6), effective institutions are critical in creating the incentives for individuals and organizations to invest and innovate. Such economic institutions include the financial system, the legal system, competition policy, the tax system, social insurance, and fiscal arrangements to provide "public goods".

SOURCES OF CANADIAN OUTPUT GROWTH (IN BUSINESS SECTOR)

	Hours Growth	Productivity Growth	GDP Growth
1962-2007	**1.7%**	**2.1%**	**3.8%**
1962-1970	1.8%	3.7%	5.5%
1971-1980	2.2%	2.2%	4.4%
1981-1990	1.6%	1.4%	3.0%
1991-2000	1.4%	2.0%	3.3%
2001-2007	1.5%	1.1%	2.6%
Post-recession			
1983-1987	3.0%	1.5%	4.5%
1993-1998	2.4%	1.7%	4.1%
Source: Statistics Canada			

Why has Canada's growth slowed?

Canada's output growth rate has followed a generally slowing trend over the past half century. After reaching 5% per year (in real terms) in the 1960s, growth slackened considerably to 3% per year in the 1980s. Although the annual rate of expansion managed to accelerate modestly in the 1990s to just above 3%, it has since resumed a downward path so far this decade, averaging 2.6% per year. Worse still, since 2001 potential has drifted downward from over 3% at the start of the millennium to approximately 2% in 2007 and 2008.

At first glance, the ratcheting down in Canada's growth performance this decade is at odds with the prosperity enjoyed prior to this past year's recession. This can be chalked up to the boom in commodity prices that lifted the country's terms of trade and fuelled blistering growth in nominal income. Since commodity prices tend to be highly volatile our focus is on real (price-adjusted) GDP.

The accompanying table (p.7) reveals the main driver of

iii Krugman, P. "Age of Diminished Expectations" MIT Press, 1997.

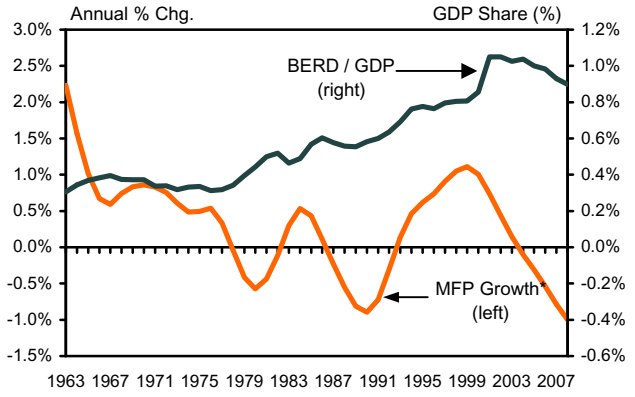
Slumping business-sector R&D and the Productivity Slow-down

Business sector R&D (BERD) has declined as a share of GDP since peaking in 2001. This slump in BERD share coincides closely with Canada's fall-off in multi-factor productivity (MFP) – the component of productivity growth that proxies for the rate of technological progress[i]. Comparing BERD and MFP across advanced economies, higher BERD is clearly associated with better MFP growth over 2000-2005. The relationship is less clear during the late 1990s, but this was a period where the adoption of a general-purpose technology (the personal computer) could facilitate rapid productivity gains.

The apparent relationship between BERD and MFP is unsurprising: economies can only advance technologically by buying high-tech capital or developing it themselves. As any engineer or scientist will attest, technological or scientific advances will not come without exerting effort, but nor does slogging at the lab bench guarantee success. However, the level of research activity certainly has bearing on whether and at what pace technology will advance in the long-run: the technological frontier won't push itself forward. Investing in R&D is intuitively a necessary but not a singularly sufficient condition for successful innovation.

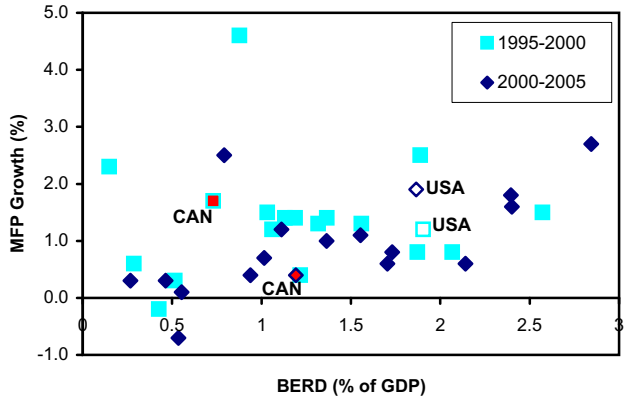
Indeed, Canada's comparatively lack-luster BERD appears to be reflected in our laggard patent performance, with Canada still under-performing the OECD average in terms of triadic patent families per capita.[ii] Intuitively, Canadian businesses won't win the patenting race if they lag competitors' spending. With advances increasingly incremental, progress at the technological frontier requires a greater proportional R&D investment. But while falling BERD and consequently laggard record in innovation appear closely linked to Canada's faltering productivity performance, it is unclear why Canadian industry has underinvested in innovation. We explore the issue, its implications and potential remedies in Annex 3.

CANADA'S BUSINESS R&D EXPENDITURE AND MULTI-FACTOR PRODUCTIVITY



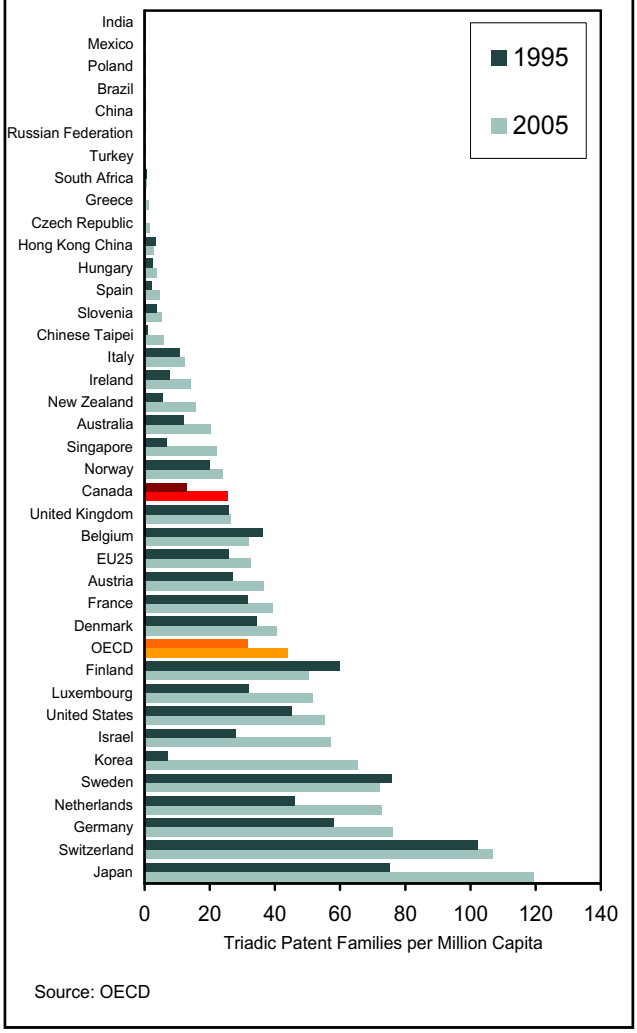
Source: Statistics Canada
* MFP smoothed using Hodrick-Prescott filter

BUSINESS SECTOR R&D EXPENDITURE AND MFP GROWTH FOR SELECTED OECD ECONOMIES



Source: OECD

CROSS-COUNTRY PATENTING PERFORMANCE



Source: OECD

i See Annex 2 for the growth accounting framework that we use in this report.

ii Triadic patent families refer to patents filed with the European, U.S. and Japanese patent offices to protect the same invention.

Institutions Rule

In the long-run, economic institutions shape the incentives for individuals to under-take privately profitable and socially beneficial activities, such as investing or innovating. Moreover, economic institutions are pivotal in creating competitive markets, as well as correcting "market failures" that inhibit an efficient outcome in competitive markets. Across countries and within economies, an abundance of theoretical and empirical research has illustrated the importance of institutions to the long-run pace of economic growth. Six key economic institutions are: the financial system, the legal system, competition policy, the tax system, provision of social insurance, and fiscal arrangements to provide "public goods".

To elaborate, a stable and efficient financial system is the essential "hand-maiden" of the real economy, ensuring the credit is channeled to the best investments. The past year's crisis in international credit markets exhibits the weaknesses of many jurisdictions' financial regulatory regimes, and highlights the general effectiveness of Canada's own financial system architecture. However, Canada notably lacks certain elements, like a well-developed venture capital sector, that are important ingredients for supporting private-sector innovation.

A well-functioning legal system is necessary to the enforcement of contracts, the resolution of insolvency, and adjudication of property rights (especially intellectual property rights), but excessive legal costs on transactions or inadequate protections on property can dissipate the returns to economic activity. Canada's absence of a single national securities regulator has been widely cited as an unreasonable impairment to companies' access to capital markets.

Competition policy is also crucial. A failure to restrain the exercise of market power can deter entry by potential competitors or allow predation by incumbents. On the other hand, protectionist trade provisions and excessive regulation of industry can also shield oligopolies and hinder the emergence of innovative firms. Present regulations protect major participants' market power in Canada's telecommunications and air transportation sectors, as well as place barriers on inter-provincial migration of high-skilled professionals.

On the tax front, poorly targeted taxation or subsidies can inefficiently distort the returns to particular activities. Certain taxes or subsidies may correct existing distortions (for instance, taxes on pollution), but many others create a misallocation of resources or diminish the returns to beneficial activities. Many of Canada's corporate tax provisions favour particular sectors. As well, various tax provisions disproportionately favour small business, arguably preventing aggregate productivity gains through scaling-up of more productive enterprises. Although recent steps have rightly been taken to phase-in low and neutral corporate taxation, still levy an excessive tax burden on capital investment.

The role of social policy in promoting growth should not be underestimated (see: TD Special Report "How are we doing on Social Policy" August 24, 2009). Such programs include universal healthcare, insurance against unemployment, old-age security transfers, and public pensions, as well as might arguably include income-targeted public subsidies for education. While poorly-designed social insurance can contribute to labour market inflexibility and thereby be a drag on growth, well-designed social programs can contribute positively to growth in at least three ways: encouraging socially-optimal investments and risk-taking by individuals, promoting efficiency within labour markets, and securing political support for market-oriented reforms.

On the final point, trade liberalization or removal of competitive barriers may involve displacement for certain workers as labour is more efficiently allocated. While such market liberalization can spur economic growth, there are short-run winners and losers. Society must then provide social insurance to buffer affected workers against these dislocations, to smooth the reallocation of labour and to assuage potential political opposition from entrenched special interests. Put bluntly, workers will not fear deregulation of protected, inefficient industries if there is hope for retraining and for a better job. Similarly, workers should not as greatly fear trade openness if losing one's job doesn't mean losing access to healthcare or being unable to see one's children attend college.

In addition to shaping the institutional setting, governments are also often direct providers of physical infrastructure, as well as other "public goods"[i] that a market would otherwise under-provide or fail to provide. While not directly producing output, public infrastructure is nonetheless critical to productivity growth. Public infrastructure exists in a variety of forms with the central characteristics of being fixed, long-lived assets that facilitate the production of output.[ii] Roads, municipal water and sewage, dams and electric grids are all examples, sharing the features of being key complements to private-sector production and having few viable substitutes.

As well, the public subsidization of basic research (that is, research that produces widely-applicable knowledge rather than a commercial application) provides a needed seed for broader innovation. In shaping effective economic institutions and correcting market failures, public policy then plays an essential role in creating the right conditions for growth.

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i "Public goods" have a specific economic definition: goods from which users cannot be easily excluded and which many users can enjoy without excluding others' concurrent use. Roads, parks, public art, national defense, or knowledge are good examples – although the first two are not "pure public goods" in the sense that they can be congested by many users.

ii Baldwin, J.R. and Dixon, J. "Infrastructure Capital: What is it? Where is it? How much of is it there?" Canadian Productivity Review, Statistics Canada, no. 15-206-X, no. 016, 2008.

the slowdown. Apart from an uptick in the 1970s due to the increasing labour market participation of "baby boomers", average hours have grown at a fairly stable pace. Labour productivity has been the chief culprit, slowing from 4% in the 1960s to only 1.1% per year so far this decade. While the 1990s marked a respite from the secular productivity slide, the rebound reflected the benefits accrued by the boom in information communications and technology (ICT) investment in the second half of the decade.

These Canadian trends resonate even more when viewed in the international context. What immediately jumps out from the tables is the fact that the trend slowdown in expansion over the past 40 years has been an international phenomenon. In fact, Canada has managed to exceed the G-7 average in terms of absolute and per-capita growth throughout much of the overall period. However, Canada's outperformance has disproportionately tied to growth in hours worked. In contrast, the nation's productivity gains have trailed behind its G-7 peers in each and every period. So far this decade, Canada's productivity growth rate has been around 60% of the G-7 average.

A comprehensive assessment behind these trends is beyond the scope of this report. (For a summary, see text box on p.18 in Annex 2). Suffice to say that Canada's stronger rate of hours worked has been tied to heightened labour force participation and more rapid growth in the working-age population, compared to other major industrialized countries. Canadian women, in particular, entered the workforce in droves during the late 1970s and early 1980s. And, in the 1990s and 2000s, Canada's structural rate of unemployment fell more quickly than average.

Still, the greater mystery is Canada's lagging historical productivity performance.[iv] Some of the key arguments put forward in economists' circles include:

- The 1960s represented a golden period for Canada's economy when significant public and private investment and R&D spending took place to support booming migration, population growth and a build-up of heavy industry. These investments generated out-sized returns to productivity and growth in early stages. But as returns diminished, productivity growth weakened.
- Growing government budget deficits in the 1970s and 1980s triggered large increases in Canada's corporate and personal tax burden. High inflation and interest rates also reduced the incentive of the private sector to invest over this period. The budget deficits put a damper on government funding of education and infrastructure, with especially pronounced reductions in the 1990s.
- The secular decline of the Canadian dollar in the 1990s provoked talk about "lazy manufacturers", whose artificially-increased competitiveness reduced incentives to invest. Of course, currency depreciation boosts domestic profits because labour costs (i.e., wages and benefits) are relatively fixed in nominal

INTERNATIONAL COMPARISON FOR SOURCES OF GROWTH

		1971 - 1980	1981 - 1990	1991 - 2000	2001 - 2007
Canada	**GDP**	**4.0**	**2.8**	**2.9**	**2.6**
	Hours	2.1	1.8	1.0	1.6
	L-prod	1.8	1.0	1.8	1.0
United States	**GDP**	**3.2**	**3.2**	**3.3**	**2.3**
	Hours	1.6	1.8	1.6	0.3
	L-prod	1.6	1.5	1.7	2.0
United Kingdom	**GDP**	**1.9**	**2.7**	**2.5**	**2.5**
	Hours	-0.8	0.7	-0.1	0.5
	L-prod	2.7	2.0	2.6	2.0
Germany	**GDP**	**2.9**	**2.3**	**2.1**	**1.2**
	Hours	-0.9	0.0	-0.4	-0.2
	L-prod	3.7	2.3	2.5	1.4
France	**GDP**	**3.6**	**2.4**	**2.0**	**1.8**
	Hours	-0.5	-0.6	-0.1	0.4
	L-prod	4.1	2.9	2.0	1.4
Italy	**GDP**	**3.7**	**2.4**	**1.6**	**1.2**
	Hours	-0.2	0.6	0.1	1.0
	L-prod	4.0	1.8	1.5	0.2
Japan	**GDP**	**4.4**	**3.9**	**1.2**	**1.6**
	Hours	0.2	0.5	-0.9	-0.5
	L-prod	4.2	3.4	2.2	2.0
G7 countries	**GDP**	**3.4**	**3.0**	**2.5**	**2.0**
	Hours	0.4	0.9	0.5	0.2
	L-prod	2.9	2.1	2.0	1.7
OECD	**GDP**	**-**	**-**	**2.9**	**2.3**
	Hours	-	-	1.1	0.5
	L-prod	-	-	2.2	1.8

Source: OECD

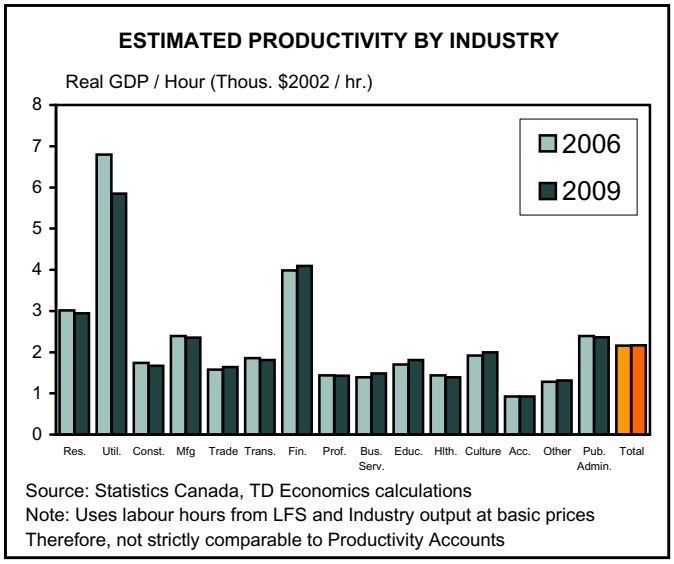
The decomposition in the above international comparison table and that for Canada on p.4, represent respectively growth in the total economy and the business sector. Note that these differ marginally but, as we assume in this report, economy-wide output growth primarily tracks that of the business sector. See Annex 2 for greater explanation.

iv For comprehensive reviews, see:

Baldwin, J.R. and Gu, W. "Productivity Performance in Canada, 1961 to 2008: An Update on Long-term Trends." Canadian Productivity Review, Statistics Canada, no. 15-206-X, no. 025, 2009.

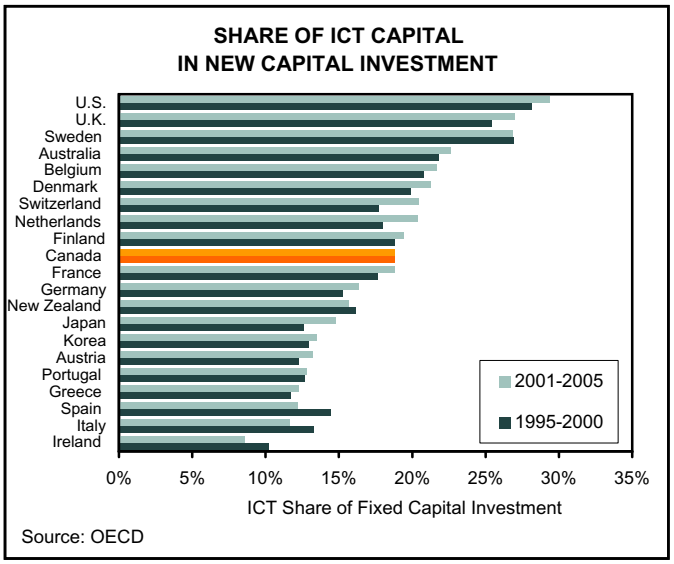
Arsenault, J.-F., and Sharpe, A. "An Analysis of the Causes of Weak Labour Productitvity Growth in Canada since 2000" International Productivity Monitor, No. 16, Spring 2008.

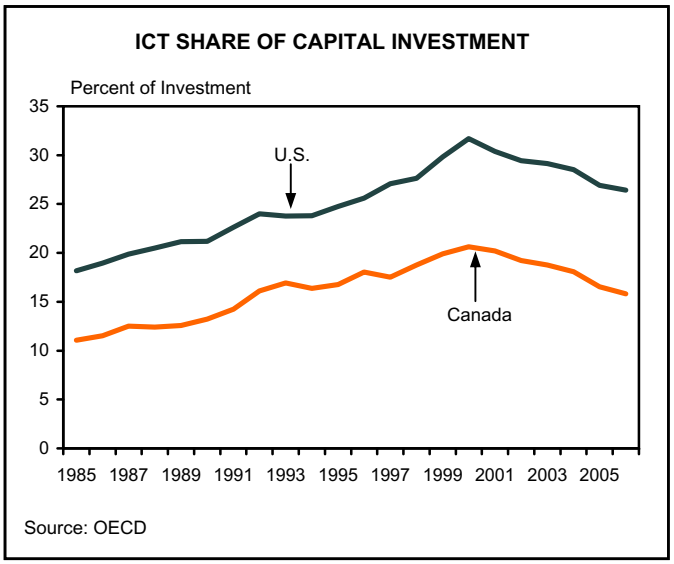
Dion, R. "Interpreting Canada's Productivity Performance in the Past Decade: Lessons from Recent Research." Bank of Canada Review, Summer 2007.



terms, but each foreign dollar now translates into more domestic currency. A low dollar is therefore a false road to long-term competitiveness. Moreover, Canada imports most of its specialized machinery and equipment (M&E) from the United States. Therefore, a depreciation of the loonie raises the Canadian-dollar cost of the M&E, diminishing the returns to near-term investment and dragging on one source of productivity growth.

- Under-investment in business capital equipment and structures is not the only area that came under pressure. Business spending on research and development (R&D) as a share of GDP has been cut back dramatically in the past decade. As we discuss in the text box (p.4), the weakening investment in R&D results in Canada's failure to produce productivity-boosting innovations. Other candidate explanations for a poor innovation record include: lower managerial quality and scarcity of innovative workers, languishing investment in "high-tech" capital, unavailability of start-up financing and barriers to foreign entry in key network industries (see Annex 3).
- More recently, the shift in Canada's production mix away from high value-added manufacturing to lower value-added services has weighed on productivity measures. Considering industries separately, aggregate labour productivity grows both from productivity growth by sector and from the reallocation of labour across sectors. During 2000-2007, productivity growth in both manufacturing and the resource sector dragged on aggregate business sector productivity. However, for the productivity effects of labour reallocation, the relative productivity levels between industries matter as well.[vi] Since manufacturing has a relatively high productivity industry, the departure of labour to a lower productivity industry, such as trade services, means a drag on aggregate productivity. It should be noted that part of the challenge in interpreting the impact of this shift is the difficulty statistical agencies encounter in accurately measuring service-sector productivity.
- During the latest interval, there were productivity-dampening distortions that accompanied the resource boom (i.e., exploitation of marginal oil and gas re-





vi See: Sharpe, A. "The Paradox of Market-Oriented Public Policy and Poor Productivity Growth in Canada" in A Festschrift in honour of David Dodge, Bank of Canada, November 2008 (available at: http://www.bankofcanada.ca/en/conference/2008/festschrift_08.html)

Pricing Carbon Emissions: The other elephant in the room

Although we do not consider the issue explicitly, the impact on potential output of strategies to mitigate carbon emissions must also be mentioned. A recent assessment by MK Jaccard and Associates explicitly modelled the reduction in economic output from strategies to achieve different emissions targets.[i] These costs are substantial - particularly for certain regions.

The impact of carbon pricing policies on potential output is highly dependent on the efficiency of the pricing mechanism and the global context of carbon reduction strategies. The pricing of carbon emissions would additionally depress productivity if it discriminates between industries and results in a distorted distribution of abatement costs. As well, international agreements on carbon pricing or the domestic treatment of export goods will affect the competitiveness of Canadian exports.[ii] If domestic or foreign carbon pricing policies reduce the competiveness of Canadian exports, the drag on exports would translate into downward pressure on aggregate demand. For both export competitiveness and productivity, effective policy design and implementation is critical to limiting the downside risks of carbon pricing.

For any move to carbon pricing, the impact on near-term potential output is likely negative. Current production processes must be re-structured so as to limit its carbon output. Certain capital goods and infrastructure will be made obsolete and will depreciate more rapidly, reducing the aggregate capital stock. However, it should be noted that the downturn has accelerated restructuring within Canada's manufacturing industry. If carbon pricing will be implemented within the next decade, government would be well-advised to provide companies who are presently undertaking restructuring with some certainty as to the mechanism and timeframe for that pricing.

One may well conjecture that carbon pricing will have a positive longer-run impact on innovation and the efficiency of production with respect to energy inputs. Empirical research demonstrates that, when implemented with predictability and consistency with respect to abatement costs, environmental regulation can strongly promote environmental technological innovation.[iii] Nonetheless, at present, the short-run costs of shifting to lower carbon production are most likely significantly greater than the prospective boost to near-term productivity.

However, in no way is this an argument against mitigating Canada's carbon emissions. Economists regard the lack of a price on pollution as a market failure, since private costs do not reflect the social costs of emissions. We do not build carbon pricing into our projections of potential; however, nor do we incorporate the present or future costs of climate change. Indeed, without abatement, the long-run impacts of climate change on Canada's long-run potential output – and that of the world – could be severely negative.[iv]

i Bataille, C., Wolinetz, M., Peters, J., Bennett, M.. and Rivers, N. "Exploration of two Canadian greenhouse gas emissions targets" M.K Jaccard and Associates, October 2009 Available at: http://pubs.pembina.org/reports/mkja-climate-targets-report.pdf

ii Bataille, C., Dachis, B. and Rivers, N. "Pricing Greenhouse emissions : The impact on Canada's Competitiveness" C.D. Howe Institute, No. 280, February 2009.

iii Johnstone, N., Hascic, I. and Popp, D. "Renewable Energy Policies and Technological Innovation: Evidence based on Patent Counts." Environmental and Resource Economics, 2009.

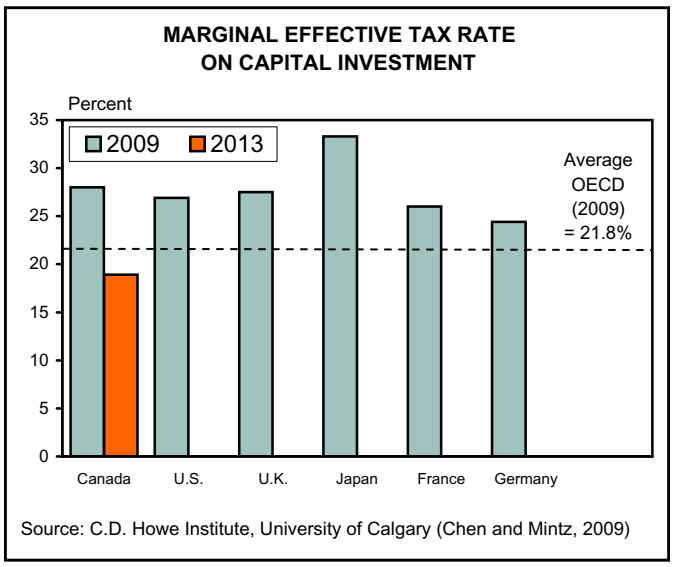
iv Stern, N. and Peters, S. and Bakhshi, V. and Bowen, A. and Cameron, C. and Catovsky, S. and Crane, D. "Stern review: the economics of climate change" Her Majesty's Treasury, 2006.

serves, disincentives for upgrading skills, clumsy use of workers) that have weighed on Canada's productivity showing in recent years. While the relatively high productivity level of the resource industry means that a reallocation of labour to that industry boosts aggregate productivity, slower productivity growth in the sector was a net drag on aggregate productivity (particulalry its "technological progress" component. See Annex 2).

As we discuss later, many of these trends have been reversed since the late 1990s as deficits fell. For example, government support across key areas of infrastructure and education have rebounded forcefully in the past decade. Furthermore, the tax structure has become more competitive, and key reforms, such as sales tax harmonization, have either been, or will soon be, implemented. While governments have been moving in the right direction, the benefits of these actions have not yet been visible in the productivity numbers. This probably reflects a combination of the long lags associated with shifts in policy and the significant barriers that remain in some of the key areas, such as personal taxation and innovation.

The Outlook for Canada's Potential Growth

In this section, we forecast Canada's potential growth over both the medium term (2009-12) and longer-term (2012-19). Details of this potential growth forecast are provided in the table on p.14. Our outlook is based on the "status-quo". In other words, we do not assume any major change in public policies above those that have already been announced. Nor do we assume any dramatic



shift from recent trends in the Canadian dollar and world commodity prices: we assume the Canadian dollar will average USD 0.80 to USD 0.85 over the longer-term and that commodity prices will achieve gradual real increases in-line with the pace of global demand. We have also not built in any impacts from a likely move towards some form of carbon pricing in the future, given the major uncertainties related to how climate-change policy will be implemented (see text-box, p.9).

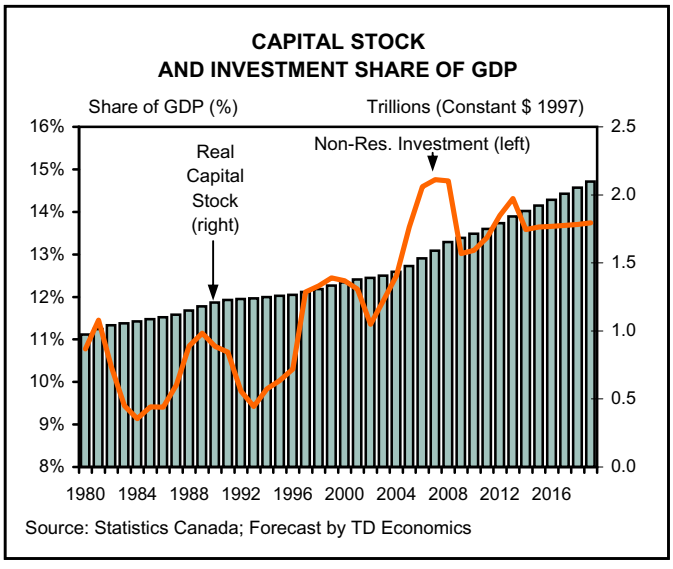
As a reminder, these estimates of potential growth represent a speed limit based on the supply-side factors of the economy. Since the recent recession has resulted in a large output gap, actual growth can be expected to outperform our estimates of potential growth over the next few years. The Bank of Canada is assumed to conduct monetary policy in order to absorb the outstanding economic slack and return core inflation to its 2% target. We believe that the gap will be eliminated in 2012. Thereafter, while actual growth will always tend to cycle around the economy's potential, on a longer-term average basis, the two rates should dove-tail.

Potential growth to slow to only average 1.6% from 2009 to 2012

Despite recent signs of recovery, the recession is likely to leave its legacy on Canada's potential growth rate over the next few years. At 1.6% per year in 2009-12, the average cruising speed would be a major deterioration even compared to the relatively depressed rates over the past 2-3 years. At the same time, with other economies also experiencing like headwinds, our projection for 2009-2012 is above the OECD's projection for the overall G-7 but roughly on par with the average across 24 largest OECD members. Canada's financial system and overall economic fundamentals are in a better state than most of its peers. Therefore, we project lesser fallout from the global credit crisis on Canada's economy in the medium-term.

Similar to past recessions, the recent one has created disruptions within key sectors and led to destruction of productive capacity. Keep in mind that some of the structural declines were evident in Canada's manufacturing sector prior to the downturn, but the recession acted to accelerate the pace of restructuring. Cuts in business investment, notably in ICT, over the past year will also dampen the growth rate of capital and weaken productivity. Diminished corporate profits have also dragged down business expenditures on R&D, which we argue is the prime culprit behind Canada's faltering productivity growth. A lack of investment in innovation lowers the probability that innovation will occur, and a steepened decline in the share of GDP devoted to business expenditure on R&D (BERD) presages continued stagnation

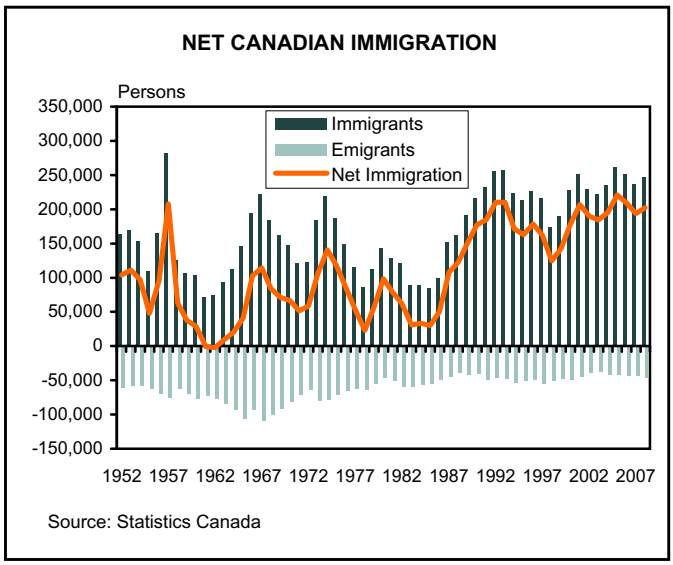
Additionally, we project a modest rise in the structural rate of unemployment, which will weigh on growth in labour hours and in the "quality" of labour. However, the effect of this rise in structural unemployment should prove transient. Compared with more rigid European labour markets, Canada's labour market is relatively free of the frictions that threaten to translate short-term joblessness into persistent, long-term unemployment. Nonetheless, unemployment will result in the atrophying of certain skills and, with the permanent closure of plants, certain work experience that is process-specific will become obsolete. Unemployed workers' success in retraining is crucial to boosting the longer-term growth in labour quality, but successful retraining will not happen overnight.



Can immigration remedy the slowdown?

Canada's net immigration obviously is strongly determined by policy, but global developments are also relevant. Immigration has become Canada's predominant source of population growth and, likely by 2010, will account for all of Canada's labour force growth. Of course, immigrants age and ultimately retire as well. Heightened immigration and a focus on younger immigrants are nonetheless touted by certain commentators as a possible solution to slowing labour force growth. However, as recently exhibited by Banerjee and Robson (2009), even shifting to a younger age-target for admitted immigrants, present immigration rates would need to more than double to 16 per thousand from approximately 7 per thousand in order to maintain a 1.3% growth in the working age population. This would be a massive policy shift and near-term public expenses would be substantial for settling such intensified immigrant inflows.

A heightened net intake and targeting of younger migrants would also assume that Canada remains attractive to potential migrants and, indeed, that domestic labour markets continue to have adequate "gravity" to retain workers. Indeed, as Banerjee and Robson (2009) note, in order to achieve a "more and younger" strategy, Canada would need to divert nearly 2/3 of the 20-24 year-old immigrants who presently go to the 11 other major immigrant-receiving OECD countries.[i] This would depend on both Canada's "salespersonship" to potential migrants, and, more importantly, on potential migrants relative returns to immigrating to different countries. The lagging labour markets outcomes of immigrants to Canada has been extensively researched, with immigrants' wage and employment gaps relative to domestic-born peers persisting at all education levels.[ii] Canada still boasts positive real wage differentials with present sending countries, preserving an incentive for migration. However, these differentials may narrow as emerging markets growth continues to outpace that in Canada. Moreover, emigration rates could conceivably increase as Canada's domestic-born or immigrant workers perceive better opportunities abroad.



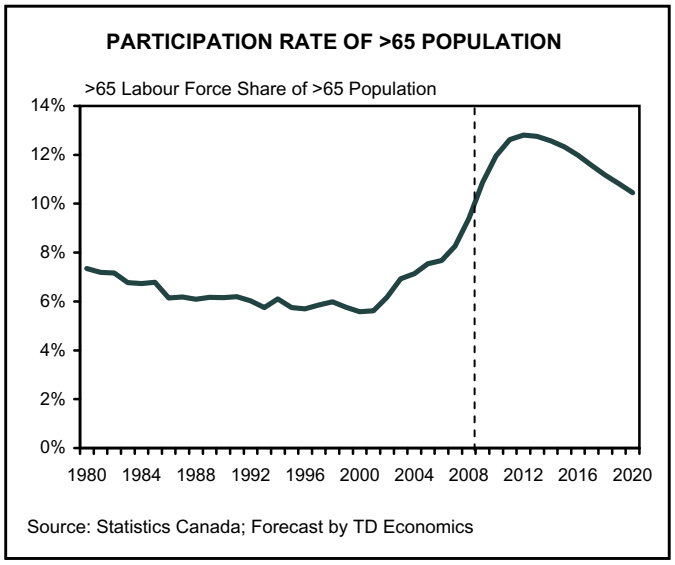
i Banerjee, R. and Robson, W. "Faster and Younger? Not so Much: Immigration's Impact on Canadian Workforce Growth and Age Structure." C.D. Howe Institute, No. 291, July 2009.

ii Gilmore, J., and C. Le Petit. "The Canadian immigrant labour market in 2007: Analysis by region of postsecondary education." Analytical Studies Branch Research Paper Series. Statistics Canada, 2008.

On the plus side, a number of factors are expected to prevent a more dramatic slowdown in potential growth over the next few years. Canada is poised to benefit further from the relative protection of its banks from the still-festering wounds of the financial crisis. Commodity prices are expected to recover over the next few years, but remain well below their recent peaks set in 2007-08. As such, we expect that some of the productivity-dampening distortions that accompanied the resource boom will ease over the next few years. Lastly, benefits will continue to flow from large public infrastructure investments in recent years, which were enhanced substantially in this year's round of stimulus budgets. Recent measures to lower the marginal effective taxation of business through lower income tax rates and sales-tax harmonization[vii], temporary measures to accelerate capital cost write-offs for M&E spending, the strengthening trend in the Canadian dollar are some notable factors that should put a floor under weakness in business investment.

As economic recovery takes hold and the impact of some of the recessionary factors ease, Canada's potential growth rate will improve gradually, rising from an estimated 1.2% in 2009 to 2.2% in 2012. As we show, this strengthening largely reflects a rebound in labour productivity from its recent ultra-depressed levels. Still, rising to only 0.9% by 2012, trend labour productivity will remain in the lower end of the recent range. As a temporary increase in the structural unemployment rate abates, firming in growth in hours worked will lend a helping hand to growth, but population aging prevents a return to the pre-recession pace of labour force growth.

vii See: Chen, D. and Mintz, J.M. "The Path to Prosperity." C.D. Howe Institute, No. 295, September 2009



Longer-term Growth Pegged at just over 2%

We project that Canada's potential growth between 2013 to 2019 will average 2.1%. With Canada's labour force growth declining steeply after 2012, potential growth will increasingly depend on Canada's performance on the productivity front. More specifically, growth in hours worked are assumed to track gains in the labour force. And by our calculation, those should slow to a paltry 0.5% per year largely reflecting the impact of the aging population and a decline in the overall participation rate. In contrast, trend labour productivity is expected to accelerate to 1.7% per year in 2013-19.

Labour force under siege

We forecast long-term labour force growth based on population projections and projected participation by age group. We employ Statistics Canada medium-scenario population projections, which assume annual immigration and emigration rates consistent with recent history. These net immigration rates assume no major changes from current immigration policies or in Canada's ability to attract immigrants (see text-box, p.11).

Our assumptions on participation rates by age group are shown in the accompanying table.

The participation of younger workers (15-35 years) will likely diminish somewhat in the near-term, owing to dampened employment prospects and consequent "stay-in-school" incentives. However, we expect the participation rate of younger workers to begin to rebound in 2011 and to trend upwards thereafter.

Participation of core aged workers (aged 35 to 55 years) has steadily increased, owing primarily to heightened participation by females in this age range. The recent relative strength of employment among this group should encourage continuing increases in female participation. Over the longer-term, we would expect the trend towards higher female participation to continue – albeit at a moderating pace.

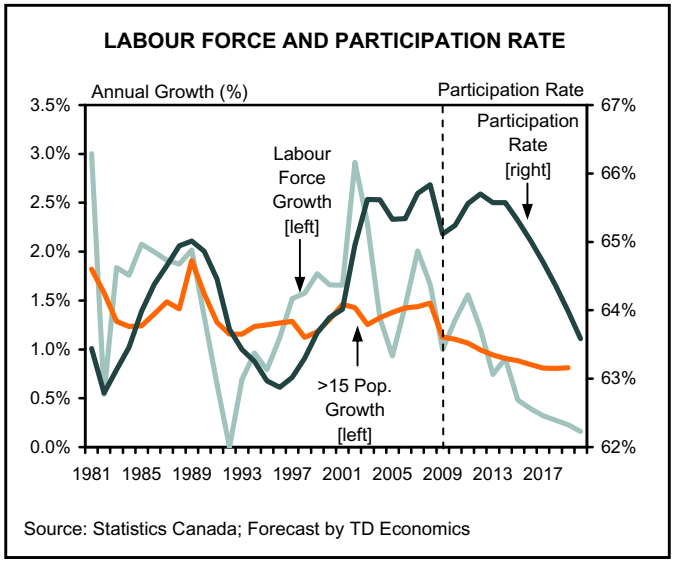
The behaviour of near-retirees (55+ years) represents the largest unknown. And given its increasing weight in the overall labour market, long-term labour market forecasts are highly sensitive to the assumptions made. Recent trends, including the end of mandatory retirement, downgrading expectations of long-term returns, changes to pension plans and increasing longevity, suggest that an increasing share of older workers will stay either fully or loosely attached to the labour force in greater numbers than before. We forecast a scenario in which approximately two-thirds of those workers who turn 65 years opt to remain in the labour force and these will, on average, remain there until age 68 or 69 years of age.

Despite an expected rise in participation rate in older workers, the relatively low participation of this cohort will still impose a gradual downtrend in overall participation. Taken together with a slower trend in gains in adult population, growth in the labour force is set to slow well below the rate of population growth. In fact, by 2019, the labour force will effectively stagnate.

LABOUR FORCE PARTICIPATION RATE BY AGE GROUP (2001-2019)

	15-19	20-24	25-45	45-64	>65	Total
2001-2004	52.7%	76.9%	85.1%	70.9%	6.5%	67.0%
2005-2008	52.2%	76.6%	86.0%	72.8%	8.2%	67.4%
2009-2012	47.0%	73.0%	86.1%	74.2%	12.1%	65.4%
2012-2019	52.6%	76.0%	86.1%	75.2%	11.7%	64.8%

Source: Statistics Canada; Forecast by TD Economics



Productivity growth poised to perk up somewhat

The stagnation in the labour force by 2019 suggests that Canada's capacity to grow will be almost fully driven by gains in labour productivity. While a languishing performance in innovation is likely to continue to plague productivity, the painful restructuring of Canadian industry should result in productivity gains by ultimately giving birth to new products and production processes. While we see this development as realistic, it also embeds a touch of optimism. It assumes that Canadian industry devotes an increasing share of value-added to innovative activities and investment in high-tech capital, that workers are effectively re-trained, and that educational attainment of younger workers is boosted. As detailed in the table on p.14, these assumptions are captured in the boosts to the respective components of our growth accounting. We assume that investment in innovation is sufficient to stave off additional "technological" regress (that is, the ongoing fall in "multifactor" productivity). However, to the extent that these assumptions do not materialize, labour productivity would fall short of our projection.

One silver lining to the productivity outlook is that, as a consequence of slower labour force growth, proportionately less investment is needed to increase the capital/labour ratio. Since the labour force will be growing at a slower pace, each additional percentage point of investment in the capital stock gets more "bang," and more capital for each worker buoys productivity.

Another reason to believe productivity will accelerate from its recent anemic showing comes from recent policy moves. Echoing an earlier point, the recent shifts by government towards a more efficient and competitive tax system should pay longer-term dividends. While the return to deficits suggests that a period of restraint is looming, we assume that reductions in shortfalls can occur gradually without a major reversal in tax rates or sizeable outright spending cuts. To the extent that governments have to change course more violently than we expect, some of the benefits of the past policy actions could be muted.

Implications

On its surface, decline of annual potential growth by around 0.5% to just over 2% might not seem so severe, but this does represent a substantial dampening of the rate at which Canada's economy grows over the long term. Such a rate lowers the growth of per capita output nation-wide to 1.2% – well below its trend rate in the post-war era. The resources available to improve each citizen's living standards will be growing more slowly. Assuming that the Bank of Canada remains committed to and successful at restraining inflation to 2%, the projected 2% real growth implies that nominal income will grow at a 4% average annual clip rather than the 5.7% recorded over 1998 to 2008. For individuals and governments, this slowdown in top lines will impose a tighter budget constraint. For governments, the combination of slower revenue growth and rising age-related spending in health and income support systems means doing more with less. Over the medium term, this squeeze will make more difficult the challenge of restoring fiscal balance.

For households, slower output per capita likely means slower growth in average household incomes. The net income (i.e. accounting profits), reaped by domestically-oriented enterprises, will grow at a slower pace and dividend payouts would then slow accordingly. As well, since the long-run capital gains on housing are tied to the growth in household disposable income, a slower pace of income growth will mean a slower pace of appreciation in home values.

For central banks, slower potential growth generally means a lower neutral interest rate (although being a small, open economy may temper this effect). However, the effectiveness of monetary policy depends on appropriately anticipating the growth rate of potential output, and gauging the output gap correctly. As the output gap closes in 2012, the Bank of Canada will face a 2% potential growth outlook rather than the 3% trend that had been its pre-2009 trend. If inflation is to remain on-target, interest rates need to be hiked in order to narrow the gap between the actual rate and policy neutral interest rate as the output gap closes. If the Bank conducts monetary policy under the assumption of a higher potential growth rate, rates could remain too low for too long, setting off an acceleration in inflation

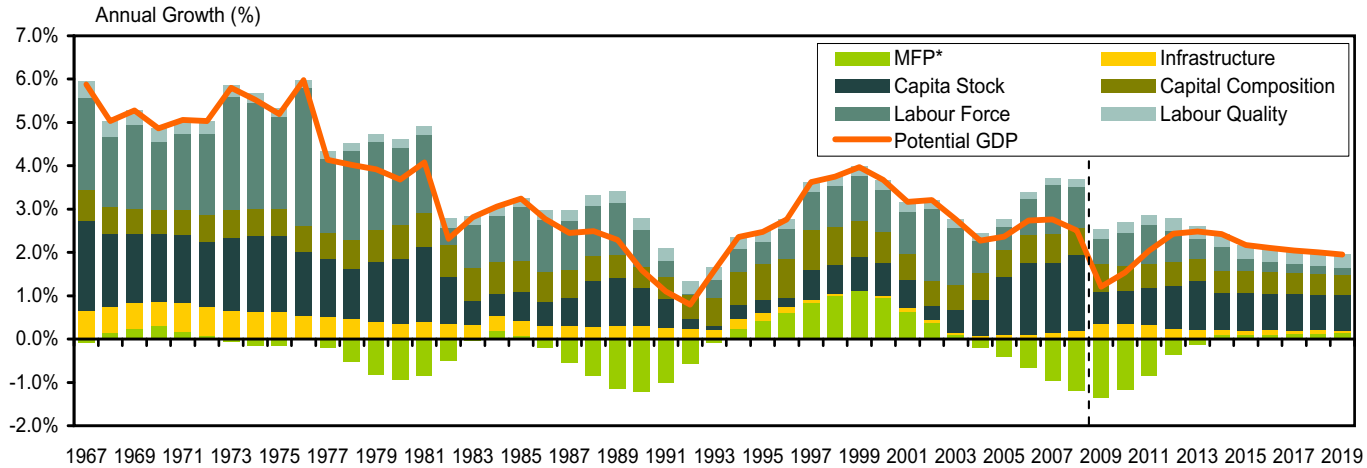
Keep in mind that the future is not yet written in stone. Pin-pointing "good" institutions and pro-growth policies are still areas for active research. However, there is general consensus among economists as to what activities allow a developed economy to grow and on how to promote these activities.[viii] The hope is that Canada's public and private sectors fully embrace this agenda in the years to come. Clearly, spurring Canada's potential growth will require a major shift towards business-sector innovation, heightened skill acquisition, and productivity-oriented public policies.

viii For Canada's remaining and looming public policy challenges, see:
Crawford, A. (ed.) "A Festschrift in Honour of David Dodge's Contributions to Canadian Public Policy." Conference Proceedings, Bank of Canada, November 2008.
Available at: http://www.bankofcanada.ca/en/conference/2008/festschrift_08.html

GROWTH RATE OF POTENTIAL OUTPUT AND CONTRIBUTIONS OF COMPONENTS	1962 - 70	1971 - 80	1981 - 90	1991 - 00	2001 - 07	2008	2009	2010	2011	2012	2009 - 11	2012 - 15	2016 - 19
Growth Rates in Percent (except where *italicized*)													
Multifactor Productivity (MFP)	1.3	0.2	-0.1	0.6	-0.3	-1.0	-1.0	-0.8	-0.5	-0.1	-0.6	0.2	0.2
Stock of Public Infrastructure (P)	4.1	3.5	2.3	1.1	0.9	2.0	3.6	3.7	3.5	2.8	3.4	1.6	0.9
Elasticity of Public Infrastructure (β_P)	15.4	15.8	14.3	12.6	10.4	9.3	9.3	9.3	9.3	9.0	9.2	8.8	8.7
MFP* (Adjusted for Infrastructure)	0.6	-0.4	-0.4	0.5	-0.4	-1.2	-1.3	-1.1	-0.8	-0.3	-0.9	0.0	0.1
Labour Input (hL)	2.8	2.8	2.2	2.1	2.1	2.0	1.4	1.7	2.0	1.7	1.7	1.2	0.8
Labour hours (L)	1.8	2.2	1.6	1.4	1.5	1.7	1.0	1.3	1.6	1.2	1.3	0.7	0.3
Labour quality (h)	1.1	0.6	0.6	0.7	0.5	0.3	0.4	0.4	0.4	0.5	0.4	0.5	0.5
Capital Input (qK)	6.4	6.4	4.3	3.7	3.8	5.6	3.2	2.6	2.7	3.0	2.9	3.5	3.5
Capital Stock (K)	4.7	4.7	2.6	1.8	2.5	4.1	1.7	1.2	1.4	1.7	1.5	2.2	2.2
Capital Composition (q)	1.7	1.7	1.6	1.9	1.4	1.5	1.5	1.4	1.3	1.3	1.4	1.3	1.3
Income Share of Capital (α)	37.7	38.7	40.3	39.8	42.9	43.0	42.5	42.0	41.6	41.2	41.8	40.0	37.9
Contributions to Potential Growth in Percent													
Multifactor Productivity (MFP)	1.3	0.2	-0.1	0.6	-0.3	-1.0	-1.0	-0.8	-0.5	-0.1	-0.6	0.2	0.2
Public Infrastructure	0.6	0.6	0.3	0.1	0.1	0.2	0.3	0.3	0.3	0.2	0.3	0.1	0.1
MFP*	0.6	-0.4	-0.4	0.5	-0.4	-1.2	-1.3	-1.1	-0.8	-0.3	-0.9	0.0	0.1
Labour Input	1.8	1.7	1.3	1.2	1.2	1.1	0.8	1.0	1.1	1.0	1.0	0.7	0.5
Labour hours	1.1	1.4	1.0	0.8	0.9	0.9	0.6	0.8	0.9	0.7	0.7	0.4	0.2
Labour quality	0.7	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.2	0.3	0.2	0.3	0.3
Capital Input	2.4	2.5	1.7	1.5	1.7	2.4	1.4	1.1	1.1	1.2	1.2	1.4	1.3
Capital Stock	1.8	1.8	1.1	0.7	1.1	1.7	0.7	0.5	0.6	0.7	0.6	0.9	0.8
Capital Composition	0.6	0.7	0.7	0.8	0.6	0.6	0.6	0.6	0.5	0.5	0.6	0.5	0.5
Growth of Potential Output	5.5	4.4	3.0	3.3	2.6	2.5	1.2	1.3	1.8	2.2	1.6	2.3	2.0
Productivity Growth	3.7	2.2	1.4	2.0	1.1	0.8	0.2	0.0	0.2	0.9	0.3	1.6	1.7
Growth in Labour Hours	1.8	2.2	1.6	1.4	1.5	1.7	1.0	1.3	1.6	1.2	1.3	0.7	0.3
Per Capita Potential GDP Growth	**3.7**	**3.0**	**1.7**	**2.3**	**1.6**	**1.4**	**0.3**	**0.5**	**1.0**	**1.4**	**0.8**	**1.5**	**1.3**

Source: Statistics Canada; Adjustments and Forecast by TD Economics

CANADIAN POTENTIAL GROWTH
ESTIMATES AND PROJECTIONS



Source: Statistics Canada; Estimates and Forecast by TD Economics
* MFP adjusted to account for contribution of Infrastructure

ANNEX 1: Bank of Canada Estimates of Potential Output and the Output Gap

The concepts of potential growth and the "output gap" are important elements in the Bank of Canada's communication of monetary policy. Again, these are not directly measurable, but an estimate of the "output gap" provides a key gauge of price pressures acting within the economy. While firms and households do not directly observe and respond to the output gap, they are aware of excess supply or demand – in the form of higher (lower) unemployment, idle (busy) machinery or higher (lower) inventories. These real experiences levy pressure on workers' wages and on the price of goods and services. In its commitment to stable and predictable growth in prices, the Bank therefore uses the output gap to coordinate policy and to communicate its actions.

However, being a concept rather than something observable, there is wide debate about the most appropriate approach for estimating the output gap and, to that end, potential output. For measuring the output gap and potential growth, hindsight is (closer to) 20/20: Historic potential growth can be more precisely estimated by using a range of both forward-looking and backward-looking data. The historic "conventional" output gap estimates are based on a statistical filter applied to observed output, with additional variables (such as unemployment and capacity utilization) included in this "extended multivariate filter" to better pinpoint the economy's undershoot or overshoot of potential.

However, for near-term estimates, the "conventional" output gap measure encounters the problem that, for the most recent periods, the "two-sided" filter (i.e. using both past and future data to impute the output gap in a given period) lacks actual "future" data. This means that estimates near the end-of-sample weight recent data highly and therefore tend to be revised as additional observations become available.

For near-term estimates of the output gap and projections of potential, the Bank therefore desires to apply a broader range of indicators and expert judgment to gauge capacity pressures in the economy. In its quarterly Monetary Policy Report, the Bank of Canada then publishes two distinct measures of the "output gap": the first, which can be imputed from the published "conventional measure" of the output gap; the second is the Bank's "all-in" judgment of the pressures with the economy.

For its projection of potential, the Bank incorporates views on productivity and labour force growth, as well examining statistical trends for the components of growth (see Annex 2). Along with a strong weighting placed on recent data and trends, the Bank also incorporates explicit forecasts computed using its Terms of Trade Economic Model (ToTEM) into its potential forecast. As mentioned, forecasts of potential involve substantial uncertainties and have fairly wide confidence intervals. As shown, owing to continuing under-performance on the productivity front, Canada's realized potential during the past years have under-performed the Bank's initial projections of potential in the MPR.

The projection of potential reported in the MPR incorporates a variety of inputs, including informed judgments about economic conditions, labour force participation rates by age cohorts, and productivity trends. As well, it incorporates projections from the Bank's work-horse quarterly projection model, ToTEM. However, as in any economic model, the result follows from the inputs and assumptions. ToTEM can explicitly compute rates of optimum utilization of capital and the structural unemployment, but these depend on the model's parameters and near-term trends in involved variables. ToTEM's potential forecast therefore follows from the Bank's judgment about what goes into the model. Even in models, judgment cannot and should not be avoided.

To compute potential, ToTEM models each component of the national accounts identity (consumption, investment, government, imports and exports) as separate sector. For each sector, production involves three-stages, incorporating capital, labour, commodities, and imports as inputs. Production at different phases involves a distinct substitutability across these different inputs, which are assigned using measured or inferred elasticities of substitution. In the model, potential output is the equilibrium at which unemployment is at its natural rate and the existent capital stock is optimally utilized.

While a more sophisticated decomposition than our growth accounting approach (see Annex 2), growth in potential output in ToTEM is dependent on the pace of technological progress, increases in the labour force, changes in structural unemployment and growth of the capital stock. Notably, technological progress (in growth accounting terms, "multifactor productivity" or MFP) in ToTEM is not endogenous (that is, computed within the model) and is modeled as an exogenous auto-regressive process (a "random walk" about a deterministic trend growth rate). Higher or lower measurements of MFP growth are registered as shocks to the process that "die out" over time. Notably, ToTEM's potential estimate does not explicitly incorporate new public infrastructure as a possible boost to productivity.

A comparison of our historical potential GDP estimates, derived using our growth accounting approach and those from the Bank show general correspondence – albeit with an admitted divergence in the late 1980s and recent years. Therefore, our growth accounting approach produces estimates which accord with the Bank's view of potential. We contend that this suitably validates the approach – at least insofar as it accords with the present views used to formulate policy.

ANNEX 2: Growth Accounting Approach

Our goal is to forecast potential GDP growth to 2019. Following from the decomposition of observed GDP in Statistics Canada's Productivity Accounts[i], we use growth accounting for the basis of our potential GDP forecast. In this report, we project aggregate supply rather than aggregate demand. In this approach, we consider each component of aggregate supply separately, using a growth accounting framework. While the growth in output is by definition the sum of the growth in labour hours and growth in productivity (output per hour), we parse productivity into its underlying components. This allows a more nuanced examination of the drivers of Canada's productivity performance, and enables a more detailed forecast of long-term productivity growth.

We employ a modified version of the growth accounting framework used by StatCan's Productivity Accounts in order to even more finely segregate sources of productivity growth. Specifically, we leverage recent work at StatCan to incorporate the contributions of investment in public infrastructure into our projections. By treating infrastructure separately, this approach arguably also better estimates the contribution of technological progress and organizational innovation to long-run output growth.

Notably, in this report, we employ estimates and forecasts of business sector productivity as the basis of assessing aggregate productivity growth. This is an reasonable assumption given the approximately equivalent historic performance of productivity in the business-sector and aggreagte economy. However, we note the imperfect measurement of productivity in the public-sector (given the absence of true markets for these services). As well, we note that public service productivity may become increasingly important to overall growth, as publicly-provided health care services constitute a increasing share of Canada's output.

In order to consider the structural evolution of each component (rather than its more volatile cyclical behaviour), we apply a statistical filter to its observed growth.[ii] This allows us to examine the long-run drivers of Canada's aggregate potential and productivity performance. Based on the long-run drivers of each component, we then project a profile for each over the 2009-2019 forecast horizon. (For an overview of the role of drivers in each period, see text-box on p.18)

The Traditional Growth Accounting Framework

In Statistics Canada's productivity accounts[iii] (as well as those of other OECD member economies), growth in observed output (Y) is decomposed into the growth rates of:

1. Multi-factor productivity (MFP)
2. Labour Hours (L)
3. Labour Quality (h)
4. Capital stock (K)
5. Capital composition (q)

The growth accounting employs a standard Cobb-Douglas production function of the form:

$$Y = MFP(qK)^{\alpha}(hL)^{1-\alpha}$$

In this identity, labour productivity (defined as the output per hour worked) is:

$$\frac{Y}{L} = MFP\left(\frac{qK}{hL}\right)^{\alpha} h$$

The assumed aggregate production function combines "factors" – capital input (qK) and labour input (hL) – as weighed by their respective income shares – α for capital and 1-α for labour. The approach then assumes that constant returns to scale holds in aggregate and that no frictions distort the economy-wide income shares received by capital and labour inputs. That is, the approach assumes that, in aggregate, capital and labour receive returns and wages equal to their respective marginal products.[iv]

MFP is computed as the residual after applying the

i See: Baldwin, J.R., W. Gu, B. Yan. "User Guide for Statistics Canada's Annual Multifactor Productivity Program." The Canadian Productivity Review, Statistics Canada, no. 15-206-XIE, no. 14, 2007.

ii Specifically, we apply a Hodrick-Prescott filter to "smooth" the annual growth of each component for the 1961-2007 series. This obviously would encounter a similiar problem to that described in Annex 1, but we are interested here in exploring the inter-period differences in each component rather than the specifically near-term trend.

iv For those unfamiliar with the distinction between labour productivity and the marginal product of labour (MPL), note that the former is calculated above as the average output produced by all hours worked in the economy, while the latter is the gain to output from an additional hour worked. In mathematical terms, the MPL is calculated as the first derivative of the production function with respect to labour hours. For the given production function, the MPL is then:

$$\frac{dY}{dL} = (1-\alpha)A\left(\frac{qK}{L}\right)^{\alpha}(h)^{1-\alpha}$$

$$= (1-\alpha)\frac{Y}{L}$$

growth rates of the capital and labour inputs. MFP then captures all of the "non-factor" contributions to production. It represents a wide range of attributes, effectively serving as a "stand-in" for technological progress and organizational innovation, as well as institutional effectiveness. As well, because public infrastructure is not included in the business-sector capital stock, the traditional MFP measure also captures contributions of government-provided public goods. As we discuss below, we modify this growth accounting to strip out the public infrastructure from MFP and thereby to explicitly incorporate renewed infrastructural investment into our projections.

Note that capital input (qK) and labour input (hL) include sub-components that implicitly adjust for the quality of hours worked and the capital stock. The capital composition (q) and labour quality (h) components do not have an explicit basis (although q might partially represent technological advances that are embodied in particular capital goods and h might be viewed to correspond with concepts of "human capital"). Rather these represent, respectively, the additional imputed growth in the capital input and labour input that results from weighting different categories of capital and labour by their respective costs.

That is, the number of hours worked by all of given type of worker is weighed by the relative wages of that type. For this purpose, workers are classified according to one of 112 types (involving 7 age groups, 4 education levels and 2 classes – employees and self-employed).

For capital, weighting is more complex since one must impute "rental prices" for different classes of capital.[v] These are imputed using appropriate rates of depreciation, corporate income tax, and capital gains for the respective class. Capital with higher depreciation and lower capital gains will have a greater "rental price". At the aggregate level, a shift of the capital stock towards capital with higher depreciation and lesser capital gains (e.g. broadly, from buildings to high-tech M&E) would increase the capital input relative to the measured capital stock. In StatCan's Productivity accounts, this effective addition to the growth rate of the capital stock is expressed as the growth in a capital composition index.

Values for labour hours and capital stock are maintained as part of StatCan's System of National Accounts (SNA). Income shares are similarly recorded in StatCan's SNA.

Note that labour hours in the SNA do not correspond directly with those measured in the Labour Force Survey (LFS). Statistics Canada uses additional administration data to compute labour hours.

Using this "growth accounting", GDP (and labour productivity) can be decomposed to identify the contributions from each component over time. Specifically, output grows according to:

$$\dot{Y} = \dot{MFP} + \alpha\left(\dot{q} + \dot{K}\right) + (1-\alpha)\left(\dot{h} + \dot{L}\right)$$

and, similarly, labour productivity grows by:

$$\left(\frac{\dot{Y}}{L}\right) = \dot{MFP} + \alpha\left(\dot{q} + \dot{K}\right) + (1-\alpha)\left(\dot{h} + \dot{L}\right) - \dot{L}$$

$$= \dot{MFP} + \alpha\left(\dot{q} + \dot{K}\right) + (1-\alpha)\dot{h} - \alpha\dot{L}$$

where $\dot{x}$ implies the percentage growth rate in the variable x.

Accounting for Public Infrastructure

Notably, public infrastructure is not included in the business-sector's capital stock, and, in the general approach to growth accounting, the contribution by infrastructure to growth would be captured in the MFP term.[vi] While not directly producing output, public infrastructure nonetheless facilitates production. Public infrastructure exists in a variety of forms with the central characteristics of being fixed, long-lived assets that facilitate the production of output. Roads, municipal water and sewage, dams and electric grids are all examples, sharing the features of being key complements to private-sector production and having few viable substitutes.

The difficulty in accounting for infrastructure in growth accounting is that its "elasticity" (that is, the marginal boost to output from an additional unit) must be computed. For private capital goods, the market rate of return would allow a direct estimate of the elasticity (indeed, in the above growth accounting framework, an estimate of private capital's elasticity follows from capital's observed share of income, α). However, for public infrastructure, the goods are generally not supplied by a market. Therefore, the rates of return to

v See: Baldwin, J.R. and W. Gu. "Multifactor Productivity in Canada: An evaluation of Alternative Methods of Estimating Capital Services." The Canadian Productivity Review, Statistics Canada, no. 15-206-XIE, no. 009, 2007.

vi See:
MacDonald, R. "An Examination of Public Capital's Role in Production." Economic Analysis Research Paper Series, Statistics Canada, no. 11F0027M, No. 050, 2008.
Gu, W. and MacDonald, R. "The Impact of Public Infrastructure on Canadian Multifactor Productivity Estimates." Canadian Productivity Review, Statistics Canada, no. 15-206-X, no.21, 2009.

A brief history of Canadian economic growth since 1960

The 1960s saw average annual output growth of upwards of 5%. Productivity growth was rapid due to extremely high-quality and large-scale capital investment, reflecting the build-up of Canada's heavy industry. The roll-out of needed infrastructure had high public returns and boosted productivity. The decade witnessed a swell in national and provincial road networks, in environmental infrastructure (sewage and water) and in cultural and recreational facilities. Productivity also surged for strong improvements to labour quality, following from the "baby boomers'" completion of college and university education. Technological progress was generally strong, with real business-sector spending on R&D advancing by over 8% annually between 1963 and 1970.

The 1970s and 1980s saw more moderate human capital growth and growth of the capital stock slowed during the 1980s. Capital growth had remained strong during the 1970s. However, during the 1980s, returns on investment were diminished by high inflation and consequent interest rate hikes, as well as the tax burden of rising deficits. Infrastructure roll-out remained strong in the 1970s but slowed further in the 1980s. The expansion of infrastructure expenditures during the 1960s and 1970s created public works for which demand "filled in" over time. With the major networks established, slowing infrastructural expenditures during the 1980s reflect diminishing returns on new infrastructural investments.

During the 1990s – particularly the latter part of the decade – growth was boosted by a resurgence in productivity. Strong technological progress owed to innovation and adoption of general-purpose information and communication technologies (ICT). Capital expenditure slowed further from the 1980s, but growth in the quality of capital improved, consistent with higher ICT investment.

The post-2001 growth slowdown reflects a slump in productivity growth to an annual average of just over 1%. Outright technological regress was a major drag. The retreat of the state of technology reflected diminished innovation and was contemporaneous with steeply diminished expenditures by business on R&D. While the growth of the capital stock has accelerated, the growth in the quality of capital has slowed from the 1990s, at least partially as a result of the slumping share of ICT capital. The expansion of infrastructure also slowed, with renewed infrastructure spending largely "patching holes" rather than creating new public works.

Human capital growth has also slowed as a consequence of a booming economy and diminished incentive for educational attainment. However, the growth in labour hours accelerated from the 1990s, with higher participation induced by strong labour markets, as well as demographic factors.

infrastructure are unobservable, and must be imputed.

To this end, recent research at StatCan has focused on 1) quantifying the evolution of Canada's stock of public infrastructure, and 2) parsing out its contribution to growth in MFP. In this approach, the growth accounting equation from above is modified to:

$$\dot{Y} = \dot{MFP}^{*} + \beta_P \dot{P} + \alpha\left(\dot{q} + \dot{K}\right) + (1-\alpha)\left(\dot{h} + \dot{L}\right)$$

where MFP^{*} is the adjusted measure of multi-factor productivity, P is the stock of public infrastructure and β_P is the elasticity of public infrastructure.[vii] This is the relationship that we employ in our forecasts potential growth in order to explicitly account for infrastructure spending.

This recent work at StatCan has demonstrated the substantial contribution of infrastructure to Canada's MFP growth over 1961-2008.[viii] This research implies an average 17% across 1961-2008. During the 1960s, high investments in public infrastructure contributed up to 0.6% annually to GDP growth, explaining between ¼ and ½ of Canada's MFP growth. The stock of infrastructure benefited strongly during the 1960s from the completion of road networks, such as the Trans-Canada Highway, and extensive investment in the hydroelectric sector. Since 1990, the contribution of infrastructure has fallen to approximately 0.1% annually. While infrastructure spending did somewhat resurge after 2002, these expenditures largely refurbished exhausted assets.

vii MacDonald (2008) computes this elasticity based on the imputed rate of return for public infrastructure (r_p), and its depreciation rate (δ_p), as well as the prices of output (p_Y) and infrastructure (p_p), employing the relationship:

$$\beta_P = \left(r_P - \delta_P\right)\left(\frac{p_P P}{p_Y Y}\right)$$

viii Gu and Macdonald (2009) impute rates of return for public infrastructure using a variety of empirical techniques. While "triangulating" on a rate of return of 17%, the estimates nonetheless lie across a range. As well, this point estimate of public infrastructure's average rate of return across 1961-2008 admittedly assumes a constant rate when in fact the returns to infrastructure were likely time-varying. Nonetheless, Gu and MacDonald (2008) experiment with such time-varying rates of return. The time-varying rates obtain results that generally agree with their adjusted estimates of MFP growth when using the constant average rate.

ANNEX 3: Canada's Faltering Innovation Record

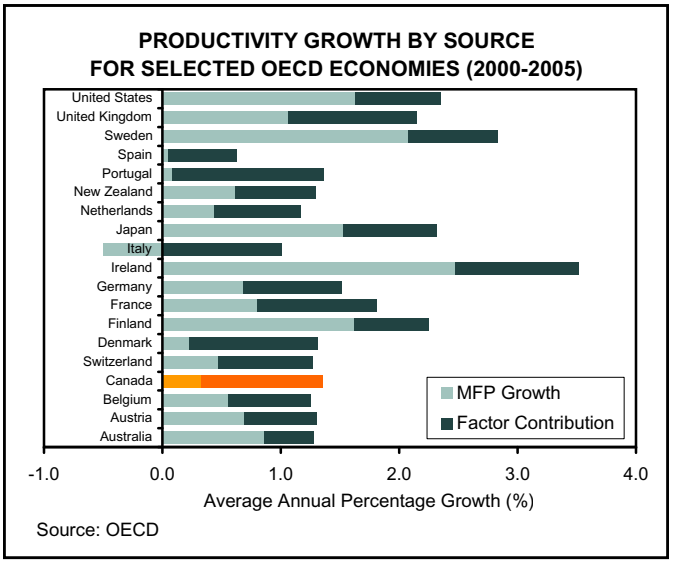
The ongoing decline of Canada's business expenditures of R&D (BERD), concurrent with the persistent decline in Canada's multifactor productivity (MFP), highlights the worrisome neglect of innovation by Canadian businesses. While universities provide critical knowledge infrastructure and conduct basic research (see text-box, p.20), investments in innovation by Canada's business sector are essential for transforming new advances into commercial applications. The recent report by the Council of Canadian Academies' Expert Panel on Business Innovation[i] provided an extensive survey of Canadian business' laggard innovation expenditures and performance, and we draw from that report in this Annex. Addressing this gap in BERD is essential for reversing Canada's languishing productivity growth.

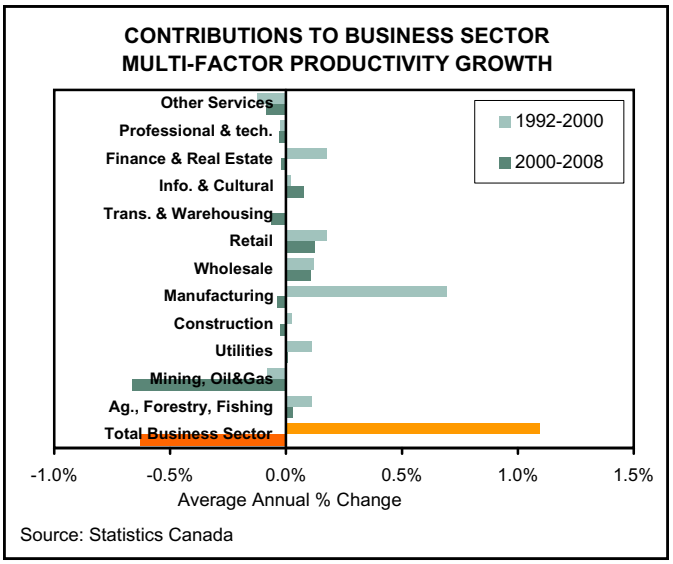
For Canada, the tech boom explains much of the rapid rise in BERD in the late 1990s. The subsidence in overall BERD owes primarily to the cut to R&D in the manufacturing sector, where it has fallen from over 5% of value-added in 2001 to 4% in 2008. A decline of BERD by the transportation manufacturing and the plummet of BERD in electronics manufacturing explain most of manufacturing's BERD sag. While overall BERD has declined, certain sectors increased their investment in innovation. BERD in petroleum and coal manufacturing increased strongly during the interval. BERD in extractive industries has historically been a low share of output, but nonetheless more-than-doubled as a share of value-added between 2000 and 2007 – although falling during 2008.

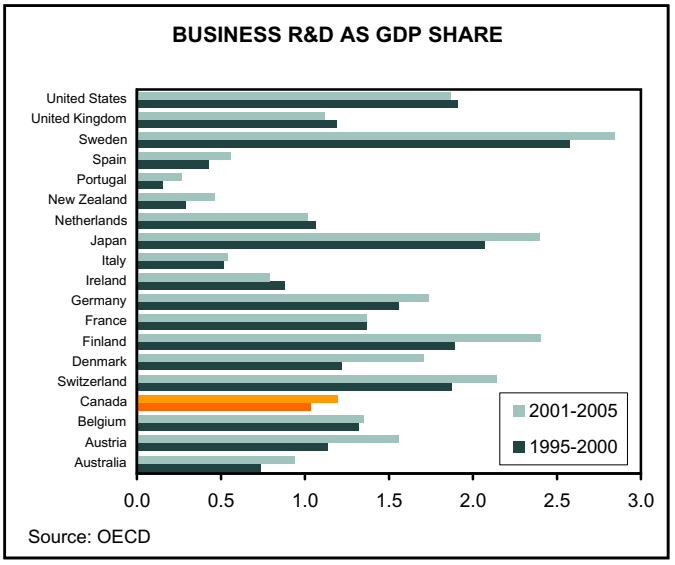
Factors in Canada's capacity to innovate are: 1) the availability of skilled management and technical professionals; 2) investment in high-tech equipment; 3) access to finance for innovative start-ups; 4) the intensity of competition; and 5) public support for R&D. Below, we discuss implications and remedies in each of these categories.

1) Canada has much technical talent but is resting on its laurels

An economy needs skilled individuals in order to innovate. To a degree, workers skilled are incorporated in the measure of labour composition. However, the presence of skilled labour can generate "knowledge externalities" and "complementarities" that are not captured in a worker's own







i "Innovation and Business Strategy: Why Canada Falls Short." Report of the Expert Panel on Business Innovation, Council of Canadian Academies, June 2009. Available at: http://www.scienceadvice.ca/innovation.html

The Importance of University Research

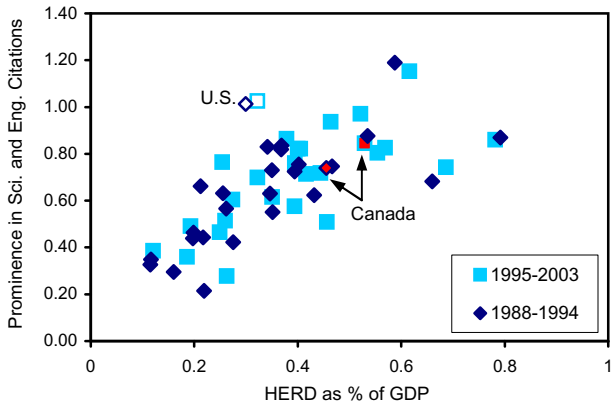
While we focus on the links between BERD and MFP growth, this is not to discount other sources of R&D expenditure. While higher education expenditure on R&D (HERD) does not display a strong correlation with near-term MFP growth, university research tends to be of the "blue sky" sort, producing new knowledge but not necessarily yielding immediate commercial application. Investing in university research is nonetheless crucial to building an innovative economy in at least three ways:

- The knowledge created in universities facilitates subsequent innovation, basic research being a critical stepping stone to new technologies;
- University research centres can provide key hubs around which clusters of knowledge industries can nucleate; and
- Immersion within the research process is important to the training of innovative workers.

During the late 1990s, Canada lagged the OECD severely in HERD, but has since emerged near the head of the pack. Over time and between countries, there is a clear link between HERD and the prominence of a country's science and engineering research, as measured by the extent of citation internationally. Canada has improved our position – both in HERD and research prominence relative to our international peers. However, this is not an advantage about which to be complacent: heightened R&D spending in other economies can provide more attractive opportunities – particularly from much boosted research funding by the science-focused Obama administration stateside. If funding is university research is not competitive, Canada's best and brightest could well gravitate to the "critical mass" at foreign universities. We would quickly lose the "human infrastructure" of university research that Canada has worked to build. Our capacity to transfer advances to industry and to train world-class students would suffer.

Where Canada's university research perhaps lacks against our international peers is in knowledge-transfer. Compared with other OECD economies, Canada lags in the performance by the higher education sector of business-sector-funded research. This measure proxies for the capacity for technology transfer between industry and universities. However, Canada boasts a very strong citation of science and engineering literature in its patents, indicating strong use of frontier advances by Canadian companies developing new technologies. University research must obviously maintain high standards of independence and integrity. Nonetheless, well-structured arrangements for industry funding can limit the risk of interference while allowing firms to access and apply new advances outside the ivory tower.

HIGHER EDUCATION R&D EXPENDITURE AND CITATION PROMINENCE



Source: OECD, National Science Foundation
* Prominence in Sci. & Eng. citations at period end (i.e. 1994 and 2003)

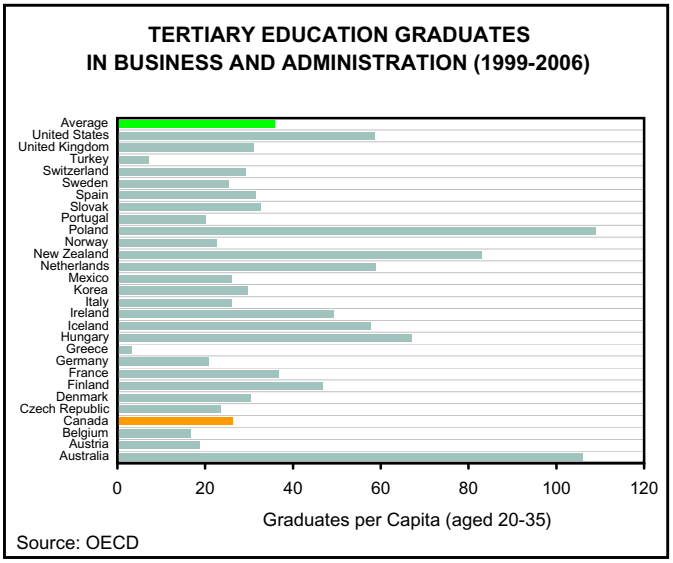
wage, yet fuel the innovative capacity of the economy. For instance, workers can hone or develop new skills by being working with another worker with more or different skills than themselves. As well, even highly skilled and innovative workers are typically less innovative without other skilled workers providing feedback.

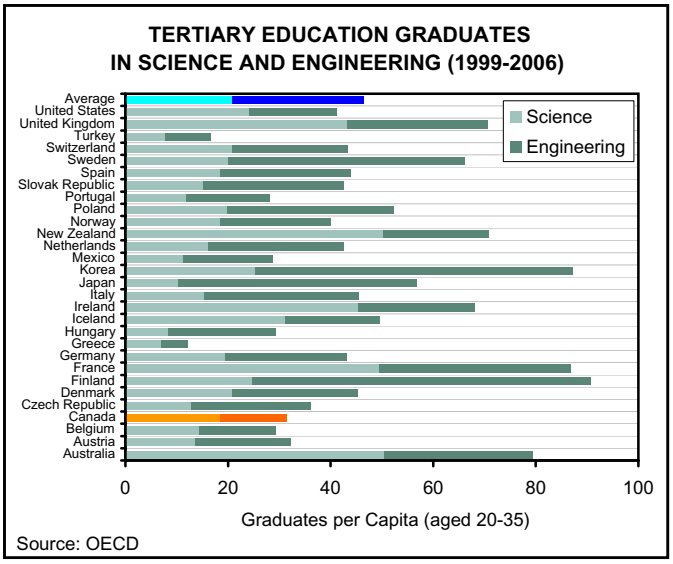
In relation to management, educational attainment among Canadian managers is below that of their U.S. counterparts, and advanced degrees are much more prevalent among U.S. managers. This might indicate a gap in the capacity of managers to grasp and apply new technologies. Moreover, empirical research demonstrates that advances in organizational effectiveness and management techniques are important channels to improve productivity.[ii] The skill level of managers will impact the productivity of individual firms, and this has aggregate implications.

In relation to technical personnel, Canada ranks high within the OECD in relation to science and technology personnel as a share of overall employment. This accords with the high relative educational attainment of the Canadian labour force. Nonetheless, Canadians holding advanced degrees per capita lags that of many of our peers. This would be consistent with the presence of skilled workers in general, but the absence of a "critical mass" of elite innovators who could propel frontier R&D.

Going forward, the educational attainment of young

ii See: "Management Matters" Institute for Competitiveness and Prosperity, Working Paper 12, March 2009.





Canadian is extremely worrisome. Canada's strong relative education level results from higher tertiary attainment in older workers. While younger Canadians have greater tertiary attainment than their parents, attainment has not advanced as quickly as in peer economies.[iii] Moreover, Canada now ranks below the OECD average in the graduation rates of the tertiary-aged population. The deficiency is particularly exaggerated in engineering and science disciplines. Compared to the OECD average, Canada granted both fewer degrees per capita and a lower share of degrees from tertiary programs in engineering and science (including mathematics) during 1999-2006. Reported post-secondary enrolment for 2007/2008 in computing and mathematics was at 1994 levels.[iv] Relative to our peers, Canada appears to not be growing its technical talent domestically. And, while immigrants to Canada often bring strong technical skills, data on immigrant employment outcomes suggest that these are not being effectively put to use.

With evidence of a relatively large technically-skilled workforce presently, the lack of technical talent does not seem a cause of Canada's lack of innovation. It seems likely that other factors impede present workers from reaching their innovative potential. Nonetheless, Canada's stock of technical talent is a depreciating asset and the evidence is that it is not being sufficiently replenished. In the presence of confounding factors, technical talent may not be a boost; however, lack of technical talent can only be a drag. With other economies having markedly surpassed Canada in graduating scientists and engineers, Canada will likely lose an innovative advantage if stagnating enrolment in these disciplines is not remedied.

2) Canada lags peer economies in high-tech investment

Although still lagging the U.S., Canada's investment in fixed capital has been relatively on par with peer economies. However, Canada's investment Information and Communications Technology (ICT) capital has both declined sharply as a share of investment and consequently lagged peer economies in per worker terms. Certain indicators hint at Canada's "follow-the-leader" approach to technological adoption, and stagnation in the growth of ICT investment implies that Canada is not as rapidly absorbing high-tech as quickly as peer economies. Various studies across industries and at the firm level show the importance of ICT investment to innovation – particularly in the manufacturing sector.

3) Canada's venture capital is scarce and not as sophisticated

Venture capital is recognized as a key ingredient for risky but innovative start-ups. The levels of risk, investment illiquidity and prolonged incubation periods involved in developing new technologies discourage debt finance. Moreover, the character of the investments requires sophisticated managers who are capable of evaluating the technical viability and commercial potential of new technologies. Venture capital pools, led by specialized managers, are therefore important to seeding innovative start-ups and to bridging new technologies across the "valley of death".[v] Canada noticeably underperforms its more

iii See: Michaud and Pelletier (2009) "Education Indicators in Canada: An International Perspective" http://www.statcan.gc.ca/pub/81-604-x/81-604-x2009001-eng.htm

iv See: Statistics Canada " Back to School - Sept 2009" http://www.statcan.gc.ca/pub/81-004-x/2009003/article/10922-eng.htm

v See: Canadian Venture Capital Association (2009) "The Impact of Venture Capital on the Economy, Jobs and Innovation" http://

innovative OECD peers in venture capital pools as a share of GDP. Moreover, Canada's new venture capital flows have declined since 2004. In contrast, those in the US are proportionately much larger and continued to grow rapidly. The stagnation of Canada's venture capital can be explained by the underperformance of these funds: while US venture capital achieved 10-year rates of return during 2002-2007, Canadian net returns were under 5%.

Surveys of venture capital point to the relative "youth" of Canadian venture capital, many of the pools having just nucleated during the pre-2001 tech boom. As well, certain commentators contend that Canadian pool managers have less management experience than their U.S. counterparts, under-use experts in assessing technologies, and spread their funds too widely and too thinly.[vi] The anecdotal evidence suggests that Canada's venture capitalists are not as sophisticated relative to that in other jurisdictions, and this looks to remain a drag on Canada's innovation potential.

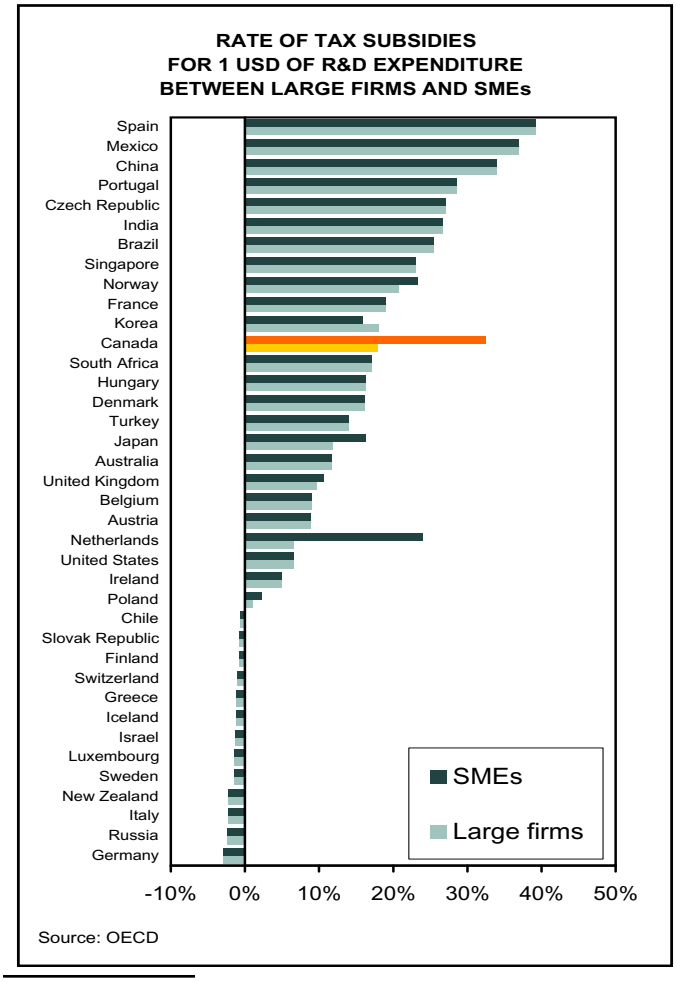
4) Lack of competition breeds complacency and rewards inefficiencies

Competition is important to innovation in two main ways: i) competition forces firms to innovate in order to sustain returns; and ii) competition ensures that market share and factors flow to the most efficient producers. The absence of competition can lessen incentives for technological adoption or innovation since "rents" by those firms with market power can be sustained without innovating.[vii]

Canada has relatively low regulatory hurdles to bringing new products to market. However, regulatory barriers to foreign entrants exist in certain key network sectors (in particular, airlines and telecommunications) and appear possible impediments to the pace of innovation in these sectors. Compared with its OECD peers, Canada's relatively low mobile telephone penetration rates speak to persistence of comparatively high telecommunications costs for consumers. In air transport, Canada places a low ceiling on foreign ownership for both domestic and international routes, excluding foreign entrants from serving Canadian markets to a much greater degree than is the case in peer economies. This is especially true in comparison to the EU, which operates an integrated air transport market. As noted by the recent Competition Policy Review Panel, there is considerable evidence that easing restrictions on foreign entrants in these sectors would enhance competition to the benefit of consumers.[viii]

5) Tax Incentives for R&D could be better structured

Canada's tax incentives for R&D are competitive internationally and studies demonstrate substantial beneficial impacts from the Scientific Research and Experimental Development (SR&ED).[ix] However, the credit discriminates in favour of small R&D performers, with the most lucrative credit targeted to SMEs. While promoting innovation by start-ups is desirable, the credit does not as effectively leverage larger firms and may discourage scaling-up of innovative activities. As well, the credit is untargeted to those types of R&D with the highest "knowledge spillovers". Lastly, legislation arguably casts the "R&D" definition too widely, resulting in a possible tax benefit for re-classifying existing activities as R&D rather than embarking on new expenditures.



vi Canadian Council of Academies (2009) www.cvca.ca/files/Downloads/CVCA_Impact_Study_ENGLISH_March_2009.pdf

vii See: Howitt, P. "Innovation, Competition and Growth: A Schumpterian Perspective on Canada's Economy." C.D. Howe Institute, No. 246, April 2007.

viii Canadian Competition Review Panel (2008) "Compete to Win" http://www.ic.gc.ca/eic/site/cprp-gepmc.nsf/eng/00060.html

ix See: Parsons and Phillips (2007) "An evaluation of the federal tax credit for scientific research and experimental development" Finance Canada Working Paper 2007-08.