The Long-term Outlook for Productivity and Per Capita Income Growth for Canada: A Comparison with Selected G-20 Countries

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ABSTRACT

This paper describes a possible long-run scenario for selected OECD and major emerging market economies. It compares outcomes for Canada against these countries' performance in a variety of dimensions that together determine productivity and output growth based on a production-function approach. It concludes that Canada should enjoy reasonable productivity and output growth in the coming half century, despite the less favourable outlook for the age structure of the population. It goes on to suggest three areas where policymakers should focus their attention: seeking more vigorous product market competition; reforming the tax system with a view to removing unnecessary distortions and emphasising the importance of tertiary education and innovation across a broad range of policy areas. It finishes with a call for the establishment of a publicly funded productivity commission, to assess existing policies and proposed changes through a productivity, innovation and competitiveness lens.

RÉSUMÉ

Cet article décrit un scénario à long terme qui pourrait se produire pour certains pays de l'OCDE et certaines économies de marché émergentes. Il compare les résultats pour le Canada à la performance de ces pays, sous divers rapports qui, ensemble, déterminent la croissance de la production et de la productivité, au moyen d'une démarche production-fonction. Il conclut que la croissance de la production et de la productivité devrait se maintenir raisonnablement bien au Canada au cours du prochain demi-siècle, bien que les perspectives soient moins favorables en ce qui concerne la structure démographique. Il propose ensuite trois domaines auxquels les décideurs devraient prêter attention: favoriser une concurrence plus vigoureuse entre les produits sur les marchés, réformer le système fiscal afin de faire disparaître les distorsions inutiles et mettre l'accent sur l'importance de l'éducation tertiaire et de l'innovation dans un large éventail de domaines stratégiques. Il termine en demandant que soit créé une commission de la productivité financée par les deniers publics qui évaluerait les politiques actuelles et proposerait des changements dans une optique de productivité, d'innovation et de compétitivité.

Chart 1

Chart 1
Output Growth in Selected G-20 Countries
Average annual rate of growth (per cent)
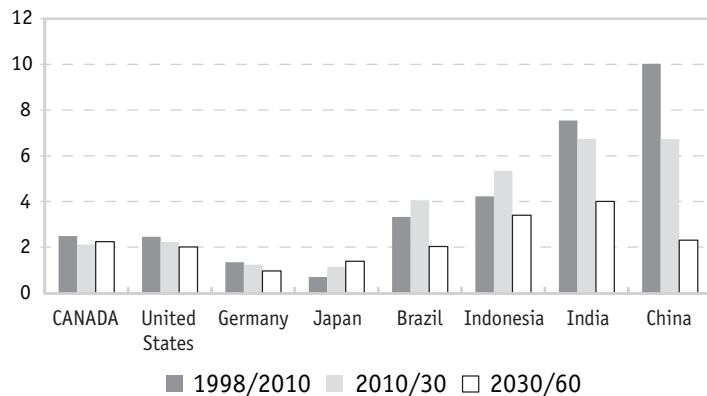
IT IS NO SURPRISE TO READERS of the *International Productivity Monitor* to learn that Canada's potential growth rate had slowed considerably even before the financial crisis of the past five years. OECD estimates show that it fell from 3¼–3½ per cent per year during the five years ending in 2001 to about 2¾ per cent per year in the following five years and 1¾ per cent per year in the most recent five years. Similar slow-downs, even if less pronounced, have been observed in most other OECD countries. Part but by no means all of that is attributable to slower population increases. The rest is due to shrinking gains in labour utilisation and human capital but most disturbingly also to a complete disappearance of multifactor productivity gains. The result is that labour productivity growth has dried up. But most economists do not believe that this is our fate and that we are entering a second Dark Age. Is there reason for hope?

This article has two objectives. First, it will describe the results of one recent attempt by my colleagues in the OECD Economics Department – undertaken before the October 2012 his-torical revision to the Canadian productivity figures – to put together a long-term scenario for OECD and key partner countries out to the year 2060 (OECD, 2012c). The key features of this scenario are described in the Appendix. The second is to follow up with a brief discussion of our policy recommendations for how to pick up the pace of productivity growth in Canada based on the empirical record of what works across OECD countries, as argued in our *Economic Survey of Canada* (OECD, 2012b) and the series of *Going for Growth* publications (OECD, 2012a).

A Possible Long-run Scenario for Selected OECD and Major Emerging Market Economies

In this section I will examine the scenario for Canada and compare its outcomes with selected G-20 partners both in and outside the OECD area with a particular focus on productivity per-formance. Data are for the total economy.

The scenarios are broken down for two peri-ods: first the initial 20 years (2010-2030) and then the final 30 years (2030-2060). Average annual output growth in Canada is expected to be fairly constant across the two sub-periods at around 2 per cent, slightly less than what has been achieved over the 1998-2010 period as the demographic structure turns less favourable (Chart 1).[2]

The story is only slightly different for the United States where output growth is expected to slow a bit less at first but again in the latter period to a rate slightly lower than Canada's. Germany has the same pattern but with much lower growth rates. Japan actually has the reverse, with growth expected to rebound from the recent past and again in the long term. Turn-ing to a few of the emerging market economies covered by the OECD projections, we see that growth is expected to ease already in the 2010-

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2   As the year 2000 was a cyclical peak and 2010 was not, 1998 was chosen as the initial year of the historical period to reduce distortions related to comparing points at different phases of the business cycle.

2030 period in China and India, but to pick up in Brazil and Indonesia. Beyond 2030 all four are predicted to suffer a marked slowdown, especially China. Nonetheless, these countries will represent 57 per cent of the total output of the proxy for world GDP (OECD plus eight non-OECD G-20 countries) in 2060, up from just 35 per cent in 2011 and 51 per cent in 2030.

These output growth scenarios are built up from a production-function approach. Let us begin with the physical capital input (Chart 2).[3] Canada's growth in capital input has been rapid by G-7 standards, but its advantage over the other OECD comparator countries is expected to slip as the capital intensity level, defined as the ratio of capital to output, slowly stabilises under the influence of rising real costs of capital globally in line with a generalized fall in saving rates. All the emerging market economies are expected to enjoy rapid growth in physical capital for some time before slowing later in the century.

Our production function also includes human capital, defined in terms of average years of educational attainment for the population aged 25 to 64, as a separate factor input.[4] Increases have been fairly small for the advanced OECD countries like Canada, whose outcome is in the middle of the pack (Chart 3). But rates of increase for human capital in the emerging market countries have been several times larger than in developed countries. While these growth rates are expected to slow down in most cases (India is the exception), they are projected to remain much more dynamic as mean educational attainment in these countries continues to catch up to developed country levels.

Chart 2

Physical Capital Growth in Selected G-20 Countries
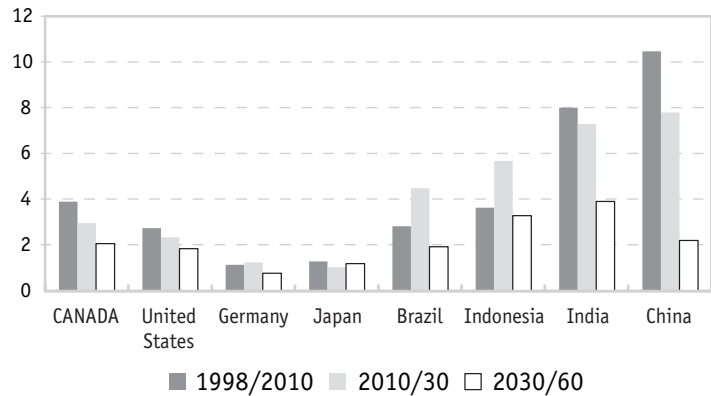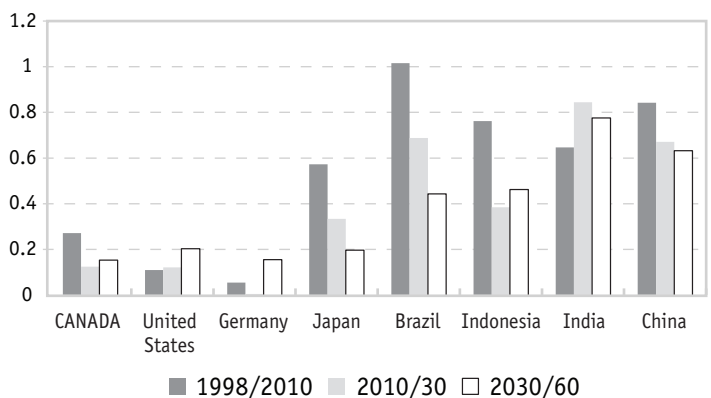Average annual rate of growth (per cent)

Chart 3

Human Capital Growth in Selected G-20 Countries
Average annual rate of growth (per cent)

When it comes to multifactor productivity growth (MFP)[5] (labour-augmenting technical progress) on the other hand Canada's record since 1998 has been disappointing, with essentially no growth whatsoever on average in recent years (Chart 4). This is similar to Japan, and even Brazil to some extent, but well behind the United States and Germany and especially the

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3   Physical capital is defined in terms of capital stock, not capital services. It includes inventories, but excludes land.

4   The human capital estimates are based on returns derived from Mincerian wage equations for the 25-29 age group. The returns are used to transform the annual figures into stock figures, that are then comparable to the physical capital estimates expressed in monetary terms. The OECD builds up the stock measure and then pushes them forward through time as the cohort ages.

5   This concept is referred to as labour efficiency in OECD (2012c).

Chart 4
Multifactor Productivity Growth in Selected G-20 Countries
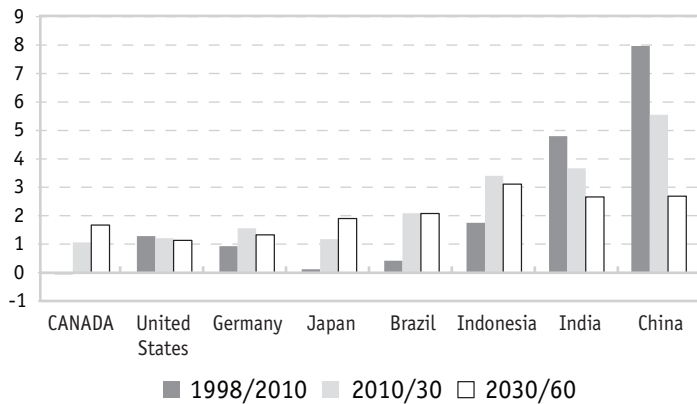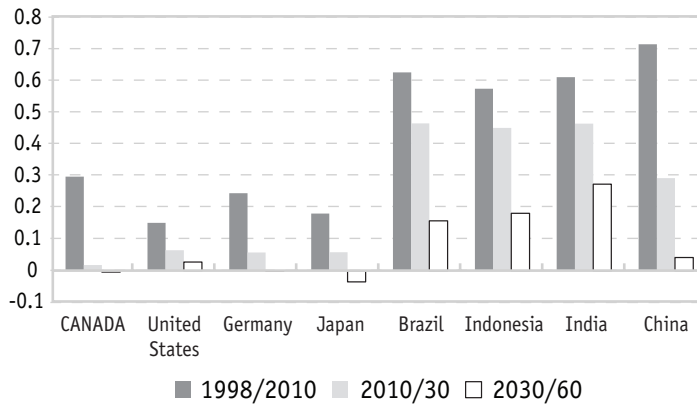Average annual rate of growth (per cent)

■ 1998/2010 ▨ 2010/30 ☐ 2030/60

Chart 5
Growth of the Working-age Population Share (15-64) in Selected G-20 Countries
Average annual rate of growth (per cent)

■ 1998/2010 ▨ 2010/30 ☐ 2030/60

Asian powerhouses of Indonesia, India and China. Even if convergence to the world technology frontier does not completely explain the heterogeneity of historical patterns, our projections assume that catch-up should be the main driver going forward, with the result that the

sharp disparity between countries is expected to narrow. There will be gradual improvement in Canada (with multifactor productivity gains averaging around 1.5 per cent per year through to 2060) and Japan and the convergence process working to brake progress in India and especially China. By 2030-2060 Indonesia will be enjoying the fastest rates of MFP growth. The pick-up in multifactor productivity in Canada reflects a return to its predicted growth path after underperformance in the 1998-2010 period.[6]

Canada, like New Zealand, represents a bit of a conundrum in terms of its productivity performance. Even though the profession has still not been able to do a good job in identifying the reasons for the productivity slowdown, we have no alternative but to resort to the international evidence of what theory and data tell us is best practise. And then we can only hope that very long lags imply that the payoff to Canada's steadily increasing adherence to such policies will eventually become manifest.

The growth in labour input can be disaggregated into a series of components. The most exogenous is changes in the demographic structure of the population, that is the rate of change in the working-age population (15-64, share expressed in terms of per cent rather than percentage points). Canada has had a slight advantage over the other large OECD countries in recent years, but that will quickly be eliminated as the population ages and baby boomers retire (Chart 5). Even high levels of immigration are unable to change that outlook. Indeed, Canada's population will age comparatively quickly. This can be seen by examining its old-age dependency ratio (the ratio of the share of the popula-

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6   The OECD model includes a catch-up equation whereby each country has its own level of multifactor productivity and converges on this level. The OECD model could not explain why multifactor productivity growth did so poorly in Canada during the recent historical period and therefore projects that it will return to its predicted long-term path. This is an optimistic projection. What held multifactor productivity back in the recent past, which we are unable to identify, may continue to do so in the future. For a discussion of the model, see Johansson *et.al.* (2012).

tion 65 and over to that aged 15-64), which is projected to move from very near the OECD average at present to a clearly higher-than-average outcome already in 2030.

Not all those of working age actually are in the labour market for a variety of reasons. One is the age distribution within the working-age group: those of prime age (25-54) have the highest participation rates by far. Another is the long-term trend increase in educational attainment, which is assumed to continue, even if at a much slower pace than over the past decades in Canada and less so than in most of these comparator countries. A third is the legal pensionable age, which is assumed to be broadly indexed to longevity.

Canada has benefited from favourable labour force participation developments, but with unchanged policies that would be expected to reverse in the future before edging up again (Chart 6); Germany has a similar pattern. The United States has had a poor record of late, but its participation is expected to bottom out before eventually beginning to rise again. Canada's advantage over the United States in terms of the employment-to-population ratio will soon begin to reverse and eventually grow to an equally large disadvantage. Japan has suffered a great deal, but most of that is behind it. China and India have also experienced declining participation, but only China's decline is expected to continue. Participation will restrain labour input growth in Brazil and Indonesia, especially in the more distant future.

The final component of the volume of labour input is the structural unemployment rate, also known as the non-accelerating inflation rate of unemployment (NAIRU), which determines the share of the labour force that can be employed without inflationary or deflationary strains emerging. All countries have only very small contributions from this factor (Chart 7). They have been modestly positive – structural unemployment has been falling – in Canada, Ger-

Chart 6
Labour Force Participation Rate Growth in Selected G-20 Countries
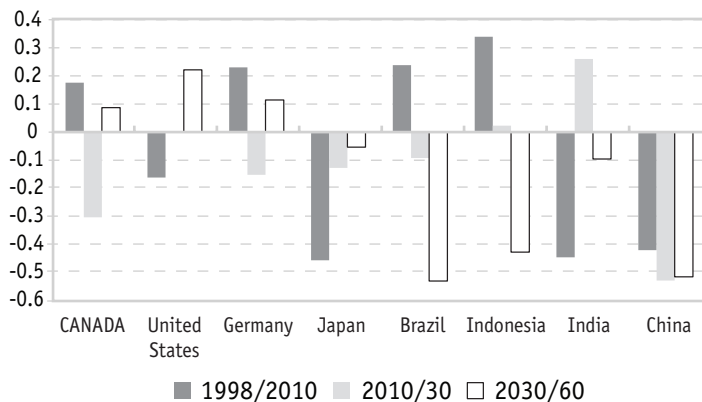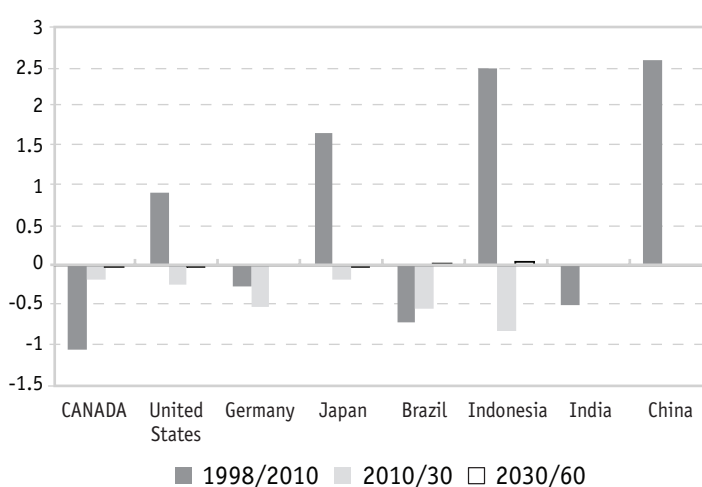Average annual rate of growth (per cent)

■ 1998/2010 ▨ 2010/30 ☐ 2030/60

Chart 7
Growth of the Structural Unemployment Rate in Selected G-20 Countries
Average annual rate of growth (per cent)

■ 1998/2010 ▨ 2010/30 ☐ 2030/60

many, Brazil and India and negative in the United States, Japan, China and, especially, Indonesia. In the future they are assumed to be essentially zero.

Putting it all together one can derive the usual measure of labour productivity, defined as output per worker, that is embedded in these data. It is widely known that Canada's productivity performance over the past decade or so has been disappointingly slow, with labour productivity at

Chart 8

Labour Productivity Growth in Selected G-20 Countries
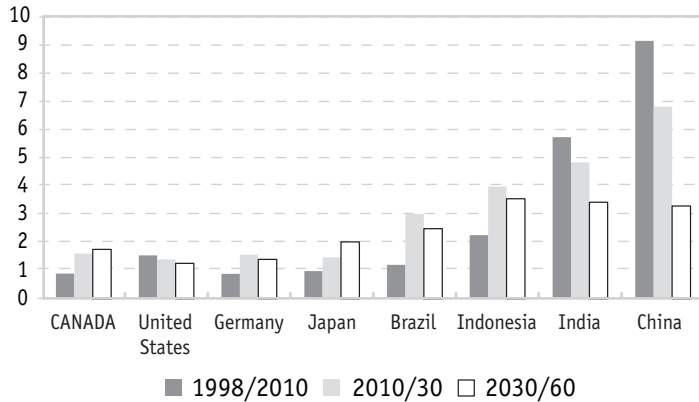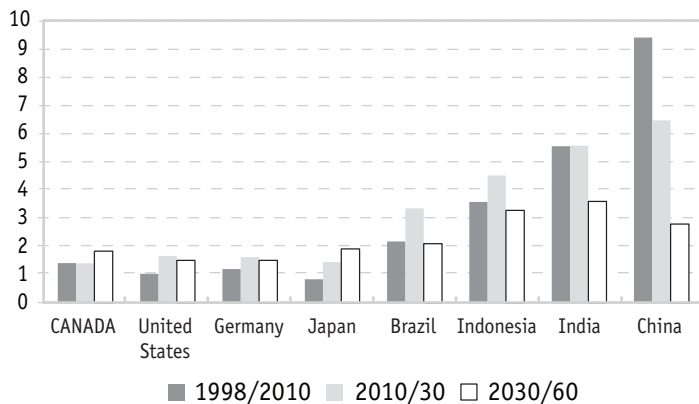
Average annual rate of growth (per cent)

■ 1998/2010 ■ 2010/30 □ 2030/60

Chart 9

Real GDP Per Capita Growth in Selected G-20 Countries

Average annual rate of growth (per cent)

■ 1998/2010 ■ 2010/30 □ 2030/60

growth projection of 1.5 per cent, Dungan and Murphy see MFP growing only at a 1.0 per cent average annual rate, with capital intensity growth adding 0.5 percentage points per year to labour productivity growth (compared to 0.2 per cent in the OECD projection).

Elsewhere, the United States, whose productivity record has been clearly superior to Canada's, is projected to lose much of that advantage in the future, mainly because of a reversal in relative capital intensity in favour of Canada. Both Germany and Japan are also expected to pick up the pace of their labour productivity gains and surpass those in the United States. The story in the four large emerging-market economies is mixed. China and India, which have made rapid strides in catching up to the labour productivity levels of the developed countries, are expected to lose some of that momentum as their shortfalls shrink. Indonesia, on the other hand, will gradually join them as another Asian tiger economy and even move to the forefront in terms of labour productivity growth in the 2030-2060 period. Brazil will remain an intermediate case, with a clear acceleration in labour productivity growth beyond the moderate growth rate experienced in the 1998-2010 period, but without reaching the rates recorded by its Asian counterparts.

Finally, these series can be used to generate per capita income/output projections. Due to deterioration in the demographic outlook and in physical and human capital growth as well as a peaking of the participation rate, actual per capita output increases in Canada are at best likely to be sustained at about 1½ per cent per year in the next two decades (Chart 9). There is a slight pick-up in the 2030-2060 period to around 1¾ per cent per year. This scenario relies on the

less than 1 per cent per annum on average. This should improve somewhat in the future, reaching 1.7 per cent on average over the next half century (2010-2060) (Chart 8).[7]

It is interesting to note that Dungan and Murphy (2012:51) project that output per worker in Canada will advance at a 1.5 per cent average annual rate to 2040, quite similar to the OECD projection. However, unlike the OECD MFP

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7   The benefits of greater productivity growth are massive. In its recently released discussion paper on the economic and fiscal implications of Canada's aging population, Finance Canada (2012:34) points out that an increase in productivity growth to 1.9 per cent per year, in line with the top G-7 performer (the United States) over the past decade, would increase real income per capita by another $18,900, or 28 per cent, by 2050. This productivity number is close to the OECD projection.

projected acceleration in multifactor productivity growth.

The story is not all that different for the United States and Germany, though the drivers are somewhat different. The gap in Canada's per capita GDP with the United States is projected to expand slightly to nearly a quarter in 2035 and then to halve in size by 2060 as the improvement in relative capital per worker comes to dominate the deterioration in labour force participation. On the other hand, Japanese per capita income gains are projected to equal and then ultimately surpass those in the other OECD majors owing to stabilizing labour force participation and improved productivity trends. Per capita growth in China, the catch-up star, will fall back once most convergence in productivity levels has been achieved, and after 2030 the fastest gains will be recorded in India and Indonesia. Again, Brazil's performance will be mid-way between those of the OECD countries and those of the major emerging market economies.

What Can Canada Do To Improve its Long-term Productivity and Per Capita Income Growth?

The OECD sees Canada's policy priorities for improving its productivity performance as lying principally in three main areas (OECD, 2012a). Without any special rank ordering, a first would be to strengthen the degree of competition in product markets, even if Canada is one of the OECD's top-ranked countries in this dimension. There is considerable evidence, Canadian and otherwise, that more vigorous competition, especially in upstream markets (Cette *et al.*, 2012), either from a liberal domestic regulatory environment (*e.g.* Conway and Nicoletti, 2007; Clark and da Silva, 2009) or from a more open trading regime (several articles by John Baldwin and colleagues and Trefler, 2004) has benefits in

terms of both static allocative efficiency and dynamic gains in productivity (Sharpe, 2010).

Industries that are most in need of regulatory reform are agricultural sectors subject to supply management (mainly dairy, which also may prove to be a stumbling block in crucial free trade negotiations), professional services (still somewhat balkanized, despite the Agreement on Internal Trade, AIT), electricity (most provinces other than Alberta still impose inefficient regulation in this sector, and the energy chapter of the AIT has still not been finalized) and postal services (few countries still give their heritage state-owned enterprise as broad a monopoly as Canada). A related productivity-sapping weakness is the series of restrictions on foreign direct investment, especially from the United States (Ng and Souare, 2011; Audet and Gagné, 2010), mainly in energy, airlines, finance, electricity, broadcasting and telecommunications, although the government has announced its intention to remove those applying to telecom firms holding less than 10 per cent of the market in the near future.

A second area where policy changes could have a measurable impact on productivity would be taxation. Any reductions in the tax wedge would help to boost labour force participation and lower structural unemployment. In addition, the OECD strongly supports the Harmonized Sales Tax and was therefore saddened by the recent decision to abandon it in British Columbia as well as by the failure of certain other provinces to adopt it. On the income tax front there remain a number of inefficient and distortive tax expenditures that could be reconsidered to allow rates to be cut. As in other countries housing is still unduly favoured over other forms of investment, although the distortion is less severe. Nonetheless, taxes on property remain an excellent base because of its immobility and impossibility to hide and one that lines up well with ability to pay if properly designed.

Another underutilized base in Canada is environmental taxes, which the latest OECD figures (from 2009-10)[8] show to be among the lowest in the OECD at less than 4 per cent of total tax revenue, compared to about 7 per cent for the average OECD country and as much as 15 per cent in Turkey. The question of a carbon or more general greenhouse gas emissions tax remains controversial in Canada and abroad. But the theory is clear that Canada's approach of implementing sectoral standards and regulation is inefficient, since it will not allow the marginal cost of emissions reductions to be equalized in general across the economy. Those who oppose taxes no matter what the base can, of course, support equivalent permit trading. The OECD approach is that the proceeds from a carbon tax would not necessarily go to pay for higher spending but rather to allow further cuts in taxes that serve to distort behaviour in welfare-harming ways, especially those that apply to saving, investment and labour supply.

The third broad policy area in which we have come to believe Canada could do better with important payoffs on the productivity front is tertiary education and innovation (Cheung *et al.*, 2012; Bibbee, 2012). Of course, Canada already enjoys very high attainment at the tertiary level by OECD standards; but few graduates go beyond a first degree; not enough managers have integrative business school training (Moldoveanu and Martin, 2008) or any university education at all (Bloom, 2011); too little in the way of entrepreneurial skills are taught; academics and businesses need to discover what each has to offer in collaborative efforts; foreign students are still relatively untapped as a source of future skilled immigrants; and greater differentiation between tertiary institutions that engage in research and those that focus primarily on teaching would promote greater quality and efficiency based on comparative advantage.

Canada's long-standing paucity of business-financed R&D has been much studied of late. The federal government's strategy had been to provide extremely generous tax incentives – only France and Spain offer anything that could compete with the Scientific, Research and Experimental Development tax credit. Following the recent report of a commission chaired by Thomas Jenkins (IPFSRD, 2011), the federal government wisely decided to adopt a more balanced position and shift some public resources back to grant programmes. However, it enlarged the gap between the small and large-firm subsidy rates and removed capital spending from the base for all firms, which risks distorting factor choice and biasing spending towards labour-intensive industries. The already numerous grant programmes should be systematically evaluated, with the least efficient being culled.

Nevertheless, innovation is much more than invention achieved by R&D. It is achieved by good ideas in other directions than new high-tech products put in place by innovative start-ups. The question of the adequacy of Canada's financial markets in their financing of such endeavours is open. Venture capital remains in the doldrums, and other early-stage capital is also not all that plentiful: taking their volumes together relative to GDP, Canada ranked only 14th out of 27 OECD countries in 2009.

Conclusion

It seems like during most of my long career as an economist that a multitude of economists have been trying to figure out why Canada's productivity growth has not been faster, with a lengthening list merely of review articles. Some progress has indeed been made over the years, but much remains unexplained. This article does not purport to provide any new answers to the conundrum, though I am not so shy as to refuse to proffer any policy recommendations, since

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8   Available at http://www2.oecd.org/ecoinst/queries/index.htm.

that is our bread and butter here at the OECD. Hence, one last piece of advice: there used to be a body called the Economic Council of Canada, which was wound up 20 years ago after 30 years of yeoman's service to the nation. It strikes me – and others (Competition Policy Review Panel, 2008; IPFSRD, 2011) – that something akin to it would be useful going forward to assess key policies and proposed measures and catalyse reform efforts through a productivity, innovation and competitiveness lens, as is done in Australia and New Zealand.

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Appendix
Methodology for Long-Term Macroeconomic Projections

While there is no single theory of economic growth, there is wide support for models in which each country would be expected to converge to its own steady-state trajectory of GDP per capita determined by the interface between global technological development and country-specific structural conditions and policies (so-called conditional convergence). In the long-run, all countries are expected to grow at the same rate determined by the worldwide rate of technical progress, but cross-country GDP per capita gaps would remain, mainly reflecting differences in technology levels, capital intensity and human capital.

The supply side of the economy consists of a standard aggregate Cobb-Douglas production function with constant returns to scale featuring physical capital, human capital, and labour as production factors plus technological progress (so-called multifactor productivity). Multifactor productivity growth is measured as the difference between growth in output and total inputs. These components of the production function are projected to 2060 in order to construct measures of potential GDP measured in terms of constant 2005 USD purchasing power parities (PPPs) (see Easterly and Levine, 2001; OECD, 2003; Duval and de la Maisonneuve, 2010; and Fouré *et al.*, 2010 for similar approaches). The projections for all components to 2013 are mostly consistent with the May 2012 *OECD Economic Outlook* projections, although some elements of the short- term non-OECD projections are taken from IMF (2012). An exception is the projection of human capital, which starts in 2011 as there is no short- term forecast available.

The fiscal side of the model ensures that government-debt-to-GDP ratios stabilize over the medium term via fiscal closure rules for the primary balance, which either stabilize debt through a gradual improvement in the primary balance or target a specific (usually lower) debt-to-GDP ratio. Debt service responds to changes in market interest rates, but with lags which reflect the maturity structure of debt. Higher debt levels are assumed to entail higher country- specific fiscal risk premia (Égert, 2010; Laubach, 2009). A further interest-rate adjustment that is equal across all countries ensures that global saving and investment are aligned.

Private saving rates for OECD countries are determined by demographic factors including old-age and youth dependency ratios, fiscal balances, the terms of trade, productivity growth, net oil balances and the availability of credit (Kerdrain *et al.*, 2010). Total saving is the sum of public and private saving, although there is a 40 per cent offset of any improvement in public saving from reduced private saving due to partial Ricardian equivalence (*e.g.* Röhn, 2010). For non-OECD countries, the total savings rate is modelled by developments in old-age and youth dependency ratios, the terms of trade, the availability of credit, the level of public expenditure (a proxy for public social protection) and productivity growth. Investment projections are backed out from projected capital stocks assuming that depreciation remains stable at recent historical levels. There is no influence from structural policies on investment, except indirectly to the extent that they boost output, although this ignores some evidence to suggest that reforms to product market regulation and employment protection legislation can boost investment rates (Alesina *et al.*, 2005; Egert, 2009; Kerdrain *et al.*, 2010). Indeed, Cette *et al.* (2012) have recently shown that upstream product market regulations limit R&D and ICT capital stocks and curb productivity in 15 OECD countries,

including Canada; moreover, the estimated effect on Canada is one of the largest in their sample.

Structural policies play an important role in shaping the long-run projections for growth and fiscal and global imbalances. The baseline long-run scenario incorporates a number of policy developments in several areas:

- The share of average life expectancy devoted to participation in the labour market is assumed to remain constant, hence the legal pensionable age is implicitly assumed to be indexed to longevity. In addition, recently legislated pension reforms that involve an increase in the normal retirement age by 2020 are assumed to be implemented as planned.

- Educational attainment continues to converge across countries relying implicitly on an expansion of education systems, particularly in countries with currently low educational attainment levels, and projected labour force participation depends on developments in educational attainment.

- Countries with relatively stringent product market and trade regulations are assumed to gradually converge towards the average regulatory stance observed in OECD countries in 2011. For other countries regulations remain unchanged. This implies faster MFP growth in countries where the regulatory stance is currently more stringent than the OECD average.

- For non-OECD countries, a gradual increase in public spending on social protection is assumed, amounting on average to an increase of four percentage points of GDP to a level of provision similar to the average OECD country. It is further assumed that this is financed in a way in which there is no effect on public saving.

- Private credit as a share of GDP is projected on the basis that countries gradually converge on the U.S. level of financial development with the gap assumed to close at 2 per cent per annum. For example, this means that for an average of the BRIC countries, the availability of credit rises from just over one-third of that in the United States in 2010, to around three-quarters in 2060.

Further details of the methodology used to make the long-term projections, including the parameterization of the links between structural factors and the components of GDP, including via new regression estimates are provided in Johansson *et al.* (2012).