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Estimates of Canada's Potential GDP and Output Gap – A Comparative Analysis

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The *Parliament of Canada Act* mandates the Parliamentary Budget Officer (PBO) to provide independent analysis to the Senate and House of Commons on the state of the nation's finances, government estimates and trends in the national economy.

This note briefly reviews the usefulness of the concepts of potential GDP and the output gap, which figure prominently in the conduct of both monetary and fiscal policy. The note also provides a comparison of potential GDP and output gap estimates for the Canadian economy.

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Key Points

In January 2010, PBO published its methodology and estimates of potential GDP (a measure of the economy's productive capacity) and the Government's structural budget balance (the balance that would be observed if the economy were operating at its potential). This note briefly reviews the usefulness of the concepts of potential GDP and the output gap (GDP relative to potential GDP), which figure prominently in the conduct of both monetary and fiscal policy.

The output gap is a comprehensive indicator of the economic cycle and is a key input into estimates of the structural and cyclical components of a government's budget balance. Estimating a government's structural budget balance is crucial because, while the cyclical component of the budget balance may be expected to dissipate over a medium-term horizon as the economy returns to its potential, the structural component may necessitate policy actions.

- The importance of providing estimates of the structural budget balance is underscored in the United Kingdom, where, under the *Code for fiscal stability* the government is required to publish estimates of fiscal aggregates adjusted for the economic cycle.
- Despite acknowledging the importance of avoiding structural deficits and providing an estimate of the Government's structural balance over history, Finance Canada has not provided an estimate of the Government's structural balance over its fiscal planning horizon.

Potential GDP and the output gap are, however, not directly observable and therefore must be estimated. Given the uncertainty surrounding potential GDP and the output gap, and given their role in the conduct of monetary and fiscal policy, it is useful to compare estimates produced by different organizations. This note compares estimates from PBO, Finance Canada, the Bank of Canada, the IMF (International Monetary Fund) and OECD (Organisation for Economic Co-operation and Development).

The comparison of potential GDP and output gap estimates shows that:

- Despite some differences in the level of the output gap at certain points in time, the output gap estimates across organizations are highly correlated;
- The output gap estimates show different views regarding the Canadian economy's relative strength heading into the recession:
 - at the upper end, the Bank of Canada estimates an output gap of +0.8 per cent in 2008 suggesting that the economy was relatively strong heading into the recession;
 - at the lower end, Finance Canada estimates an output gap of -2.2 per cent in 2008, which suggests that the Canadian economy was already in a relatively weak position even before the recession began; and,
 - PBO, the IMF and the OECD, however, estimate that the Canadian economy was operating near potential heading into the current recession with output gap estimates of -0.5, -0.5 and -0.2 per cent respectively.

- All organizations project that potential GDP growth will average less than 2 per cent over the 2009 to 2014 period, which would represent a reduction of over 1 percentage point in potential GDP growth relative to the last decade; and,
- Based on the forecast of real GDP growth in Budget 2010, PBO's estimate suggests that real GDP will return to its potential by 2014, while Finance Canada's estimate suggests that real GDP will remain roughly 1 per cent below its productive capacity.

Finance Canada's estimate of the output gap indicates that the Canadian economy was operating well below its potential in 2008 and will not return to its potential over the medium term, which raises the following questions that parliamentarians may wish to examine:

- What factors are responsible for Finance Canada's estimate of the weakness in the economy, relative to its potential, heading into the recession?
- What factors explain Finance Canada's projected improvement in potential GDP growth over the medium term?
- How does the Government incorporate its assessment of the economy's performance – as measured by the output gap – into its fiscal planning framework?

In a departure from past practices, Budget 2010 (Annex 4, pages 328-329) provides an estimate of the growth in potential GDP over the medium term (2009-2014) and some detail of the economic forecasts underlying the fiscal projections; however, PBO believes that Finance Canada could further improve budget transparency by providing:

- additional detail and information related to the estimate of potential GDP growth over both the medium-term and long-term (i.e., beyond 2014) horizons;
- detail regarding the forecasts of the income composition of nominal GDP; and,
- its estimate of the Government's structural budget balance based on Budget 2010 economic and fiscal projections.

PBO believes that providing the above estimates and information would not only promote budget transparency but would also enhance the quality of policy decisions.

1. Introduction

In January 2010, PBO published its methodology and estimates of potential GDP¹ and the Government's structural budget balance (see PBO (2010a)). The following provides a brief review of the usefulness of the concepts of potential GDP and the output gap, as well as a comparison of potential GDP and output gap estimates for the Canadian economy. Budget 2010 (see Annex 4, page 329) provides estimates of growth in potential GDP over the medium term; however, PBO believes that there is scope for Finance Canada to further improve budget transparency.

2. The Usefulness of Potential GDP and Output Gap Estimates

Recent PBO analysis (see PBO (2010b)) has highlighted the importance of potential GDP in comparing the severity of the recession across G7 countries.² While taking account of a country's potential GDP is essential in making international comparisons of economic cycles, assessing GDP relative to potential GDP – i.e., the output gap – figures prominently in the conduct of both monetary and fiscal policy. Koske and Pain (2008) note that output gaps are seen as providing indications of prospective inflationary pressures and are a key input into estimates of cyclically-adjusted, or structural, budget balances. Indeed, central banks and ministries of finance, as well as international organizations, regularly produce, analyse and disseminate estimates of potential GDP and the output gap.

Potential GDP is, however, an unobservable measure of the economy's productive capacity and, by extension, the output gap is an unobservable measure of the utilization of the economy's productive capacity. Since potential GDP is not observed directly it must be estimated.

¹ PBO defines potential GDP as the amount of output that an economy can produce when its capital, labour and technology are at their respective trends.

² Based on IMF estimates and projections of GDP and potential GDP, PBO found that the severity of the recession in Canada was in line with the experience of other G7 countries.

Various approaches to constructing estimates of potential GDP have been developed (e.g., statistical filtering-based and production function-based methods).³ Therefore, given the uncertainty surrounding potential GDP and the output gap, and given their role in the conduct of monetary and fiscal policy, it is useful to compare estimates produced by different organizations.

Further, estimates of potential GDP and output gaps are typically revised following revisions to observed data series – which are themselves estimates – raising questions about their reliability. Cayen and van Norden (2005) assess estimates of Canadian output gaps based on various statistical and econometric detrending methods and find that measurement error may be more serious than previously thought.⁴ However, based on OECD's production function-based estimates of potential GDP, Tosetto (2008) finds that initial and current estimates of Canada's output gaps are highly correlated (low correlation implies large revisions) and that revisions to Canada's output gap estimates are among the smallest of the 15 OECD countries examined.⁵

Despite the uncertainty surrounding estimates of potential GDP and output gaps and concerns about their reliability, a number of studies conclude that they continue to provide useful information to monetary and fiscal policymakers. Tosetto (2008) indicates that output gaps “may still provide indications about prospective inflationary

³ PBO's approach measures potential GDP from the supply side of the economy based on trend estimates for labour input and labour productivity (see PBO (2010a) for further details). Cerra and Saxena (2000) review a number of different methods that can be used to estimate potential output. Mishkin (2007) discusses the basic approaches to estimating potential output (i.e., statistical/econometric, production function and dynamic stochastic general equilibrium (DSGE) approaches).

⁴ Cayen and van Norden (2005) find that Canadian output gap estimates can be subject to important revisions and that in most cases data revisions are not the primary cause of output gap revisions. Most of their real-time (i.e., initial) estimates have less than 50 per cent correlation with their final (i.e., current) estimates.

⁵ Tosetto (2008) finds that with respect to initial and current output gap estimates, the average revision (in absolute terms) for Canada is 0.50 percentage points, which is second only to New Zealand at 0.45 percentage points. For comparison, the size of the revision for the remaining G7 countries is, on average, twice as large (0.99).

pressures and, therefore may be used in defining monetary policies and structural fiscal balances.” Koske and Pain (2008) suggest that potential GDP and output gaps “help situate current economic developments and contain information that can help to account for current fluctuations in inflation or the fiscal position.” Mishkin (2007) argues that “[f]or better or worse, we cannot escape the need for information on output gaps so that we can forecast the future path of inflation and evaluate the current setting of our monetary policy instruments.” Beffy et al. (2006) note that potential GDP and output gaps provide “[a] benchmark for projecting economic potential and growth beyond the short term on the basis of alternative supply-side assumptions.” In summarizing the IMF’s research in this area, De Masi (1997) notes that the concepts of potential GDP and output gaps “are central to the IMF’s analytical work in providing policy recommendations to member governments.”

Potential GDP also provides a natural benchmark against which historical and international comparisons can be made. Indeed, because trends in labour supply and productivity growth may change over time and because countries typically have different trends in labour supply and productivity, PBO believes that historical and international comparisons should examine an economy’s performance relative to its trend or potential GDP across time and/or across countries. Comparing the depth or duration of recessions in a given country over different time periods without taking into account changes in potential GDP may provide a misleading representation of the economic cycle.⁶

For example, similar declines in observed GDP (expressed in percentage terms) across recessions would seem to suggest similar recessionary impacts. However, if an economy’s potential GDP

growth also declined over time, the recessionary impact in the most recent recession would be smaller when measured relative the economy’s potential GDP. Similarly, while declines in observed GDP across countries might be comparable, failing to take into account each country’s potential GDP would understate (overstate) the recessionary impact relative to other countries if its potential GDP growth were higher (lower) than other countries.

3. Structural Budget Balance

The structural or cyclically-adjusted budget balance is typically defined as the budgetary balance that would be observed if the economy were operating at its potential GDP. The estimate of potential GDP therefore figures prominently in calculating the structural balance since it is used to identify the cyclical revenue and expenditure components of the budget. PBO (2010a) extends the standard methodology used to construct estimates of the structural budget balance by further adjusting the budgetary balance to account for terms of trade or ‘trading gain’ effects, given the importance of commodities to the Canadian economy.

A government’s structural budget balance is also unobservable and uncertainty surrounds any estimate of it – beyond the uncertainty related to the estimate of potential GDP used in its calculation (e.g., uncertainty related to estimation of the cyclical sensitivity of taxes and spending). Koske and Pain (2008) argue that although the structural budget balance cannot be measured perfectly it remains a ‘useful’ concept.

Giorno et al. (1995) indicate that estimates of the structural balance help to “provide a clearer picture of the government’s underlying fiscal situation.” Further, distinguishing between structural and cyclical components of a government’s budgetary balance is crucial because, while the cyclical component may be expected to dissipate over a medium-term horizon as the economy returns to its potential, the structural component may necessitate policy actions. Murchison and Robbins (2003) note that such

⁶ Typically, historical comparisons of observed GDP during recessions – in terms of their depth or duration – are expressed relative to the peak in GDP prior to the recession. This abstracts from the growth in GDP observed prior to the recession and what growth would have been in the absence of the recession, both of which could differ across periods.

distinctions would help policymakers in setting effective policies:

For instance, permanent programs should not be implemented based on cyclical changes in the budgetary position. Moreover, it may be inappropriate to take fiscal measures to reverse a deficit as it may already be in the course of reversing itself as economic conditions improve. Conversely, government action may be required to reverse a widening structural deficit in order to restore financial integrity.

The concept of a structural budget balance has also figured into the Government's fiscal planning. The 2008 Economic and Fiscal Statement noted that its actions would "help ensure that on a structural basis (i.e. absent the temporary, cyclical weakness), the Government remains in a surplus position." Further, Budget 2009 indicated that one of the principles guiding the Government's Economic Action Plan was that the "stimulus plan should be phased out when the economy recovers to avoid long-term structural deficits." Despite acknowledging the importance of avoiding structural deficits, the Government has not provided any estimates of its structural balance over its fiscal planning horizon. Finance Canada does, however, provide estimates of the Government's structural budget balance (on a National Accounts basis) over the historical period 1975-2008.⁷

4. Estimates of the Output Gap

Because potential GDP is not directly observable and thus has to be estimated, this section compares PBO's output gap estimate for Canada with alternative estimates produced by Finance Canada⁸, the Bank of Canada, the OECD and the

IMF. Annex A provides each organization's potential GDP estimates as well as the data and methodological sources.

Although comparing estimates across organizations by no means quantifies the true uncertainty surrounding estimates of potential GDP and the output gap, the comparison is still useful for a number of reasons. First, the output gap estimates of the organizations considered in this comparison are featured prominently in their respective analyses and external publications. Second, despite the uncertainty surrounding these estimates they are often used to formulate policy. Third, comparisons of output gap estimates allow one to examine how different organizations have characterized the economic cycle. Finally, comparisons of potential output facilitate discussion of where the economy is likely headed in the future which is an important input into the budget planning exercise as well as into the analysis of the sustainability of public finances.

Figure 1 plots the output gap estimates of PBO, Finance Canada, the Bank of Canada, the IMF and the OECD from 1980 to 2008. Despite differences in the level of the output gap at specific points in time the general movements of the estimates are similar over history. The correlations of the estimates range from a low of 0.824 between the Bank of Canada and Finance Canada to as high as 0.961 between PBO and Finance Canada estimates.⁹ However, comparing the sign of the output gap estimates (i.e. whether the economy is operating above or below potential) reveals differences between the five measures. For example, the percentage of the time PBO estimates of the output gap have the same sign as their counterparts ranges from a high of 89.3 per cent relative to Finance Canada to as low as 67.9 per cent relative to the OECD, which would affect an organization's estimate of the structural budget balance.

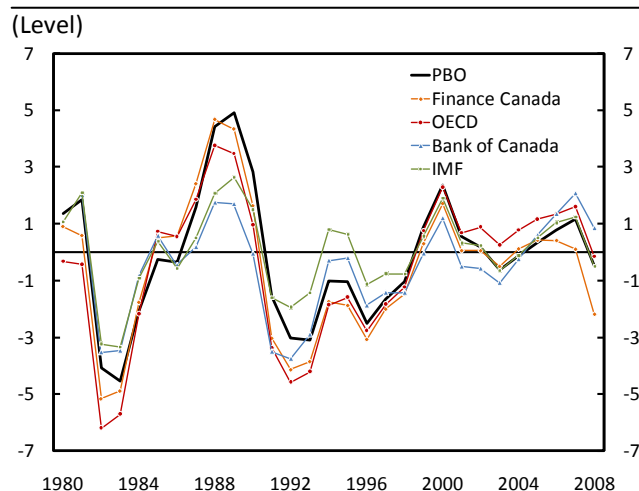
⁷ See Tables 45 and 46 in Finance Canada's *Fiscal Reference Tables October 2009*. PBO (2010a) provided a comparison of PBO and Finance Canada estimates of the Government's structural budget balance over history. Despite the differences in accounting frameworks, calendar/fiscal years, and methodologies, PBO and Finance Canada estimates of the Government's structural balance track each other closely over history (the correlation coefficient was calculated at 0.96).

⁸ Estimates of Canada's (nominal) potential GDP for the period 1975 to 2008 are contained in Finance Canada's *Fiscal Reference Tables October 2009*. Budget 2010 (Annex 4, page 329) presents forecasts of Canada's potential GDP growth over the period 2009 to 2014.

⁹ The statistics in this section were calculated over the 1981 to 2008 period since this was the longest common sample across organizations.

Figure 1

Output Gap, 1980 to 2008



Sources: Office of the Parliamentary Budget Officer, Haver Analytics, Bank of Canada, Finance Canada, OECD and IMF.

Note: The output gap is measured as the per cent deviation of real GDP from its potential.

The current period provides a case in point. Based on their respective output gap estimates, different views exist regarding the Canadian economy's position heading into the current recession. At the upper end, the Bank of Canada estimates that the economy was above its potential (+0.8 per cent) in 2008. At the lower end, Finance Canada estimates that the economy was operating well below its potential (-2.2 per cent) in 2008. PBO, the IMF and the OECD, however, estimate that the Canadian economy was operating near potential heading into the current recession with output gap estimates of -0.5, -0.5 and -0.2 per cent respectively.

These divergent estimates imply significantly different interpretations of the strength of the Canadian economy heading into the recession. The Bank of Canada estimate suggests that the economy was in a strong position heading into the recession, having operated above its potential since 2004. On the other hand, the Finance Canada estimate suggests that the Canadian economy was already in a weak position before entering the recession having underperformed its potential since the second half of 2006, which

opened up a significant amount of excess capacity even before the start of the recession.

The different estimates of the output gap heading into the recession are entirely the result of different views of potential GDP since the observed real GDP series used in each output gap estimate is the same (Table 1). The range of potential GDP growth estimates is relatively narrow over the 2000 to 2003 period, with all five organizations estimating that potential GDP growth slowed following the end of the high tech boom, but the range of potential GDP growth estimates widens substantially over the 2006 to 2008 period. Generally most organizations estimate that potential GDP growth was stable and/or declining after 2003, while Finance Canada is an outlier estimating that potential GDP growth picked up from 2003 to 2006 before stabilizing at 2.8 per cent, well above other estimates.

Table 1

Potential GDP Growth, 2000 to 2008

	(Per cent)									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	
PBO	3.7	3.6	3.3	2.7	2.6	2.5	2.4	2.1	2.1	
Finance Canada	3.8	3.5	2.9	2.4	2.5	2.7	2.9	2.8	2.8	
Bank of Canada	3.9	3.5	3.0	2.4	2.3	2.1	2.1	1.8	1.7	
OECD	3.7	3.4	2.7	2.5	2.6	2.6	2.7	2.3	2.2	
IMF	3.8	3.4	3.0	2.8	2.6	2.4	2.3	2.3	2.2	
Range	0.3	0.2	0.6	0.4	0.4	0.6	0.8	1.1	1.1	
<i>Addendum:</i>										
Real GDP growth	5.2	1.8	2.9	1.9	3.1	3.0	2.9	2.5	0.4	

Sources: Office of the Parliamentary Budget Officer, Bank of Canada, Finance Canada, OECD and IMF.

Note: The range is calculated as the highest estimate minus the lowest estimate in each year.

5. Projecting Potential GDP Growth

Potential GDP growth provides an estimate of how fast the economy can grow when all factors of production are fully utilized. Given each organization's starting point estimate of the output gap and real GDP growth forecast, the growth rate of potential GDP will influence how quickly the output gap can be expected to close over the

projection horizon. In turn this will affect their respective estimates of structural budget balances and inflationary pressures.

Despite differences in 2007 and 2008, the range of potential GDP growth estimates narrows noticeably over the projection horizon (Table 2). Specifically, all five organizations estimate that potential GDP growth slowed in 2009 following the onset of the global recession. PBO estimates the smallest reduction in potential GDP growth in 2009 with a decrease of one-fifth of a percentage point, while Finance Canada estimates the largest reduction in potential GDP growth with potential GDP growth projected to slow from 2.8 per cent in 2008 to 1.8 per cent in 2009, a 1-percentage point decline. The three remaining estimates suggest a 0.4 to 0.5 percentage point reduction in potential GDP growth.

Table 2

Potential GDP Growth, 2007 to 2014

(Per cent)

	2007	2008	2009	2010	2011	2012	2013	2014
PBO	2.1	2.1	1.9	2.0	2.0	1.9	1.8	1.7
Finance Canada	2.8	2.8	1.8	1.4	1.5	1.7	1.9	2.0
Bank of Canada	1.8	1.7	1.2	1.5	1.9	1.9		
OECD	2.3	2.2	1.8	1.7	1.9			
IMF	2.3	2.2	1.7	1.6	1.6	1.7	1.9	2.0
Range	1.1	1.1	0.7	0.6	0.5	0.2	0.1	0.3
<i>Addendum:</i>								
Budget 2010 Real GDP growth	2.5	0.4	-2.5	2.6	3.2	3.0	2.8	2.6

Sources: Office of the Parliamentary Budget Officer, Bank of Canada, Finance Canada, OECD and IMF.

Note: The range is calculated as the highest estimate minus the lowest estimate in each year.

All organizations project that potential GDP growth will average less than 2 per cent over the 2009 to 2014 period, which would represent a reduction of over 1 percentage point in potential GDP growth relative to the last decade. PBO's projection of potential GDP growth is, on average, the highest over both the near-term (2009 to 2011) and medium-term (2009 to 2014) horizons. However, there are differences at the end of the projection period. PBO projects that potential GDP growth

will slow over the last 3 years of the projection as a result of lower labour input growth, while Finance Canada and the IMF are projecting an increase in potential GDP growth. Understanding the source of these divergent views could be important in the context of long-term fiscal sustainability analysis. For example, Finance Canada and the IMF could have a more optimistic view of trend labour productivity growth.

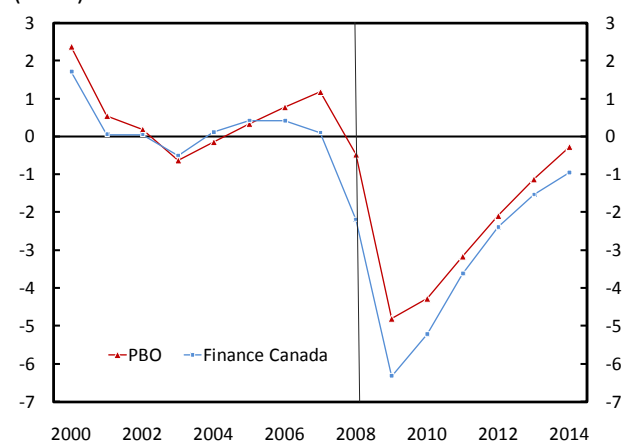
6. PBO and Finance Canada Output Gap Projections

The output gap projections of PBO and Finance Canada are compared in this section to illustrate the impact that the starting point of output gap and potential GDP growth projections can have on projections of the output gap. PBO and Finance Canada estimates were chosen for this comparison because both organizations use the same private sector real GDP growth forecast from Budget 2010 and therefore any differences between the two output gap estimates over the projection horizon can be attributed to either the starting point estimate or the respective potential GDP growth projections.

Figure 2

Output Gap, 2000 to 2014

(Level)



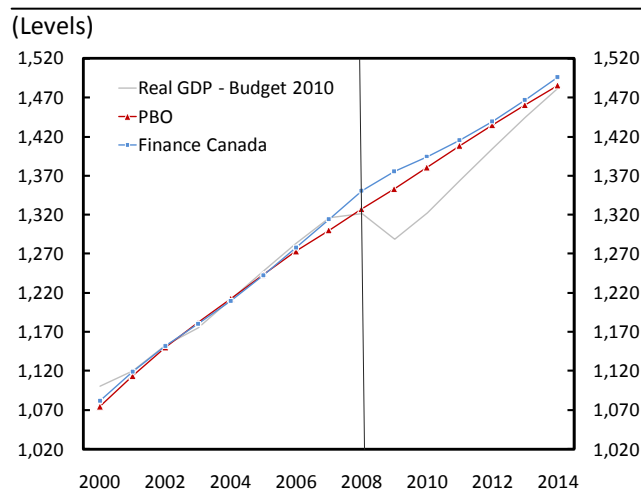
Sources: Office of the Parliamentary Budget Officer, Finance Canada.

Note: The output gap is measured as the per cent deviation of real GDP from its potential.

Figure 2 shows that Finance Canada's output gap is below PBO's in every year of the projection horizon indicating that the current recession was more severe than PBO estimates suggest. Finance Canada's estimate also suggests that the current recession has been deeper and the cumulative real GDP loss relative to potential will be larger than either the 1981 or 1990 recessions. The gap between the two estimates is entirely due to Finance Canada's weaker starting point estimate of the output gap. In fact, because PBO's projection of potential growth is, on average, greater than Finance Canada, the difference between the two output gap estimates shrinks somewhat over the projection horizon.

Figure 3

Potential and Real GDP, 2000 to 2014



Sources: Office of the Parliamentary Budget Officer, Finance Canada.

Note: Potential and real GDP are expressed in billions of chained 2002 dollars.

An alternative way of looking at the output gap differences is to examine the respective potential GDP estimates in *levels*. Figure 3 shows that PBO and Finance Canada estimates of potential GDP were quite close over the 2000 to 2006 period, while a rather large gap opened up in 2007 and 2008. As a result, this led to the starting point difference noted earlier, with PBO's estimate of potential GDP roughly 1.7 per cent lower than Finance Canada's estimate in 2008. This gap is projected to shrink over the projection horizon due

to PBO's higher average potential GDP growth, but is never entirely eliminated. PBO's estimate suggests that real GDP will return to its potential by 2014, while Finance Canada's estimate suggests that real GDP will remain roughly 1 per cent below its productive capacity (see Figure 3).

7. Improving Budget Transparency

Budget 2010 presented the medium-term economic forecast that the Government provided to the G20, IMF and World Bank under the *Framework for Strong, Sustainable and Balanced Growth* that will facilitate G20 members' assessment of the mutual consistency of their policies and economic projections (see p.143 and Annex 4 in Budget 2010). This economic forecast is consistent with the forecasts on which the fiscal projections in Budget 2010 are based, with the exception of CPI (Consumer Price Index) inflation.¹⁰ The detail presented in Annex 4 includes growth forecasts of the major expenditure components of GDP in addition to the medium-term estimates of Canada's potential GDP growth. PBO welcomes the provision of this additional information. In the past, PBO had requested forecasts of both the expenditure and income components of GDP underlying Finance Canada's fiscal projections; however, this information was deemed a Cabinet confidence by the Privy Council Office and therefore was not provided.¹¹

PBO believes that Finance Canada could further improve budget transparency by providing:

¹⁰ The forecast of CPI inflation is based on the Bank of Canada's projection.

¹¹ In 2008 and 2009, PBO requested from Finance Canada the income and expenditure assumptions underlying GDP (as well as the data to calculate effective tax rates) that were used to develop their status quo fiscal projections. See the requests <http://www2.parl.gc.ca/sites/pbo-dpb/documents/PBO%20Info%20Request%20001.pdf> and http://www2.parl.gc.ca/sites/pbo-dpb/documents/Followup_IR_001002.pdf. In April 2009, the Department of Finance confirmed that the information PBO had requested was deemed to be a Cabinet confidence (http://www2.parl.gc.ca/sites/pbo-dpb/documents/Response_001_B.pdf) and therefore could not be provided.

- additional detail and information related to the estimate of potential GDP growth over both the medium-term and long-term (i.e., beyond 2014) horizons;
- detail regarding the forecasts of the income composition of nominal GDP; and,
- its estimate of the Government's structural budget balance based on Budget 2010 economic and fiscal projections.

As indicated in PBO (2010a), Finance Canada provides estimates of the Government's structural budget balance over history based on the methodology described in Murchison and Robbins (2003).¹² Using Finance Canada's methodology, and given Finance Canada's estimate of potential GDP out to 2014, the forecasts presented in Budget 2010 could be used to provide an estimate of the Government's structural budget balance over its fiscal planning horizon.

The importance of providing estimates of the structural budget balance is underscored in the United Kingdom, where, under the *Code for fiscal stability* the government is required to publish estimates of fiscal aggregates adjusted for the economic cycle.¹³ Farrington et al. (2008) indicate that publishing cyclically-adjusted, or structural, forecasts of the budget balance and key fiscal aggregates "helps to promote transparency in the operation of fiscal policy and enhance the quality of policy decisions."

¹² Finance Canada's methodology is similar to PBO's except that the sensitivity of revenue and expenditure components to the output gap is estimated directly using regression techniques, as opposed to using a microsimulation database. The regression technique also adjusts for simultaneity between economic and fiscal variables.

¹³ A draft of the updated *Code for fiscal stability* is available at: http://www.hm-treasury.gov.uk/d/fiscal_stability_draft_code.pdf.

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Annex A

Table A-1

Potential GDP Estimates*

Millions of 2002 chained dollars

	PBO	Finance Canada	Bank of Canada	OECD	IMF
1980	616,988	619,829		627,464	618,848
1981	635,561	643,566	634,449	650,133	633,990
1982	655,603	663,100	651,360	670,390	649,838
1983	676,674	679,158	668,672	685,008	668,225
1984	697,975	695,781	689,086	698,631	689,760
1985	718,034	712,507	711,987	710,966	713,449
1986	736,027	729,272	736,803	729,451	737,680
1987	752,775	746,677	763,267	750,758	760,860
1988	768,693	766,833	788,778	773,623	786,423
1989	785,130	789,465	809,855	796,078	802,603
1990	802,625	812,075	825,717	817,469	813,121
1991	820,743	833,360	836,832	836,242	821,157
1992	840,672	850,382	846,269	854,300	831,224
1993	860,830	867,665	858,713	870,852	846,373
1994	883,209	889,784	876,820	890,838	867,305
1995	908,347	916,052	900,644	913,362	893,196
1996	936,948	942,368	930,651	939,409	923,775
1997	967,919	971,497	965,604	969,779	959,262
1998	1,001,344	1,005,822	1,005,183	1,003,374	998,718
1999	1,036,676	1,042,710	1,046,245	1,037,939	1,039,952
2000	1,075,000	1,082,013	1,087,387	1,075,974	1,079,921
2001	1,114,067	1,119,579	1,125,800	1,112,570	1,116,551
2002	1,150,731	1,152,346	1,159,544	1,142,819	1,150,202
2003	1,182,012	1,180,542	1,187,298	1,171,688	1,182,324
2004	1,212,986	1,209,866	1,214,219	1,201,884	1,212,682
2005	1,243,618	1,242,570	1,240,300	1,233,520	1,241,513
2006	1,273,537	1,278,207	1,266,222	1,266,354	1,270,322
2007	1,300,595	1,314,605	1,288,865	1,295,158	1,299,802
2008	1,327,650	1,350,951	1,310,181	1,323,396	1,328,013
2009	1,353,326	1,375,268	1,326,171	1,347,329	1,350,573
2010	1,380,878	1,394,521	1,346,073	1,370,872	1,371,894
2011	1,408,699	1,415,439	1,371,648	1,396,542	1,393,879
2012	1,435,093	1,439,502	1,397,710		1,418,189
2013	1,460,830	1,466,852			1,444,606
2014	1,485,938	1,496,189			1,472,963

Sources: Office of the Parliamentary Budget Officer; Finance Canada; Bank of Canada; IMF; OECD; Haver Analytics.

*** Table A1 Notes – Data and Methodology Sources**

Office of the Parliamentary Budget Officer

Potential GDP estimates are taken from PBO (2010a) which also describes PBO's methodology for estimating Potential GDP.

Finance Canada

Potential GDP estimates are calculated by PBO using Finance Canada's October 2009 Fiscal Reference Tables (FRT) which provide estimates of the Government's structural budget balance over the period 1975 to 2008, expressed in terms of millions of dollars and as a ratio i.e., expressed relative to (nominal) potential GDP. Nominal potential GDP can therefore be calculated as the dollar value of the structural balance estimate divided by the structural balance-to-potential GDP ratio. The (actual) GDP deflator is then used to deflate nominal potential GDP to calculate real (i.e., inflation-adjusted) potential GDP. To calculate Finance Canada's projected level of potential GDP over the medium term, the 2008 level of potential GDP from the FRT is extrapolated using Finance Canada's estimates of potential GDP growth over the period 2009 to 2014, which are provided in Annex 4 of Budget 2010 (see page 329). Robidoux and Wong (1998) describes potential GDP in Finance Canada's Canadian Economic and Fiscal Model (CEFM) – the model used to estimate the economic impact of the Economic Action Plan (see Annex 1 in Budget 2010).

Bank of Canada

Potential GDP estimates are calculated using historical estimates of the Bank of Canada's conventional output gap measure, information from the January 2010 Monetary Policy Report (MPR) and authors' calculations. Over history the estimates of the Bank of Canada's conventional output gap measure are available from the third quarter of 1981 to the fourth quarter of 2009. Two adjustments have been made to this measure over history. First, the estimate was extrapolated back to the first quarter of 1981 by holding the year-over-year growth rate of potential GDP at its 1981Q3 estimate over the first two quarters of the year. Second, the size of the output gap was adjusted upward by approximately 0.5 per cent in each quarter of 2009 to line up the last estimate with the Bank's assessment "that the economy was operating about 3¼ per cent below its production capacity in the fourth quarter of 2009." Finally, the level of potential GDP was extended over the projection horizon using the annual potential GDP projections from Table 3 of the January 2010 MPR. For further details on how the conventional output gap measure is constructed see Butler (1996) and for a more complete description of the factors underlying the Bank's projection of potential GDP see Technical Box 3 of the October 2009 MPR.

IMF

Potential GDP estimates are taken from the IMF's October 2009 World Economic Outlook Database. De Masi (1997) describes the IMF's methodology used to estimate potential GDP.

OECD

Potential GDP estimates are taken from the OECD's December 2009 Economic Outlook No. 86 Database. Giorno et al. (1995) describes the OECD's methodology used to estimate potential GDP.