OFFICE OF THE PARLIAMENTARY BUDGET OFFICER
CANADA
BUREAU DU DIRECTEUR PARLEMENTAIRE DU BUDGET

Fiscal Impacts of Lower Oil Prices

Ottawa, Canada
January 27, 2015
www.pbo-dpb.gc.ca

The mandate of the Parliamentary Budget Officer (PBO) is to provide independent analysis to Parliament on the state of the nation's finances, the government's estimates and trends in the Canadian economy; and upon request from a committee or parliamentarian, to estimate the financial cost of any proposal for matters over which Parliament has jurisdiction.

The Honourable John McKay, Member of Parliament (Scarborough-Guildwood) requested analysis on the effect of the recent decline in the price of crude oil on Canada's fiscal situation.[†] Based on the Member's request, this note addresses the following questions:

Question 1: What is the impact of lower oil prices on projected federal surpluses?

Question 2: What is the impact of lower revenues resulting from lower oil prices on the fiscal gap of the total government sector?

[†] The Member was also interested in the long-term impacts of factors affecting oil prices (for example, the development of energy reserves in the U.S. and growth in renewable energy sources). Such analysis is beyond the scope of this note and may be addressed in future work.

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Any errors or omissions are the responsibility of the authors. We thank Mostafa Askari and Jason Jacques for comments.
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SUMMARY OF ESTIMATED IMPACTS

Question 1: What is the impact of lower oil prices on projected federal surpluses?

The fiscal impact of the recent decline in oil prices will depend on the persistence of low oil prices and the forces underlying the weakness in oil prices. Since the path for oil prices over the next five years is uncertain, PBO has constructed two hypothetical oil price scenarios (Table S1).

Table S1: Oil price scenarios

West Texas Intermediate (WTI) oil price, US$/barrel

	2014	2015	2016	2017	2018	2019
Baseline	95	81	81	81	81	81
Scenario 1	93	48	48	48	48	48
Scenario 2	93	51	60	69	78	81

Sources: Energy Information Administration; PBO assumptions.

To estimate the impact on federal surpluses, PBO first uses its macroeconomic model to estimate the impact of each scenario on the forecast of nominal gross domestic product (GDP) from the November 2014 *Update of Economic and Fiscal Projections* (EFP 2014). Finance Canada's fiscal sensitivities are then used to adjust revenues and expenses projected in EFP 2014. PBO considers only the impact on nominal GDP resulting from lower GDP inflation and therefore its estimates should be viewed as a lower bound since real GDP would likely be reduced.

In EFP 2014, the Government's budget balance for planning purposes included a $3 billion annual "set-aside for contingencies" which if not required would be used to reduce the federal debt. Notably, the potential for further declines in oil prices was cited as a candidate for such contingencies. Given the estimated fiscal impacts in scenario 1, lower oil prices would more than exhaust the Government's set-aside for contingencies over 2015-16 to 2019-20 (Table S2). Based on the underlying balance projected in EFP 2014, a small budget deficit ($0.4 billion) would be realized in 2015-16, with budgetary surpluses maintained in 2016-17 through 2019-20. Under scenario 2, temporarily lower oil prices would only exhaust the set-aside for contingencies in 2015-16, and budgetary surpluses would be somewhat larger compared to scenario 1.

Table S2: Revised EFP 2014 projected budgetary balance

$ billions

	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Planning balance	-2.9	1.9	4.3	5.1	6.8	13.1
Set-aside for contingencies	3.0	3.0	3.0	3.0	3.0	3.0
Underlying balance	**0.1**	**4.9**	**7.3**	**8.1**	**9.8**	**16.1**
Scenario 1 balance	**-1.2**	**-0.4**	**2.5**	**3.4**	**5.1**	**11.3**
Scenario 2 balance	**-1.2**	**0.7**	**5.2**	**7.3**	**10.1**	**16.6**

Sources: Finance Canada; PBO calculations.

Question 2: What is the impact of lower revenues resulting from lower oil prices on the fiscal gap of the total government sector?

PBO measures the degree to which the fiscal structures of the government sector are not sustainable by calculating a "fiscal gap", which is defined as the immediate and permanent change in a government's operating balance (revenue less program spending) relative to GDP that is required to stabilize the debt-to-GDP ratio over the long term. The above results can be applied to the fiscal gap framework to provide a rough approximation of the impact on total federal and subnational government fiscal sustainability. PBO will provide its complete analysis of fiscal sustainability later this year.

Lower revenues resulting from lower oil prices would increase the total government fiscal gap by approximately 0.2 percentage points in scenario 1 and 0 percentage points in scenario 2 (Table S3).

Table S3: Impacts of lower oil prices on fiscal gaps

% of GDP

	Federal government	Subnational governments	Total government
FSR 2014 fiscal gap	-1.4	1.7	0.3
Scenario 1 revenue impact	**0.0**	**0.2**	**0.2**
Scenario 2 revenue impact	**0.0**	**0.0**	**0.0**

Source: PBO calculations.

1 BACKGROUND

In its November 2014 *Update of Economic and Fiscal Projections* (EFP 2014), the Government projected that its budget balance for planning purposes would improve from a deficit of $2.9 billion in 2014-15 to a surplus of $13.1 billion in 2019-20. This projection was based on the average private sector economic forecast from Finance Canada's survey, adjusted for lower oil prices (assuming West Texas Intermediate (WTI) prices remained near US$81 per barrel), as well as a $3 billion annual set-aside for contingencies such as further declines in oil prices.

Since EFP 2014, WTI oil prices have continued to decline, reaching US$48 per barrel.[1] According to International Monetary Fund (IMF) staff, both supply and demand factors have played a role in the decline in oil prices since June.[2] On the supply side, they note that a major factor was the announced intention of Saudi Arabia—the largest oil producer in the Organization of the Petroleum Exporting Countries (OPEC)—not to counter increasing supply from other producers and OPEC's November 2014 decision to maintain their production ceiling despite a perceived glut. IMF staff also noted that the outlook for growth in world oil demand has been revised down since June. This revision could reflect, in part, expectations of weaker global economic growth going forward, which would appear consistent with observed declines in metal prices and long-term government bond yields.

Ultimately, the fiscal impact of the recent decline in oil prices will depend on the persistence of low oil prices and the forces underlying the weakness in oil prices. Persistently low prices for Canadian crude oil would, all else equal, reduce nominal gross domestic product (GDP) below levels projected in EFP 2014. Low oil prices would weigh on real GDP growth but, according to EFP 2014, more importantly on Canada's terms of trade (that is, export prices relative to import prices) and therefore economy-wide prices (GDP inflation). Box 1 provides a brief overview of how lower oil prices affect the Canadian economy.

Although both supply and demand factors are likely responsible for the decline in oil prices observed since EFP 2014, the quantitative analysis that follows considers only the impact on nominal GDP resulting from lower GDP inflation.[3] As such, the results

Box 1 The impact of lower oil prices on the Canadian economy

In its April 2011 *Monetary Policy Report* (Technical Box 2), the Bank of Canada provided a framework describing the various channels through which a change in commodity prices affects the Canadian economy. The following applies the Bank's framework to the case of lower oil prices.

Direct CPI channel: A reduction in oil prices has a direct impact on some components of the Consumer Price Index (CPI) such as gasoline, fuel oil and transportation.

Terms-of-trade channel: Since Canada is a net exporter of oil, a reduction in oil prices lowers export prices relative to import prices, which causes a deterioration in the terms of trade and reduces Canadians' foreign purchasing power (real gross domestic income).

Production-costs channel: Lower oil prices reduce production costs for firms that use oil products as an input in their production processes, which can increase the potential activity in the economy.

Commodity-supply channel: A reduction in oil prices lowers profits in the oil-producing sector, which leads to reduced production, labour, capital and wages in that sector.

Foreign-demand channel: Since Canada's main trading partners are net oil importers, lower oil prices stemming from supply factors would help boost foreign demand for Canada's non-oil exports. However, if lower oil prices are caused by weaker global activity, demand for Canada's non-oil exports will be reduced.

Total effect: The effects of lower oil prices are transmitted through the above channels and the overall impact on Canada's economy (Table B1) depends on the forces driving oil prices (supply or demand shocks).

Table B1: Impact of lower oil prices on the Canadian economy

	Real GDP	Inflation
Oil-supply shock	—	↙
Oil-demand shock	↙	↙

[1] The average WTI oil price observed since January 1, 2015. Over the same period, the decline in the price for Canadian crude oil (for example, Western Canada Select (WCS)) of almost 50 per cent is larger than the decline (of around 40 per cent) in global Brent and U.S. WTI benchmarks.

[2] Available at: http://blog-imfdirect.imf.org/2014/12/22/seven-questions-about-the-recent-oil-price-slump/.

[3] Disentangling the supply and demand factors driving movements in oil prices in order to derive an independent estimate of the impact on real GDP would require significant additional work, which could be conducted in future analysis. Consistent with Finance Canada's view, PBO's present judgement is that the impact of lower oil prices on economy-wide prices is more important for nominal GDP. Moreover, the

presented below should be viewed as a lower bound (in absolute terms) since real GDP would likely be reduced. PBO will provide an updated projection in its forthcoming *Economic and Fiscal Outlook*.

2 METHODOLOGY

The path for oil prices over the next five years is uncertain. To assess the fiscal impacts of lower oil prices, PBO has constructed two hypothetical oil price scenarios.[4] In the first scenario, low WTI oil prices are assumed to persist through to 2019, remaining at their recent level of US$48 per barrel (Table 1). In the second scenario, WTI oil prices are assumed to increase gradually (and linearly) from US$48 in the first quarter of 2015 back to US$81 per barrel by the end of 2018.[5] Both scenarios are compared to the baseline assumption of US$81 per barrel, consistent with the EFP 2014 projection.

Table 1: Oil price scenarios

WTI oil price, US$/barrel

	2014	2015	2016	2017	2018	2019
Baseline	95	81	81	81	81	81
Scenario 1	93	48	48	48	48	48
Scenario 2	93	51	60	69	78	81

Sources: Energy Information Administration; PBO assumptions.

To estimate the impact of lower oil prices on projected federal surpluses (Question 1), PBO first uses its macroeconomic model to estimate the impact on nominal GDP resulting from lower GDP inflation under the two oil price scenarios considered. The model is first calibrated to the adjusted private sector outlook for nominal GDP in EFP 2014, which was based on the assumption that WTI oil prices remain at US$81 per barrel.[6] The model is then simulated with the two oil price scenarios to provide estimates of the impact on nominal GDP.[7] Next, PBO uses the fiscal sensitivities for GDP inflation presented in EFP 2014 to translate the estimates of nominal GDP impacts into fiscal impacts, which are then applied to the underlying budgetary balance (that is, not considering the set-aside for contingencies) projected in EFP 2014.[8] As noted in EFP 2014, these sensitivities are "generalized rules of thumb" that assume proportionate changes in GDP components and that "[a]ctual economic shocks may have different fiscal impacts". Notwithstanding these limitations, PBO believes that these sensitivities can be used to provide a reasonable estimate of the federal fiscal impact.

To estimate the impact of lower revenues resulting from lower oil prices on the fiscal gap of the total government sector (Question 2), PBO uses the federal revenue and nominal GDP results from Question 1 to calculate the impact on the federal fiscal gap. The impact on subnational governments' own-source revenue is then estimated by applying the historical relationship between fluctuations in subnational and federal government own-source revenues—as a result of movements in the terms of trade—to the estimated impacts on federal revenue from lower oil prices.

risk assessment in EFP 2014 highlights the possibility that "further crude oil price declines would dampen growth in economy-wide prices and ultimately nominal GDP."

[4] In the baseline scenario, PBO has assumed that the discount of Canadian crude oil prices (represented by the price of WCS) relative to the WTI benchmark and the WTI-Brent price differential are maintained at levels existing at the time of EFP 2014. Consequently, the WTI-WCS (Brent-WTI) differential is assumed to be US$15 (US$4) per barrel over the period 2015-2019. In scenario 1, the WTI-WCS and Brent-WTI differentials are assumed to remain at their January 2015 levels (US$14 and US$1 per barrel, respectively). In scenario 2, WTI, Brent and WCS oil prices are assumed to increase linearly from their January 2015 levels and return to their levels assumed in the baseline scenario in 2018Q4.

[5] The assumed path of WTI oil prices in scenario 2 is broadly consistent with WTI oil price futures through 2016.

[6] In EFP 2014, Finance Canada estimated the impact on nominal GDP of WTI oil prices remaining near US$81 to be approximately -$3 billion in 2014 and -$16 billion per year over 2015-2019, relative to the levels forecast in the September 2014 private sector survey. Although EFP 2014 did not provide the precise oil price projections underlying this estimate, results based on PBO's macroeconomic model—assuming WTI oil prices remain at US$81 instead of US$98 per barrel—are in line (-$16.7 billion on average) with Finance Canada's estimated impact on nominal GDP.

[7] In the baseline and oil price scenarios considered, real GDP growth is assumed to be unchanged from the average private sector forecast in the September 2014 survey.

[8] The fiscal sensitivities in EFP 2014 indicate that a one-year, 1-percentage point reduction in GDP inflation would reduce the budgetary balance by about $2 billion annually, on average; a one-year, 1-percentage point reduction in real GDP growth would reduce the budgetary balance by about $5 billion annually, on average.

3 NOMINAL GDP IMPACTS

If WTI oil prices remain at US$48 per barrel (scenario 1), PBO estimates that this would reduce the level of nominal GDP by $54 billion annually, on average, over 2015-2019, relative to the adjusted private sector forecast of nominal GDP in EFP 2014 (Table 2).

Table 2: Impacts of lower oil prices on nominal GDP

$ billions

	2014	2015	2016	2017	2018	2019
Baseline level	1974	2046	2137	2233	2329	2426
Scenario 1 impact (WTI remains at US$48)	-2	-48	-52	-54	-56	-59
Scenario 2 impact (WTI increases to US$81)	-2	-42	-30	-17	-5	0

Sources: Finance Canada; PBO calculations.

If, however, WTI oil prices gradually increase from US$48 back to US$81 per barrel by the end of 2018, PBO estimates that this would reduce nominal GDP by $42 billion in 2015 and $30 billion in 2016 relative to the adjusted nominal GDP forecast in EFP 2014. As the WTI oil price returns the level assumed in EFP 2014, the impact on nominal GDP dissipates.

4 FEDERAL FISCAL IMPACTS

Based on Finance Canada's fiscal sensitivities, lower oil prices assumed under scenario 1 (that is, WTI oil price remaining at US$48 per barrel) would reduce federal budgetary revenues by approximately $7.6 billion annually, on average, over 2015-16 to 2019-20 (Table 3). Lower economy-wide prices result in lower household incomes and corporate profits, which reduce personal and corporate income tax revenues as well as EI premiums and revenues from sales of goods and services.

However, lower prices also reduce federal expenses, providing a partial offset to the revenue losses. Spending on statutory programs that are indexed to inflation, such as elderly benefit payments and the Canada Child Tax Benefit would be lower. Spending on programs that are tied directly to growth in nominal GDP (for example, transfers to provincial and territorial governments) would also be lower, as well as direct expenses from cheaper purchases of goods and services. Overall, the federal budgetary balance would be reduced by $4.8 billion annually, on average, over 2015-16 to 2019-20.

Table 3: Fiscal impacts under scenario 1

$ billions

	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Revenues	-2.1	-8.2	-7.2	-7.4	-7.5	-7.7
Expenses	-0.8	-3.0	-2.5	-2.6	-2.8	-3.0
Budgetary balance	-1.3	-5.3	-4.8	-4.7	-4.7	-4.8

Source: PBO calculations.

With the assumed recovery in oil prices back to levels projected in EFP 2014 (that is, WTI oil prices returning to US$81 per barrel) under scenario 2, the fiscal impacts are muted (Table 4). The peak impact on the budgetary balance is -$4.2 billion in 2015-16 and declines over the projection horizon, contributing positively to the budgetary balance in 2018-19 and 2019-20.[9]

Table 4: Fiscal impacts under scenario 2

$ billions

	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Revenues	-2.1	-6.5	-3.1	-1.3	0.3	0.4
Expenses	-0.8	-2.3	-1.0	-0.5	0.0	-0.1
Budgetary balance	-1.3	-4.2	-2.1	-0.8	0.3	0.5

Source: PBO calculations.

In EFP 2014, the Government's projected budget balance for planning purposes included a $3 billion annual "set-aside for contingencies" which if not required would be used to reduce the federal debt. Notably, the potential for further declines in oil

[9] Under scenario 2, the impact on revenues in 2018-19 and 2019-20 is positive. This reflects the indexation of personal income tax (PIT) brackets, which are indexed to inflation over the September-to-September period preceding the tax year. As nominal GDP growth rises above the baseline projection over 2016-2019 under scenario 2 (as oil prices return to their baseline levels), growth in personal income outpaces the inflation indexation adjustments, which provides temporary boosts to PIT revenues.

prices and uncertainty over global economic growth were cited as candidates for such contingencies. Given the estimated fiscal impact in scenario 1, lower oil prices (WTI remaining at US$48 per barrel) would more than exhaust the Government's entire set-aside for contingencies over 2015-16 to 2019-20. All else equal, based on the underlying balance projected in EFP 2014, a small budget deficit ($0.4 billion) would be realized in 2015-16, with budgetary surpluses maintained in 2016-17 through 2019-20 (Table 5).[10] Under scenario 2, temporarily lower oil prices in the near term would only exhaust the set-aside for contingencies in 2015-16 and budgetary surpluses would be somewhat larger compared to scenario 1.

Table 5: Revised EFP 2014 projected budgetary balance

$ billions

	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Planning balance	-2.9	1.9	4.3	5.1	6.8	13.1
Set-aside for contingencies	3.0	3.0	3.0	3.0	3.0	3.0
Underlying balance	**0.1**	**4.9**	**7.3**	**8.1**	**9.8**	**16.1**
Scenario 1 balance	**-1.2**	**-0.4**	**2.5**	**3.4**	**5.1**	**11.3**
Scenario 2 balance	**-1.2**	**0.7**	**5.2**	**7.3**	**10.1**	**16.6**

Sources: Finance Canada; PBO calculations.

It is important to recall, however, that the fiscal impacts of lower oil prices considered in these scenarios reflect only the impact of lower economy-wide prices and do not include impacts from lower real GDP that would likely materialize. As such, the fiscal impacts (in absolute terms) should be viewed as lower bound estimates.

[10] The budget balances projected in scenarios 1 and 2 do not include a new $3 billion annual set-aside for contingencies. Under these scenarios, if the Government maintained the practice of setting aside $3 billion annually for contingencies, the planning balances corresponding to these scenarios would be $3 billion lower in each year.

5 TOTAL GOVERNMENT FISCAL GAP

PBO provides its assessment of the sustainability of federal government finances, as well as the combined finances of subnational governments, in its annual *Fiscal Sustainability Report* (FSR). PBO will provide its analysis of fiscal sustainability later this year, updating it for economic developments and fiscal policy measures.

In its 2014 FSR, PBO estimated that a small fiscal gap[11] existed for the total government sector. The fiscal gap for the total government sector was estimated at approximately 0.3 percentage points of GDP, indicating that some combination of revenue increases and spending reductions would need to be implemented immediately and maintained indefinitely to stabilize the public debt-to-GDP ratio at its current level. This small total government gap, however, concealed a larger fiscal gap at the subnational level (1.7 percentage points of GDP) that was largely offset by fiscal room—to reduce revenues and/or increase program spending—at the federal level (1.4 percentage points of GDP).

Although PBO will provide its complete analysis of fiscal sustainability later this year, it is possible to apply the results in the previous section to the fiscal gap framework to reflect the impact of lower oil prices on federal and subnational government revenues.[12] However, these estimates do not incorporate any (potentially) offsetting impacts from reduced spending on programs as a result of lower oil prices. Consequently, they should be regarded as

[11] PBO measures the degree to which the fiscal structures of the government sector are not sustainable by calculating a "fiscal gap"—the difference between the current fiscal structure and a structure that is sustainable over the long term. The fiscal gap conveys—in a single number—the magnitude of the policy action necessary to avoid unsustainable increases in a government's debt-to-GDP ratio. Specifically, PBO's fiscal gap is calculated as the immediate and permanent change in a government's operating balance (that is, revenue less program spending) relative to GDP that is required to achieve the level of the current debt-to-GDP ratio over the long term (for example, 75 years).

[12] Federal and subnational own-source revenues are expressed relative to nominal GDP under the baseline and alternative oil price scenarios to determine the revenue impact in terms of percentage points of GDP in 2019-20. Given that government own-source revenues relative to GDP in PBO's fiscal gap framework are assumed to be constant at their levels projected five years ahead, the percentage point revenue impacts calculated in 2019-20 should provide a reasonable estimate of the impact of lower government revenue on the fiscal gap.

rough approximations and partial estimates of the impact of lower oil prices on total government fiscal sustainability.

Table 6 shows that based on the scenarios considered in Section 4, lower oil prices would increase the total government fiscal gap by approximately 0.2 percentage points under scenario 1 (WTI oil prices remain at US$48 per barrel until 2019) and 0 percentage points under scenario 2 (WTI oil prices increase back to US$81 per barrel by the end of 2018).[13] The impact of lower oil prices on subnational governments in scenario 1 is larger given that their own-source revenues are more sensitive to oil price fluctuations compared to the federal government, reflecting their greater dependence on natural resource royalties.

Table 6: Impacts of lower oil prices on fiscal gaps

% of GDP

	Federal government	Subnational governments	Total government
FSR 2014 fiscal gap	-1.4	1.7	0.3
Scenario 1 revenue impact	**0.0**	**0.2**	**0.2**
Scenario 2 revenue impact	**0.0**	**0.0**	**0.0**

Source: PBO calculations.

[13] In scenario 1 the revenue impact on the federal fiscal gap is zero since the decline in federal revenues is similar in percentage terms to the decline in nominal GDP, which leaves the revenue-to-GDP ratio essentially unchanged. In scenario 2, both federal and subnational fiscal gaps are essentially unchanged given the temporary nature of the oil price shock.