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When and How to Adjust Beyond the Business Cycle? A Guide to Structural Fiscal Balances

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Structural balances are an extension of cyclically adjusted balances, correcting for a broader range of factors such as asset and commodity prices and output composition effects. Such analysis helps strengthen the understanding of the underlying drivers of fiscal positions that became apparent during the recent global crisis. This technical note seeks to provide operational guidance on when and how to apply various approaches to compute cyclically adjusted and structural fiscal balances. The main lesson is that there is no single way of adjusting fiscal balances; the appropriate adjustment should take into account the purpose of the analysis, data availability, the fiscal regime, and the economic structure, but will ultimately reflect analytical judgment. The note presents an empirical example based on Canada and other examples from country work. It also makes available a package of STATA codes for the regressions and diagnostic tests needed to estimate cyclically adjusted and structural balances, and an Excel template to compute these balances once elasticity estimates are available that can be readily adapted to other country cases.

I. Motivation and Overview

1. In the wake of the global financial crisis, understanding the underlying drivers of fiscal positions has received intense interest. Cyclically adjusted and structural balances are used extensively in an effort to explain how sharply deteriorating fiscal balances relate to changes in the macroeconomic environment (IMF, 2010a). The main purpose of cyclical adjustment is to arrive at an estimate of the fiscal position net of cyclical effects. For this purpose, fiscal aggregates are adjusted for temporary effects associated with the deviation of actual from potential output. However, only assessing the effect of the output gap on fiscal variables may not capture other transitory factors and could therefore lead to an inaccurate assessment of the fiscal stance, and/or fiscal sustainability. In such cases, the structural balance provides a more accurate characterization of fiscal policy than the cyclically adjusted balance.

2. Structural balances can be viewed as an augmentation of cyclically adjusted balances, as they adjust for a broader range of factors.[1] More specifically, structural balances aim at quantifying and removing the impact of

- factors that are not closely correlated with the business cycle, such as changes in asset or commodity prices, or changes in output composition; and
- one-off, or temporary, revenue or expenditure items, which do not affect the underlying fiscal position.

3. Structural balances therefore complement cyclically adjusted balances in interpreting fiscal positions. For example, cyclical adjustment alone may not detect the impact of a commodity price boom on higher commodity-related revenues. Instead, cyclically adjusted balances would signal an improvement and convey the misleading impression that the fiscal "effort" behind this improvement is significant (while in reality there was none) and that the improvement is permanent (while it may last only as long as the price boom). Similarly, an export driven economic expansion would likely have a lesser fiscal impact than expected during other types of expansions, since exports are subject to low taxes, if at all. In this case, cyclically adjusted balances may show a deterioration in the fiscal position, signaling inaccurately that fiscal policy has been loosened.

4. More generally, structural balances provide insights into three important aspects of fiscal policy analysis (based on Blanchard 1990):

- *Measuring discretionary changes in fiscal policy.* Computing structural balance entails decomposing the fiscal position in two parts: one representing the fiscal response to changes in economic activity—the cyclical component—and another reflecting the policy stance independent of the economic environment—the structural balance. Changes in the cyclical component represent the impact of automatic stabilizers (they are "automatically" triggered by the tax code and benefit systems, requiring no policy intervention) and other transitory economic factors captured in the adjustment. Changes in the structural balance require policy actions and therefore reflect discretionary changes in fiscal policy.[2]
- *Measuring fiscal sustainability.* Fiscal sustainability can usefully be assessed based on the debt dynamics arising from the structural fiscal stance (Escolano, 2010). By comparing the structural balance against a benchmark such as the debt-stabilizing fiscal balance, one can gauge to what extent the current course of fiscal policy can be sustained without the government having to adjust taxes or spending. This also yields a measure of the

[1]This view of the structural balance is also reflected in the IMF World Economic Outlook (WEO) definition of the structural balance: "Structural balance […] refers to the general government cyclically adjusted balance adjusted for nonstructural elements beyond the economic cycle. These include temporary financial sector and asset price movements as well as one-off, or temporary, revenue or expenditure items."

[2]Dos Reis et al. (2007) argue that it may be more appropriate to refer to automatic stabilizers as a passive policy response to the cycle, since not modifying tax rates in the wake of large and observable swings in the tax base is as discretionary as the decision to modify them.

fiscal effort necessary to correct imbalances. The structural balance is well suited for this purpose as it corrects for cyclical deficits and one-off expenditures, which are temporary and do not require fiscal adjustment.

- *Measuring the fiscal policy stance.* Changes in structural balances can also indicate the impact of discretionary fiscal policy on the economy (Muller and Price, 1984). For example, a widening in the structural deficit points to an expansionary fiscal policy stance, or in other words, to an ***intended*** positive contribution of discretionary fiscal policy to aggregate demand (the ***actual*** impact depends on other factors and could result in different effects from those originally planned). However, structural balances are no more than a complementary indicator to measure the impact of fiscal policy on aggregate demand; such analysis would require a broader measure of the fiscal position including, for example, the effect of automatic stabilizers and policy lending.

5. Operationally, computing structural balances entails a series of interconnected steps (Figure 1).

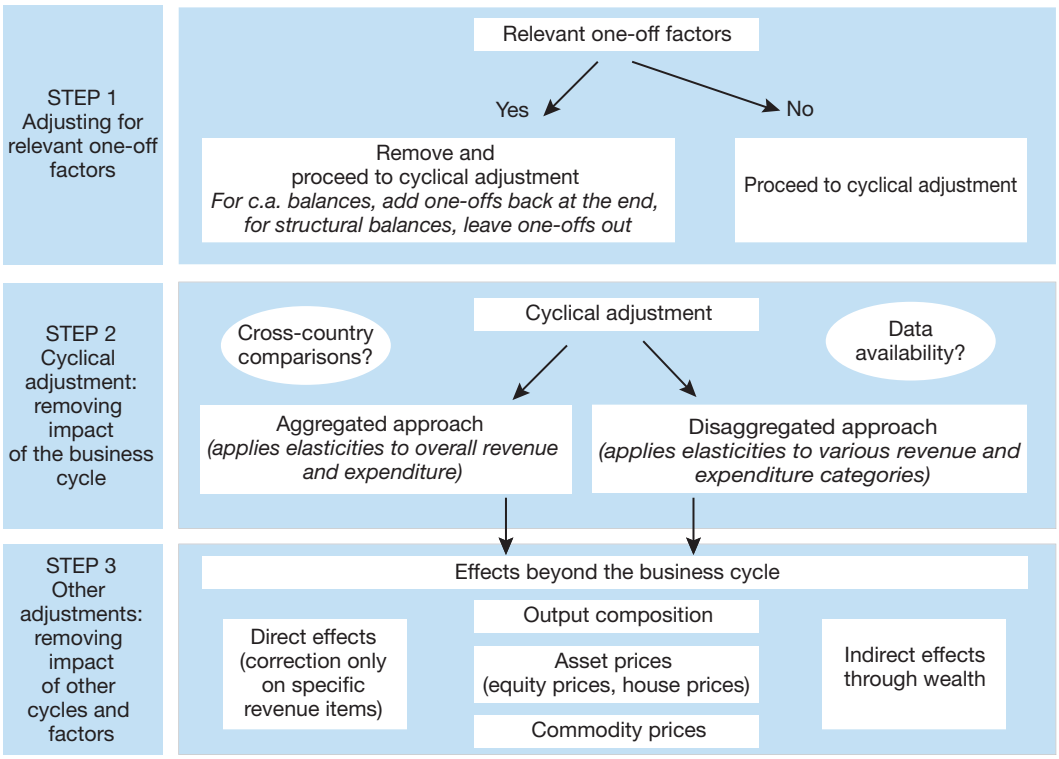
- Identifying and removing one-off fiscal operations (**Step 1).** Large, non-recurrent fiscal operations may distort the analysis of the underlying fiscal position and should be excluded from structural balance estimates (see Appendix I for a discussion).
- Assessing the impact of the business cycle on revenue and expenditure (**Step 2**). This can be achieved via an ***aggregated method*** (when elasticities are used to measure the sensitivity of total revenue and spending to the output gap), or via a ***disaggregated method*** (with elasticities specific to various revenue and expenditure components).
- Estimating the effects of *other economic cycles or factors* (**Step 3**), such as those related to asset or commodity prices, and output composition effects.

Step 1 should be carried out before proceeding to any form of adjustment to avoid biased elasticity estimates and ensure correct identification of the cyclical component. Steps 2 and 3 are interconnected because the adjustment for effects beyond the business cycle often includes—explicitly or implicitly—an adjustment for the output gap. For example, an adjustment for output composition effects will not require an additional adjustment for the output gap, while adjustments for asset prices typically involve a ***simultaneous*** correction for sharp run-ups in asset prices and the output gap.

6. This technical note seeks to provide operational guidance on when and how to apply various approaches to compute cyclically adjusted and structural balances. In many cases, data availability limits adjustment options, but even in cases where data are available, the approach to adjustment ultimately reflects analytical judgment.

7. While the present note provides guidance on how to compute the structural balance in practice, it leaves significant room for analytical judgment. Depending on the purpose of the analysis, data availability, fiscal regime, and economic structure, various options are available. While differences in approaches can be broadly justified and reconciled,

Figure 1. Steps for Adjustment for Economic Cycles and Other Factors



there is scope for better understanding what the various methodologies do and how these can be refined and extended. In this note, an empirical example based on Canada illustrates these points, utilizing regressions and diagnostic tests needed to estimate cyclically adjusted and structural balances (Boxes 2, 5, and 7).[3] Boxes 3, 6, and A1 provide examples from adjustment beyond the business cycle in country work.

8. **The rest of this note is organized as follows.** Cyclical adjustment, using either the aggregated or the disaggregated approach, is covered in Section II. Section III presents methods to adjust fiscal balances for economic factors such as asset and commodity prices, as well as output composition effects. Section IV provides some specific tips to help the practitioner apply various methods. Section V concludes.

II. Cyclical Adjustment

A. The Aggregated Approach

9. **The purpose of cyclical adjustment is to decompose the overall balance into a cyclical and a cyclically adjusted component**:

[3]An Excel template to compute adjusted balances and STATA codes to perform the empirical analysis for the case of Canada accompany this note and are available upon request.

$$OB = CB + CAB, \quad (1)$$

where *OB* is the overall balance, *CB* is the cyclical balance (the part of the fiscal overall balance that automatically reacts to the business cycle), and *CAB* is the cyclically adjusted balance (the part of the overall balance that is left after cyclical movements are taken out), expressed in nominal terms.[4] The aggregated approach computes the cyclically adjusted balance as a function of cyclically adjusted overall revenue (R^{CA}) and cyclically adjusted expenditures G^{CA}:

$$CAB = R^{CA} - G^{CA}. \quad (2)$$

10. Cyclically adjusted revenues can be obtained by adjusting actual revenues for the effect of the deviation of potential from actual output, with the revenue elasticity defining the strength of the cyclical effect:[5]

$$R^{CA} = R\left(\frac{Y^*}{Y}\right)^{\varepsilon_{R,Y}}. \quad (3)$$

In economic terms, with a revenue elasticity higher than one ($\varepsilon^{R,Y} > 1$), each percentage increase in the output gap triggers a percentage change in revenues that is larger than one.

11. Cyclically adjusted expenditures can be obtained likewise:

$$G^{CA} = G\left(\frac{Y^*}{Y}\right)^{\varepsilon_{G,Y}}. \quad (4)$$

Under the assumption of a zero expenditure elasticity, $\varepsilon_{G,Y} = 0$ cyclically adjusted expenditure is equal to actual expenditure, $G^{CA} = G$, in which case the business cycle does not trigger any response in expenditure levels and the cyclical expenditure component is zero. Expenditure is often viewed as discretionary in its entirety, and thus independent from the business cycle. While this may be a reasonable good approximation in some cases, in practice, some expenditure items (e.g., unemployment expenditure) will exhibit a cyclical pattern.

12. Aggregate revenue and expenditure elasticities can be assumed or sourced from the literature. Values commonly assumed are 1 for revenues and 0 for expenditures. While this approach does not distinguish between the various components of revenue and expenditure (which are treated as an overall variable), the loss of accuracy may be acceptable in some cases: some empirical evidence points to the aggregated one-zero elasticity assumptions being a good approximation of the weighted average of disaggregated elasticity estimates further discussed below (Girouard and André, 2005). However, where available, country specific elasticities for overall revenue and expenditure should be used, either from existing studies or estimated in a regression framework.

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[4] See Fedelino et al. (2009) for a discussion of the appropriate scaling of cyclically adjusted fiscal aggregates.

[5] Equation (3) is derived from the assumption that the ratio of cyclically adjusted revenue to actual revenue moves together with the ratio of potential output to actual output in the following way: $\frac{R^{CA}}{R} = \left(\frac{Y^*}{Y}\right)^{\varepsilon_{R,Y}}$. See also Girouard and André (2005), p. 6. The output gap is denoted as the *ratio* of potential to actual GDP (Y^*/Y). This relates directly to the more commonly used expression for the output gap, *the percentage deviation of actual from potential GDP* $\left(gap = \frac{Y - Y^*}{Y^*}\right)$ as follows: $\frac{Y^*}{Y} = \frac{1}{gap - 1}$.

13. In sum, the aggregated approach to cyclical adjustment is a simple exercise with minimal data requirements. It is a parsimonious approach that not only is relatively easy to communicate, but also provides a basis for cross-country comparisons. The downside of this approach is that it yields accurate results only if the major fiscal aggregates behave broadly similarly with respect to the output gap and there is little change in the composition of revenues.

B. The Disaggregated Approach

14. The disaggregated approach, sometimes referred to as the "OECD methodology," is based on the cyclical adjustment of individual revenue and expenditure categories. The cyclically adjusted overall balance can be expressed as:

$$CAB = \left[\left(\sum_{i=1}^{N} R_i^{CA}\right) - G_{cur}^{CA} + R^{NCA} - G^{NCA}\right], \tag{5}$$

where R_i^{CA} represents the cyclically adjusted component of the *i-th* revenue category, G_{cur}^{CA} represents cyclically adjusted current primary expenditures, while R^{NCA} and G^{NCA} contain all revenue and expenditure categories that do not require cyclical adjustment, e.g., non-tax revenue, capital, and net interest expenditures (Girouard and André, 2005). In this presentation only one expenditure category, current expenditure, is assumed to have a cyclical component. This can easily be modified to include a number of (sub-)components. In principle, interest expenditures could also display cyclical behavior as fiscal deficits tend to move with the cycle, implying higher (lower) borrowing requirements when output is below (above) trend, which would lead to cyclical fluctuations in the interest bill. Countercyclical movements in the interest rate, though, are likely to compensate for the cyclical behavior of borrowing requirements, leaving only a small net effect, if at all.[6]

15. On the revenue side, the elasticity of each revenue category can be decomposed into two factors. The output elasticity of tax revenue ($\varepsilon_{R_i,Y}$) is the product of the elasticity of tax revenues (R_i), with respect to the relevant tax base (B_i),$\varepsilon_{R_iB_i}$, and the elasticity of the tax base relative to the output gap, $\varepsilon_{B_i,Y}$:

$$\varepsilon_{R_i,Y} = \varepsilon_{R_iB_i} \cdot \varepsilon_{B_i,Y}. \tag{6}$$

Applying this decomposition to the computation of cyclically adjusted revenue yields:

$$R_i^{CA} = R_i\left(\left(\frac{Y^*}{Y}\right)^{\varepsilon_{B_i,Y}}\right)^{\varepsilon_{R_i,B_i}}. \tag{7}$$

Assuming, or deriving, the value of the tax elasticity with respect to its base is the first step. In addition to statutory tax rates, derivation also requires knowledge of the income distribution; for practical reasons, one might draw from results of existing studies (Box 1). For example, Girouard and André (2005) estimate these elasticities for 28 countries, with the results

[6] Farrington et al. (2008) find a negligible effect of the cycle on interest expenditures in the case of the UK.

Box 1. Elasticities: Estimate, Derive, or Assume?

The adjustments discussed in this note involve three groups of elasticities:

1. Elasticities of overall revenues and expenditure with respect to the output gap and other cycles;

2. Elasticities of various tax and expenditure bases with respect to the output gap and other cycles;

3. Elasticities of categories of revenues and expenditure with respect to their respective bases.

Estimation of elasticities. Elasticities of overall revenues and expenditures with respect to the output gap and other cycles (group 1) and elasticities of various tax bases with respect to the output gap and other cycles (group 2) can be estimated in a simple regression framework. Elasticities relate the percentage change in one variable, X, to a one-percentage-point change in another variable. A common way to estimate the elasticity of a time series of interest, X, for example, revenues, expenditure, or their base, with respect to the output gap, is by estimating the following equation:

$$\log X = \alpha + \varepsilon_{X,Y} \cdot \log\left(\frac{Y^*}{Y}\right) + u \qquad \text{(a)}$$

If the aim is to estimate the sensitivity of X with respect to more than just the output gap, these elasticities should be estimated jointly:

$$\log X = \alpha + \varepsilon_{X,Y} \cdot \log\left(\frac{Y^*}{Y}\right) + \varepsilon_{X,A} \cdot \log\left(\frac{A^*}{A}\right) + u \qquad \text{(b)}$$

- **Econometric specification.** To ensure consistent estimation of the elasticities, variations or additions to equations (a) and (b) may be necessary. Some tax bases respond with a lag to the output cycle, requiring a dynamic specification. Seasonality should be modeled appropriately, and non-stationarity may require a specification in first differences. To control for potential endogeneity of the business cycle, instrumental variable approaches or GMM could be applied. To account for structural shifts in the relation between tax bases and the underlying cycles, dummy variables or trends may improve the econometric fit.
- **Policy changes.** When possible, tax or expenditure data used in regressions should be corrected for the impact of major policy changes. Failure to do so could result in biased or unstable estimates. Rolling estimates and subsample analysis can help detect unstable relations.

Derivation and assumption of elasticities. Elasticities of revenues and expenditure with respect to the bases (group 3) are often derived from the country's tax code or, in the case of expenditures, the social security scheme. For income taxes, this requires computing the effective tax rates along the income distribution—often derived from microdata—to obtain an average elasticity of income tax to earnings. Owing to the progressive nature of most income tax systems, this elasticity would typically be greater than one. For ad valorem consumption taxes, a unit elasticity of tax collection with respect to the tax base—private consumption—may be assumed if variation of tax rates (weighted by consumption baskets) is limited.

TABLE 1. COMMON TAX ELASTICITIES			
Tax category	**Elasticity of tax revenue relative to its base**	**Elasticity of base relative to output gap**	**Elasticity of tax revenue relative to output gap**
Personal income taxes	≈ 1.5–2	≈ 0.6–0.9	≈ 1.0–1.7
Corporate income taxes	≈ 1	≈ 1.2–1.8	≈ 1.2–1.8
Social security contributions	≈ 0.8–1.1	≈ 0.6–0.9	≈ 0.5–0.9
Indirect taxes	≈ 1	≈ 1	≈ 1

Source: Girouard and André (2005).

summarized in Table 1.[7] The second step is an econometric estimation of the sensitivity of the relevant tax bases with respect to the output gap. This requires specifying macroeconomic proxies for the tax bases. For income taxes and social security contributions, a common proxy is the wage bill, for corporate income taxes, the tax base is a measure of corporate profits, whereas private consumption serves as a base for indirect taxes. With these two elasticities at hand, the elasticities of tax revenue with respect to the output gap can be computed. The resulting elasticities of revenue categories with respect to the output gap tend be noticeably larger than one for income taxes (reflecting the progressivity of many income tax regimes), around one for indirect taxes (reflecting generally flat indirect (VAT) tax rates), and somewhat smaller than one for social security contributions.

16. On the expenditure side, the elasticities of current expenditure categories can also be decomposed into two factors. Current transfers—in particular unemployment benefits—are most likely to display a cyclical behavior owing to the benefit system. In contrast, nominal spending on other items such as wages and goods and services is likely to be largely independent of the business cycle, not requiring any adjustment. The output elasticity of expenditures $\left(\varepsilon_{G_{cur},Y}\right)$ is the product of the elasticity of current expenditures $\left(G_{cur}\right)$ with respect to its base, for example, unemployment, and that of the base with respect to the output gap:

$$\varepsilon_{G_{cur},Y} = \varepsilon_{G_{cur},U} \cdot \varepsilon_{U,Y} . \tag{8}$$

Applying this decomposition to the computation of cyclically adjusted expenditure yields:

$$G_{cur}^{CA} = G_{cur}\left(\left(\frac{Y^*}{Y}\right)^{\varepsilon_{U,Y}}\right)^{\varepsilon_{G_{cur},U}} . \tag{9}$$

As with revenues, the elasticities of expenditure with respect to the base can be assumed or derived. If the expenditure category is narrowly defined to include unemployment benefits only, a proportional relation with respect to its base, unemployment, may be assumed (i.e., elasticity of 1). As a result, the output elasticity of that expenditure category will be

[7]For country-specific results for personal income tax and social security contribution elasticities with respect to their bases, see Girouard and André (2005), Table 5; for other elasticities see p. 12 in the same paper.

determined by the elasticity of unemployment with respect to the output gap, which can be estimated in a simple regression framework or sourced from the literature.

17. The disaggregated approach, while more data-intensive, generally offers advantages over the aggregated approach in terms of stability and greater insights into the cyclical response of various tax and expenditure items. Average elasticities can be a source of instability in the aggregated approach; allowing for tax- and expenditure-specific elasticities may yield greater stability, enhancing the reliability of results. The disaggregated approach shows which tax and expenditure items drive the cyclical balance, providing insights into the composition of automatic stabilizers. Knowledge of cyclical sensitivities of individual tax items can also help assessing the impact of an economic slowdown on sub-national public finances if taxes are subject to revenue sharing.

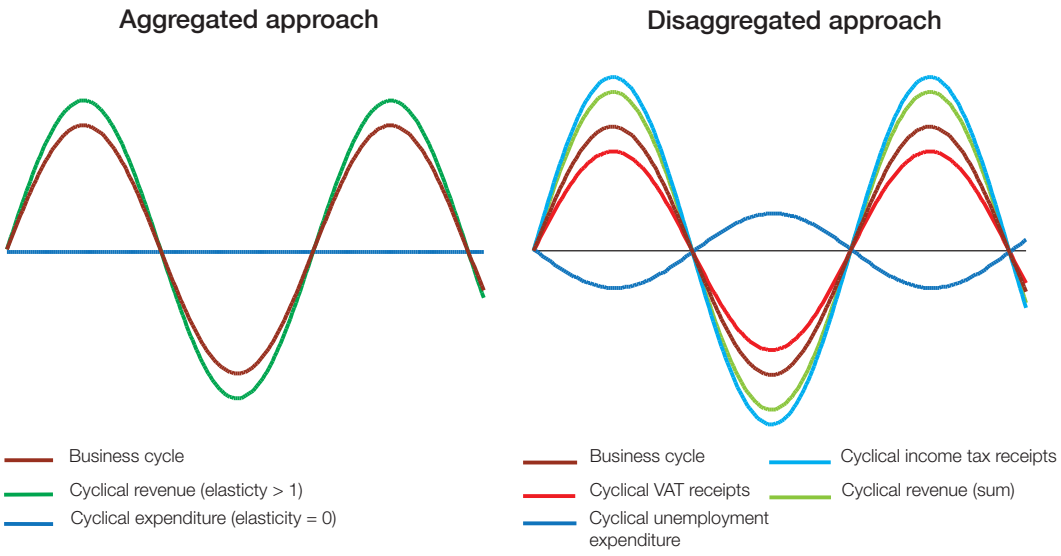
C. Which Approach to Follow?

18. The cyclically adjusted variables obtained from the aggregated approach will mirror the weighted average of disaggregated adjustments of revenue and expenditure categories if at least two conditions are met:

- *The composition of expenditures and revenues remains broadly constant*. If this does not hold, the weights applied to the individual elasticities would change, implying a changing weighted average. In reality, the share of income taxes in total tax receipts tends to increase during an economic boom and fall during a recession, while the opposite would happen with consumption taxes. This would suggest that the aggregate approach works best if there are no significant differences in the cyclical behavior of major taxes or expenditure items.
- *Elasticities for individual revenue and expenditure categories remain broadly constant*. However, changes in tax policy or the social benefit system affect elasticities, influencing the cyclical sensitivity of fiscal variables.

19. Even when these conditions apply, results from the aggregated and disaggregated approach differ (Figure 2). The first panel shows the stylized cyclical components of revenue and expenditures plotted against a stylized business cycle for the aggregated approach, using the standard zero elasticity assumption for spending, while the revenue elasticity is assumed to be larger than 1. The disaggregated approach shown in the second panel decomposes the cyclical revenue behavior into a component attributable to consumption taxes (VAT) and another to income taxes (other taxes could also be considered). The amplitude of the income tax cycle in this illustration is larger than that of the business cycle, as the elasticity of income taxes with respect to output is larger than one. The opposite holds for consumption taxes, as the elasticity is smaller than one. Comparing the two approaches shows that the revenue elasticity for the aggregated approach can be interpreted as the average elasticity of individual taxes with respect to output, weighted with their respective share in total tax receipts.

Figure 2. Cyclical Components in the Aggregated and Disaggregated Approach



20. The nature of output fluctuations is important when deciding which approach is more appropriate for cyclical adjustment. The business cycle is commonly measured by the output gap, which decomposes output into a trend and a cyclical component. However, the link between output and most fiscal variables is indirect: taxes are based on income, consumption, and trade, but not output. While a broad co-movement of these economic variables is a central part of the business cycle definition, amplitudes may differ. For example, consumption smoothing can lead to a consumption cycle that is more muted than the business cycle, whereas fixed costs in the production process can cause higher amplitudes in the income cycle. As a result, consumption taxes would exhibit a more muted cyclical behavior than income taxes. The disaggregate approach is better suited to detect—and model—such characteristics. Box 2 illustrates the results of the aggregated and disaggregated approach in the case of Canada. More generally, besides having different amplitudes, income, consumption, and unemployment cycles need not be closely correlated with output, and even may have different cycle lengths. In such cases, adjustments based on the output gap alone may not be sufficient, and additional factors, such as the composition of output, need to be considered.

III. Adjustment Beyond the Business Cycle

21. The business cycle as measured by the output gap does not always provide an adequate summary of the state of the economy, making it necessary to go beyond cyclical adjustment to obtain a fiscal indicator independent of macroeconomic fluctuations.

Box 2. An Empirical Application to Canada: Cyclical Adjustment

An empirical application to Canada illustrates the differences between the aggregated and disaggregated approach. The aggregated approach shows significant cyclical effects, but the choice of elasticities is only secondary. The right panel of Figure B1 compares the cyclically adjusted primary balance using standard and estimated elasticities (in percent of potential GDP) with the primary balance (in percent of GDP). Elasticities do not matter much, despite their significant differences (estimated elasticities: 1.4 and 0.2; standard elasticities: 1 and 0). Estimates of aggregate elasticities were unstable as they neglect tax policy changes.

Figure B1. Output Gap, Primary Balance, Aggregated Approach

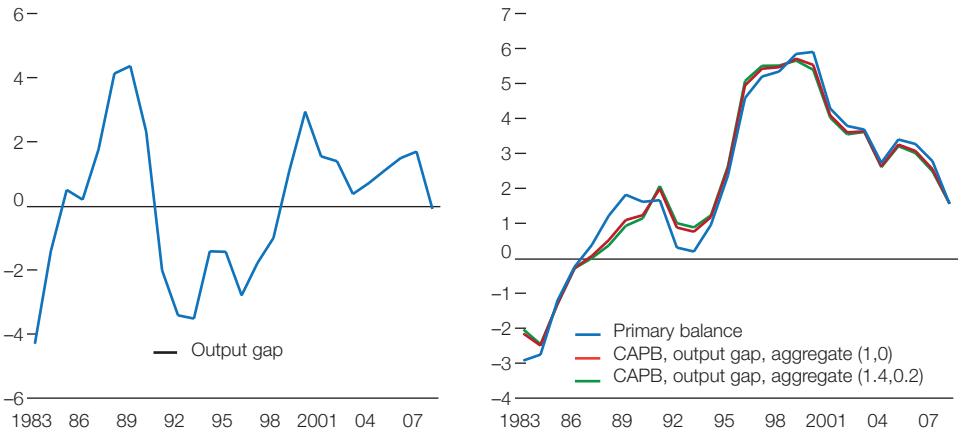
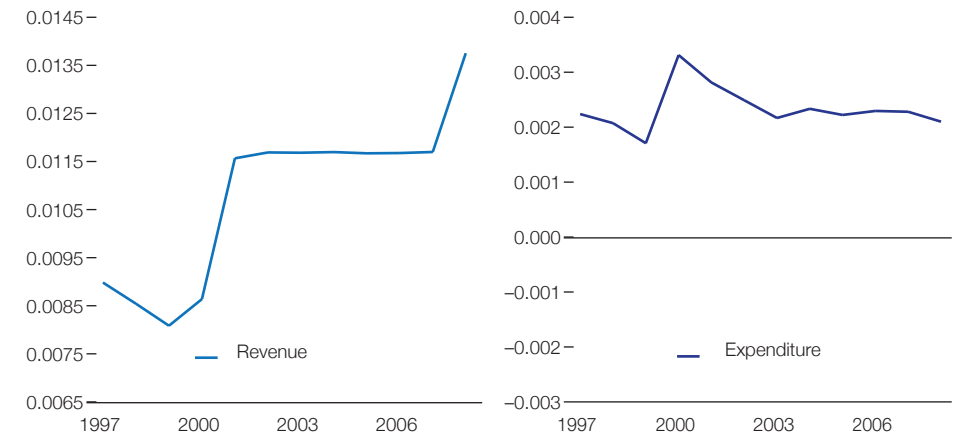


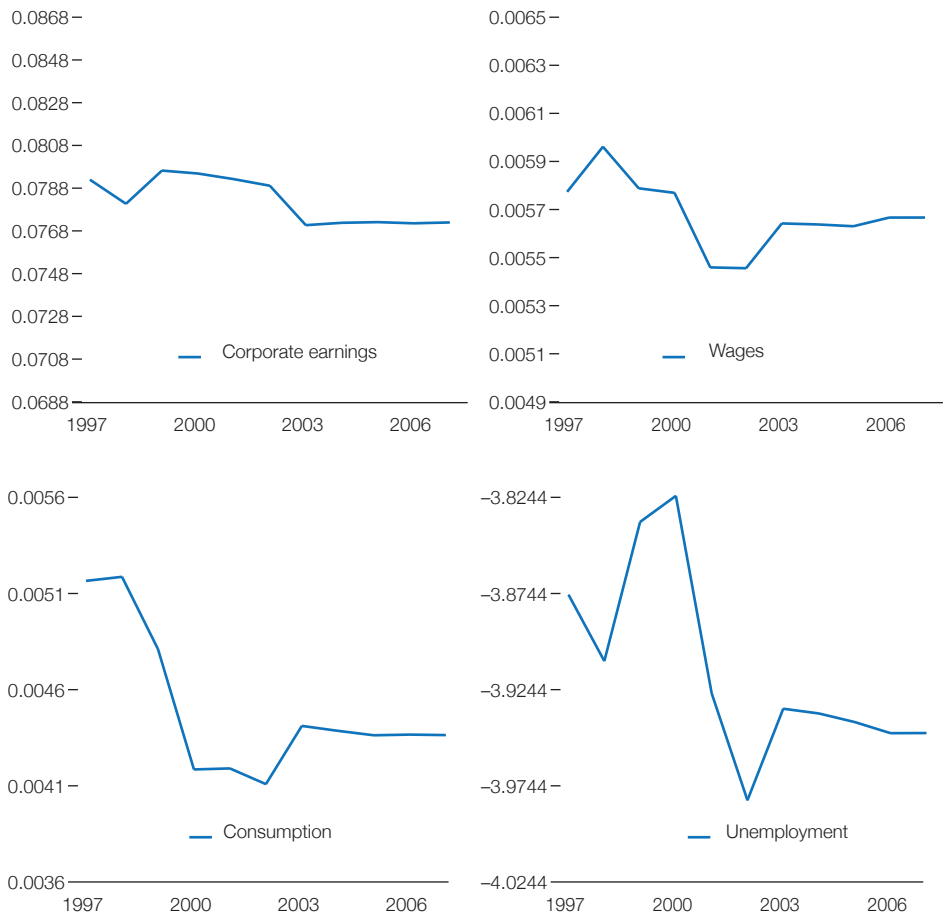
Figure B2 shows recursive estimates of these elasticities. The instability in the aggregate revenue elasticity is particularly pronounced around the year 2000. In contrast, the recursive estimates of the disaggregated tax elasticities prove to be more stable (Figure B3). The consumption tax elasticity is an exception, and it is possibly the instability of this tax

Figure B2. Aggregated Approach: Recursive Estimates of Elasticities



Box 2 *(concluded)*

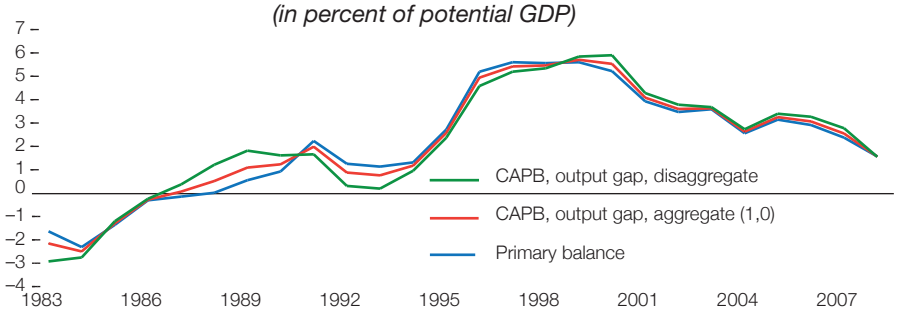
Figure B3. Disaggregated Approach: Recursive Estimates of Elasticities



category drives the instability observed at the aggregated level. The use of a "constant tax regime" series, corrected for the impact of tax measures on the revenue collection, would enable a more accurate estimate and serve as an appropriate independent variable to gauge the elasticity with respect to the output gap. Nevertheless, for all tax bases the estimated values were comparable to the ones reported in other studies (Barnett and Matier 2010), including for subsamples.

Cyclically adjusted balances based on the disaggregated approach show more pronounced differences from, and amplify the impact of, the output gap on fiscal balances (Figure B4). For the recession in 1991, the aggregated and disaggregated adjustment show the fiscal response in a similar way; however, the estimated discretionary response varies up to ½ percent of GDP depending on the approach (Table B1). A closer look at the components reveals that the cyclical adjustment for unemployment expenditure accounts for a significant share of this difference.

Figure B4. Aggregated and Disggregated Approach
(in percent of potential GDP)



The following are the main lessons from this exercise:

- Looking at the entire sample period, the cyclically adjusted primary balances track the unadjusted primary balance closely, yet in selected periods significant differences emerge.
- Cyclical adjustment provides a more textured picture of fiscal policy during two key time periods, 1989-93 (straddling a recession) and 2006-08 (run-up to a recession). Fiscal policy, in response to the recession in 1991, was loosened in the subsequent year by about 1 percent of GDP—lower than implied by the primary balance (Table B1).
- In the aggregated approach, the measure of the output gap has a larger impact than the specific values of the elasticities. In particular, the sensitivity of the adjustment to a range of commonly found elasticities is very small. The empirical estimation of these elasticities is hampered by the absence of a constant tax regime series.
- The disaggregated approach identifies a larger cyclical component. By disentangling the various tax and expenditure components, this approach is able to fit better the response of individual tax bases to the output cycle.

Table B1. Aggregated and Disaggregated Adjustments for the Output Gap
(in percent of potential GDP)

	1989–1993									2006–2008				
	Level					Changes				Level			Changes	
	1989	1990	1991	1992	1993	1990	1991	1992	1993	2006	2007	2008	2007	2008
Primary balance	1.8	1.6	1.7	0.3	0.2	–0.2	0.0	–1.4	–0.1	3.3	2.8	1.6	–0.5	–1.2
CAPB, output gap, aggregate (1,0)	1.1	1.3	2.0	0.9	0.8	0.1	0.8	–1.1	–0.1	3.1	2.6	1.6	–0.5	–1.0
CAPB, output gap, disaggregate	0.6	0.9	2.3	1.3	1.2	0.4	1.3	–1.0	–0.1	2.9	2.4	1.6	–0.5	–0.8
Memo item														
GDP (real annual growth)	2.6	0.2	–2.1	0.9	2.3	–2.4	–2.3	3.0	1.5	2.8	2.2	0.5	–0.6	–1.7
Output gap	4.4	2.3	–2.0	–3.4	–3.5	–2.1	–4.3	–1.4	–0.1	1.5	1.7	–0.1	0.2	–1.8

While the business cycle is the most prominent source of macroeconomic fluctuations, these can arise also from other disturbances—or shocks, in macroeconomic parlance—such as boom-and-bust cycles of asset or commodity prices.[8] The structural balance, in addition to removing the effect of one-off fiscal operations (Appendix 1), should correct for all macroeconomic fluctuations, not only those attributable to the business cycle. If these are uncorrelated with the business cycle and have strong fiscal impacts, it may become necessary to go beyond cyclical adjustment to account for them.

22. Adjustments beyond the output gap are warranted when changes in asset prices, terms of trade, or commodity prices are significant. Commodity prices could rise temporarily because of surges in global demand, or the financial or the real estate sectors may be experiencing price bubbles. If the fiscal revenue derived from these sources is significant, an adjustment is needed to determine the underlying fiscal position. This would not be the case if the asset category in question is narrow and wealth effects are small, or if the revenue derived from such assets represents a negligible fraction of overall revenues. Methodologies discussed in Section III.A below can be used to estimate the impact of asset and commodity prices on revenues.

23. Cyclical adjustment—and its reliance on the output gap as a summary measure of the state of the economy—is also likely to fall short when the composition of output changes. Structural balances can take into account such fluctuations in consumption, exports, and other aggregates, by capturing the output composition effect. For example, a house price boom would affect consumption much more than exports, which would have significant fiscal implications, as an economic expansion driven by consumption will have a much larger impact on tax collection than an export-driven expansion, given that the former is typically more heavily taxed than the latter. Cyclical adjustment would miss this effect, because it only considers the output gap, which could be the same in both scenarios. Establishing the correlation between relevant cycles requires estimates of the cyclical component of consumption, exports or imports, as well as for commodity or asset prices (Box 4). As a general rule of thumb, the higher the correlation with the output gap, the lesser the need for an additional adjustment, because the standard cyclical adjustment will capture most of the cyclical components of the other variables. In contrast, if the correlation is low and there are significant changes in the output composition, the methodologies discussed in Section III.B should be considered.

24. Adjustments beyond the business cycle require more judgment; therefore, the use of these techniques should be well motivated and documented. The need for judgment arises principally from the fact the "normal" state of economic variables other than output is difficult to define. Standard filtering techniques used for arriving at the output gap may not be

[8]See also the discussion of the nature of aggregate fluctuations and their role for structural balances in Hagemann (1999).

suitable for asset or commodity prices, as will be discussed below. In addition, they may not always be appropriate for real variables such as consumption either. Rather, the sources of the macroeconomic fluctuations matter. For example, if shocks to consumption stem primarily from the demand side, filtering techniques will correctly identify the cyclical and trend components. However, if the shocks stem from the supply side, their impact is likely permanent, which makes a structural adjustment unnecessary (and the artificial trend-cycle decomposition resulting from filtering techniques misleading).

A. Adjusting for Asset and Commodity Prices

25. As noted above, the standard cyclical adjustment may be supplemented with an adjustment for large movements in asset or commodity prices:

- *Commodity price or terms of trade adjustment*. When fiscal balances depend heavily on revenue from commodity exports or, more generally, the terms of trade, a correction for swings in these prices may shed additional light on the underlying fiscal position. The direct effect of natural resource-related revenue could be eliminated by using non-resource fiscal indicators (such as non-oil balances, Box 3); still, when analyzing fiscal sustainability, the permanent component of natural resource-related revenue should be considered, which in itself requires a discussion of price fluctuations (and the pace of resource depletion). Beyond their direct impact on revenues, commodity price trends may also have indirect effects (for example, higher firm profitability and corporate income tax receipts) that need to be taken into account by the adjustment methodology.
- *Asset price adjustment*. Asset prices, in particular real estate and equity prices, can also have an impact on the underlying fiscal position. The direct run-up in fiscal revenue related to asset prices and capital transactions in some countries before the recent financial crisis is one example. A recent study for the United Kingdom found that a permanent increase of 10 percent in asset and house prices is estimated to increase the cyclically adjusted tax receipts directly by between 0.1 and 0.4 percent of GDP annually (Farrington et al. 2008). In addition, there may be significant indirect wealth effects from higher property prices, for example, via higher consumption.

26. As with cyclical adjustment, both an aggregated and disaggregated approach are available for the asset and commodity price adjustment. The methodology is the same for both types of prices; the following discussion refers to asset price adjustments.[9] Box 3 discusses a number of examples from country work.

Aggregated approach

27. Aggregated asset price adjustment is an extension of the aggregated approach used for cyclical adjustment. It consists of adding a separate term for the deviation of asset

[9]A useful exposition of asset price adjustment is also available in Morris and Schuknecht (2007).

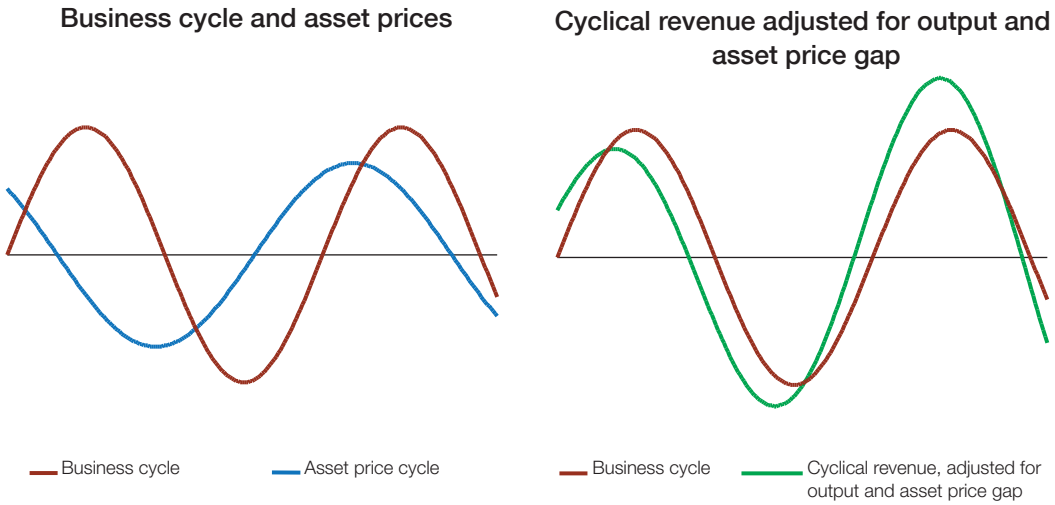
Box 3. Adjustment for Asset and Commodity Prices in Country Work

The slump of the housing market in **Spain** that began in 2008 has exposed the vulnerabilities of Spanish fiscal accounts to movements in asset prices. Martinez-Mongay et al. (2007) estimate that as much as three quarters of the increase in tax revenue between 1995 and 2006 may have been transitory and related to an ongoing asset boom. The paper argues that the tax base for indirect taxes (private consumption) needs to be augmented to include household expenditure on new housing, which is not included in private consumption data, because in Spain transactions in new dwellings are subject to VAT and contributed 7 percent of total indirect tax revenue. Likewise, for income taxes, the paper argues that the net operating surplus may not be the best tax base, in particular owing to the treatment of extraordinary profits from valuation changes and tax provisions to carry over losses that are not reflected in the reference year, and instead uses the price-to-earnings ratio from listed companies. After carefully removing discretionary tax policy changes from the tax aggregates, the paper finds a co-integrating relationship in log levels between individual tax receipts and their bases, and follows to derive short- and long-term tax elasticities. Instead of defining equilibrium asset prices, the paper measures the increase in asset prices with respect to the 1995 base year.

In the **United Kingdom,** public finances are directly influenced by asset prices through stamp duties, the capital gains tax, and the inheritance tax. More generally, fiscal revenue depends on financial sector profits, which moves in line with broader asset prices, for example, the stock market. Farrington et al. (2008) estimate both the elasticity of aggregate tax receipts and that of disaggregate taxes with respect to a well-defined housing and stock market price gap (see Box 4). The aggregate adjustment indicates that a 10 percent increase in housing and equity prices above their equilibrium level would boost tax receipts by 0.4 percent of GDP annually. The disaggregate approach shows a lower elasticity, yielding an additional 0.1 percent of GDP. In particular, the disaggregate estimation surprisingly shows no significant effect of asset prices on corporate tax receipts. The larger elasticity found in the aggregate approach could be due to the capture of wealth effects.

For **natural resource exporting countries,** the budget sensitivities to commodity prices can be assessed using country specific price indices (see Box 4). When a single or very few commodities are relevant, a simpler framework may be appropriate. For example, in some cases economic performance and fiscal revenues depend to a large extend on oil prices and domestic production. Fiscal revenues associated with the commodity export may be easily identifiable as such in the fiscal accounts, and fiscal aggregates excluding the oil sector should be defined accordingly (Villafuerte and Lopez-Murphy, 2010). Moreover, in heavily resource-dependent countries, traditional measures of the business cycle, such as the output gap, can be difficult to estimate. In such cases, it may be preferable to arrive at structural balance estimates by looking at the non-natural resource part of the budget and the economy, and relate these to the projected rents from the natural resource sectors.

Figure 3. Business Cycle, Asset Prices and Cyclical Revenue



prices from their benchmark level, denoted as the asset price gap $\left(\frac{A^*}{A}\right)$:

$$R^{CA,A} = R\left(\frac{Y^*}{Y}\right)^{\varepsilon_{R,Y}}\left(\frac{A^*}{A}\right)^{\varepsilon_{R,A}}, \qquad (10)$$

where $R^{CA,A}$ stands for revenues adjusted for the output and asset price gaps. Box 4 discusses a number of options to help define an appropriate benchmark for the "fundamental" value of asset prices. If the elasticity of revenues with respect to the asset price gap is zero, $\varepsilon_{R,A} = 0$, the formula is identical to the standard cyclical adjustment of equation (3), whereas for elasticity greater than zero the asset price gap affects structural revenues. A key advantage of this specification is that the significance of this elasticity can be tested empirically. It also allows for different output and asset price cycles (Figure 3).

28. This approach accounts for both direct and indirect effects. More specifically, part of the wealth effect, especially the impact on output, would be captured by the standard cyclical adjustment term $\left(\frac{Y^*}{Y}\right)$, while the asset price gap term would account for the rest.

29. Joint estimation of the elasticities is important to avoid double counting. The output gap and the relevant commodity or asset-price cycles may be correlated; hence using the elasticities estimate for $\varepsilon_{R,Y}$ from equation (3) may lead to over adjustment.

Disaggregated approach

30. The disaggregated approach used for cyclical adjustment can be extended to include a term for the asset price gap. The impact on corporate income taxes is used as an example, given that corporate income taxes are likely to depend on asset prices if the financial sector is large. In this case, corporate income tax receipts adjusted for the output gap and the asset price gap $\left(R_{CIT}^{CA,A}\right)$ are a function of (i) the actual corporate income tax collections,

Box 4. Identifying Cycles and Determining Equilibrium Levels

Identifying cycles or deviations of variables from their "norm" is critical input when adjusting fiscal balances. Key variables include:

- Output and its composition: current account norm, consumption cycle
- Commodity prices, terms of trade, and asset prices
- Tax and expenditure bases (wages, earnings, private consumption, unemployment).

Statistical filtering techniques decompose a time series into its trend and cyclical components and provide useful statistical benchmarks. Some techniques (e.g., the Hodrick-Prescott filter) perform better if the underlying series is extended beyond the sample period of interest, reducing the impact of the last observation on the trend estimate. In principle, statistical filtering is an appropriate technique for identifying trends in output, tax bases, and output composition, as long as the nature of the economic fluctuations justifies such decomposition.

Statistical filtering should not be used indiscriminately. Filtering yields a trend-cycle decomposition by construction, but when changes in economic variables reflect structural changes in the economy, a trend-cycle decomposition may wrongly point to temporary fluctuations. Structural balances should not correct for permanent changes.

For commodity prices, terms of trade, and asset prices, filtering may not always be the optimal solution. It is not clear if these variables follow a long-term trend or cycle. Given high volatility in asset prices, the trend estimate may be influenced heavily by the sample chosen. The following are examples of alternative approaches to arrive at asset or commodity price benchmarks:

- Guidance on specific benchmark levels may exist from national authorities (e.g., Chile's independent copper price board sets a benchmark level for the long-run price

(ii) the elasticities of the tax base—economy wide corporate earnings, in this case—with respect to output $\left(\varepsilon_{B_{CIT},Y}\right)$ and asset price gaps $\left(\varepsilon_{B_{CIT},A}\right)$, and (iii) the elasticity of corporate income tax receipts with respect to the base $\varepsilon_{R,B_{CIT}}$.[10]

[10]More generally, the cyclical and structural adjustment to revenues can be represented in a unified approach. The most general form is given by the equation:

$$R^{CA} = \sum_{i=1}^{N_i} R_i \left(\prod_{j=1}^{N_j} \left(\frac{x_j^*}{x_j} \right)^{\varepsilon_{R_i X_j}} \right)^{\varepsilon_{R,B_i}},$$

where i is a disaggregated category of revenue, N_i is the number of disaggregated revenue categories, x_j is a cycle or factor to be adjusted for, and N_j is the number of cycles to be adjusted for. For one cycle and one tax category ($N_i = N_j = 1$) the expression above yields equation (3).

of copper). In oil-producing countries, the budget may be built around a central oil price projection. Such benchmarks could provide a baseline scenario.

- Benchmarks may also be defined using economic theory and historic time series. For example, Farrington et al. (2008) define a housing price benchmark as the observed median value of the ratio of real house prices to real disposable income per capita, and use the median ratio of share prices to nominal GDP to define the share price benchmark.
- An alternative is to use prices that prevailed in the recent past. This approach makes no pretense of looking at the deviation of asset or commodity prices from their fundamental values, but instead benchmarks them against their level in a specific time period—a strategy followed in Blanchard (1990). When such benchmarks are used, structural balances have to be interpreted as representing the underlying fiscal position that would have prevailed if the prices in question had remained at the benchmark level.
- For countries exporting a diverse set of commodities, an alternative to a suitably weighted commodity price index measured against some form of benchmark is the "trading gain gap" used, for example, in structural balances estimates for Australia and Canada. The trading gain gap is computed as a ratio of the GDP deflator relative to the final domestic demand deflator (see Barnett and Matier (2010)).

To determine equilibrium levels of variables such as the consumption cycle or the absorption gap, economic models may be useful. Shifts in the sources of economic growth, for example, from exports to domestic consumption, may be temporary, but could also be permanent and consistent with the long-term current account norm. Statistical filtering techniques will not identify this equilibrium correctly, and using the equilibrium level predicted by economy theory would be preferable.

Sensitivity analysis is recommended and should be disclosed. Since the equilibrium concept used for asset or commodity price adjustment is likely to be controversial, scenarios with different benchmarks should be performed. If the results show that the structural balance is very sensitive to price movements and different benchmarks, this is a result in itself.

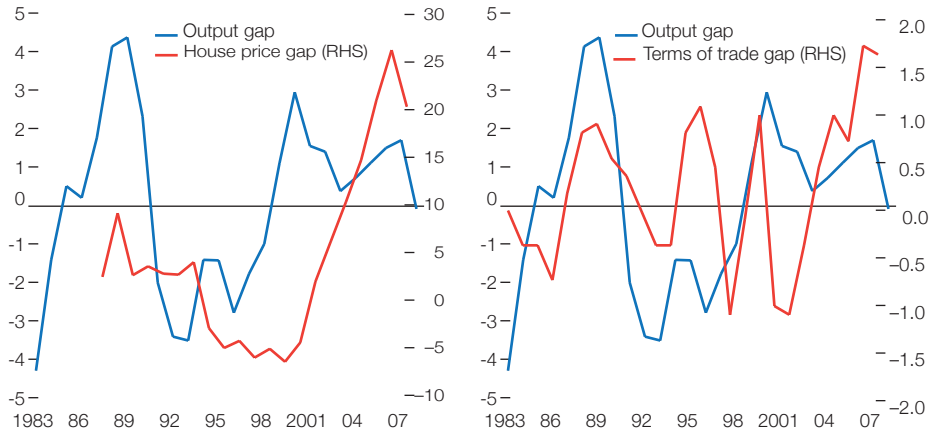
$$R_{CIT}^{CA,A} = R_{CIT}\left(\left(\frac{Y^*}{Y}\right)^{\varepsilon_{B_{CIT},Y}}\left(\frac{A^*}{A}\right)^{\varepsilon_{B_{CIT},A}}\right)^{\varepsilon_{R,B_{CIT}}}. \quad (11)$$

If the effect of asset prices on revenues is insignificant, this equation simplifies to (7). To capture indirect effects, it is important that the adjustment for the asset price gap is also included in other taxes, especially indirect taxes, given that the wealth effect is likely to affect private consumption. Adjustments beyond the output gap are further illustrated in the empirical application to Canada in Box 5.

Box 5. An Empirical Application to Canada: Adjustments Beyond the Economic Cycle

For Canada, the house price and trade cycles could have a significant impact on fiscal balances. While the trade cycle shows a clear oscillating pattern, a key difficulty is to estimate equilibrium values for house prices, and compute the corresponding gap. While far from optimal, the estimates below rely on a filtering technique, and show that house prices may not follow a cycle but rather a long-term trend (Figure B5). The estimate of the house-price gap is sensitive to the choice of smoothing parameters; in this exercise, smoothing parameters were chosen to reflect the common understanding of inflated property prices at the end the sample period. However, it should be noted that no filtering technique would have foreseen the turnaround in the series associated with the slowdown in the housing market, which represents a reversal of a long-term trend. This underscores the fact that adjustments for asset prices may prove to be more insightful in hindsight, rather than from a forward-looking perspective.

Figure B5. Output, House Price, and Trading Gap



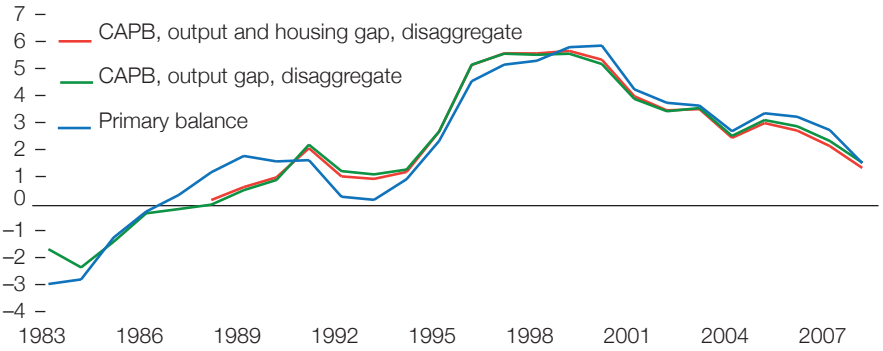
Estimates of other economic cycles are sensitive to the econometric specification; only the house price gap turned out to be statistically significant. When additional variables are added in the elasticity regression (housing price gap or the terms or trade gap), the estimated elasticities with respect to the output gap are broadly similar to the estimates obtained from the regression with output measures alone (Figure B6 and Table B2). The estimated elasticity of various tax bases with respect to the terms of trade gap is small

B. Adjusting for Output Composition Effects

31. The adjustment for output composition effects, sometimes referred to as the "ECB approach," is similar to the disaggregated cyclical adjustment, but with separate estimation of the cyclical components of individual tax and expenditure bases.[11] As a

[11]See Bouthevillain and others (2001) for a detailed exposition.

Figure B6. Disggregated Output and House Price Gap Adjustment
(in percent of potential GDP)



and not significant in most cases. Compared with the adjustment for the output gap, the additional adjustment for the house price gap ranges between +/- 0.2 percent of GDP. As expected, the difference is largest when the house price gap is large, or dephased from the output cycle.

Table B2. Adjusting for the Output and Housing Price Gap

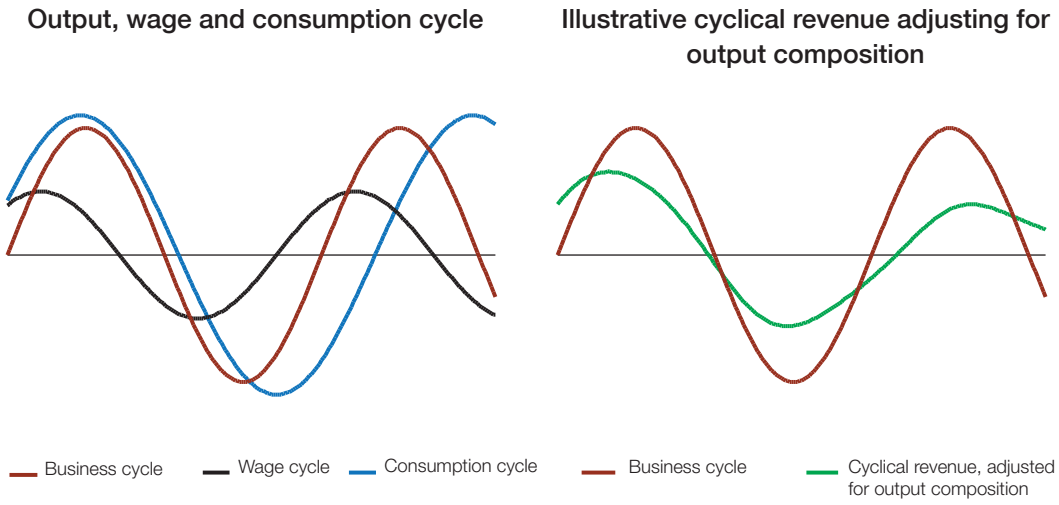
(in percent of potential GDP)

	1989–1993									2006–2008				
	Level					Changes				Level			Changes	
	1989	1990	1991	1992	1993	1990	1991	1992	1993	2006	2007	2008	2007	2008
Primary balance	1.8	1.6	1.7	0.3	0.2	–0.2	0.0	–1.4	–0.1	3.3	2.8	1.6	–0.5	–1.2
CAPB, output gap, disaggregate	0.6	0.9	2.3	1.3	1.2	0.4	1.3	–1.0	–0.1	2.9	2.4	1.6	–0.5	–0.8
CAPB, output and housing gap, disaggregate	0.7	1.0	2.1	1.1	1.0	0.4	1.1	–1.0	–0.1	2.8	2.2	1.4	–0.6	–0.8
Memo item														
GDP (real annual growth)	2.6	0.2	–2.1	0.9	2.3	–2.4	–2.3	3.0	1.5	2.8	2.2	0.5	–0.6	–1.7
Output gap	4.4	2.3	–2.0	–3.4	–3.5	–2.1	–4.3	–1.4	–0.1	1.5	1.7	–0.1	0.2	–1.8

The adjustment for the house price gap is significant, but this result rests on the (ex-post) identification of the boom. While unsustainable asset price developments can always be better identified with hindsight, this result does not preclude an analysis of budget sensitivities to various scenarios of possible future asset price developments.

consequence, the economic cycles responsible for the cyclical behavior of individual tax and expenditure categories can differ from each other in amplitude and phase, whereas cyclical adjustment would assume these cycles to be closely synchronized with the output cycle. Box 6 discusses a number of examples from country work. Figure 4 presents consumption and wage cycles, as these are important for the cyclical behavior of income (wages) and

Figure 4. Output Composition and Cyclical Revenue



indirect (consumption) tax bases. Wage and consumption cycles can be out of phase with the output cycle as well as with each other, they can differ in their frequencies, and they can differ in their amplitude.[12] With consumption and wages moving along different cycles, the composition of output changes over time.

32. A regression of individual tax receipts on the relevant tax base gap adjusts for output composition effects in revenue. An estimate of the cyclical component of the relevant tax base, $\left(\frac{B_i^*}{B_i}\right)$ is included so that

$$R_i^{CA,OA} = R_i \left(\frac{B_i^*}{B_i}\right)^{\varepsilon_{R_i B_i}}, \tag{12}$$

where $R_i^{CA,\,OA}$ denotes revenue category i adjusted for cyclical variation in its base. Implementing this approach also requires elasticity estimates linking individual revenue categories to their respective bases, $\varepsilon_{R_i B_i}$. Tax bases can benefit from refinement: for example, when looking at income tax receipts, a further disaggregation of the wage bill into average compensation (price effect) and employment (quantity effect) may be needed if the elasticity of compensation with respect to the output cycle is different from that of employment.

[12]Consumption and output cycles may differ in the presence of shocks that affect consumption, investment, or exports in a different manner, for example, a terms of trade shock. A lag in the consumption cycle relative to the output cycle could also stem from delays in which information on the state of the economy—an important input for the consumption decision—is available to households. Likewise, labor market features such as real wage rigidities and a backward-looking wage setting mechanism could explain the lower amplitude of the wage cycle and its lag relative to the other two cycles.

Box 6. Adjustment for Output Composition Effects in Country Work

For selected **European economies,** Bouthevillain et al. (2001) find that controlling for the changes in the composition of output changes the characterization of fiscal policy in certain episodes. Output composition effects are most significant in Italy in 1995, where an adjustment for the business cycle alone would signal a narrowing cyclical deficit. However, a broader view of output composition—taking into account the export-oriented growth, combined with low wage growth and record low employment levels that prevailed at that time—signals a widening the cyclical deficit. Applying the same methodology to **South Africa** (IMF, 2006) shows that consumption and corporate profit growth rates beyond GDP expansion positively affect fiscal balances.

A more stylized approach to adjust for output composition effects is to focus on **domestic absorption** (defined as output minus net exports). This approach is motivated by the observation that the tax burden of consumption is high and that of exports is generally low; a shift in the output composition between these two aggregates is generally associated with significant swings in fiscal revenues. To gauge these effects, indirect tax revenue can be adjusted for the effect of the output gap and absorption gap, while for other revenue an adjustment for the output gap is sufficient. This approach may be suitable for economies where current account imbalances are relevant and data availability poses additional constraints. Part II Chapter 6 of the European Commissions' Report on Public Finances (European Commission 2010) applies this methodology to European economies, and finds absorption induced effects on fiscal balances of up to 1½ percent of GDP for advanced euro area countries (Sweden) and up to 4 percent for new member states (Bulgaria).

During 2002-07 **Bulgaria's** external balance—defined as the actual current account deficit minus the estimated equilibrium current account deficit—recorded a significant shift from –6 percent of GDP to 12 percent of GDP, while the output gap changed by only 4 percentage points. This development was driven by a consumption boom that fuelled indirect tax receipts. While conventional measures of the fiscal stance point to a tightening from 2003 onwards, controlling for the widening absorption gap reveals a neutral fiscal stance (IMF 2007). For a similar application to **Macedonia,** see IMF (2010b); for a cross-country analysis on the effect of absorption booms on fiscal policy, see Dobrescu and Salman (2010).

33. On the expenditure side, a regression of current expenditure on the unemployment gap adjusts for unemployment trends, regardless of the output gap. Using the ratio of structural unemployment to actual unemployment, instead of the output gap measure combined with a measure of unemployment, provides the direct link between the expenditure and its base:

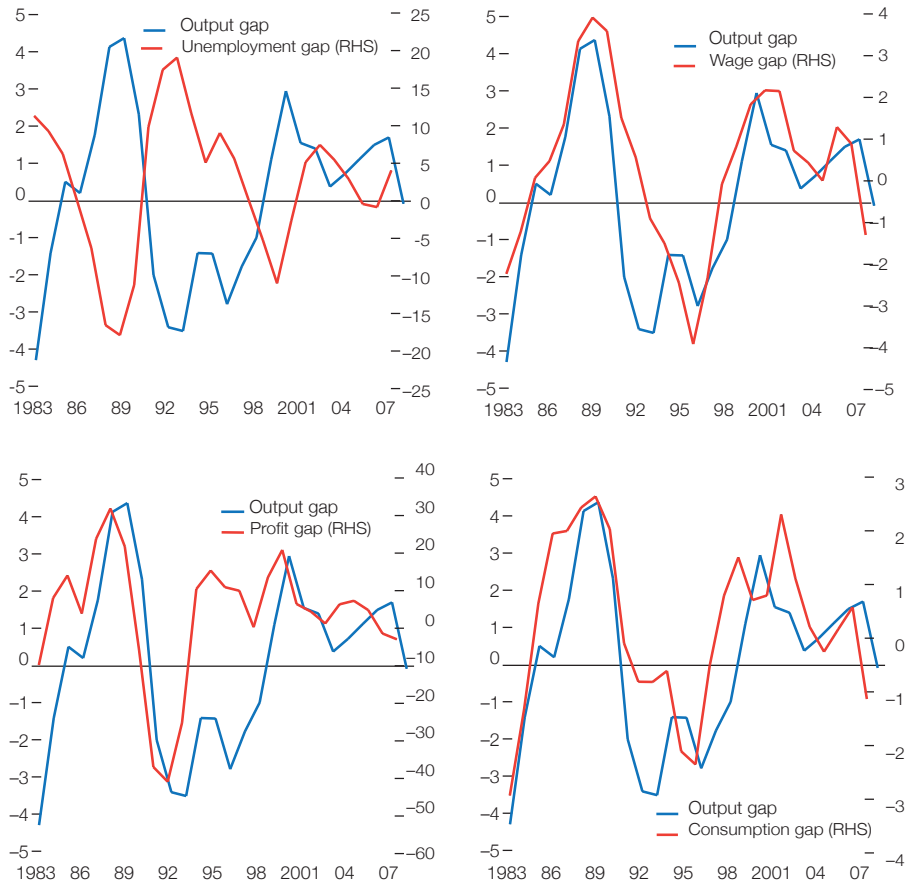
$$G_{cur}^{CA,OA} = G_{cur}\left(\frac{U^*}{U}\right)^{\varepsilon_{G,U}}. \qquad (13)$$

Box 7 presents the results of the empirical application to Canada when output composition effects are considered.

Box 7. An Empirical Application to Canada: Adjustments for Output Composition Effects

Continuing with the Canada example, output composition effects appear modest, as various economic cycles appear highly correlated (Figure B7 and Table B3). Unemployment and output cycles are highly negatively correlated (correlation coefficients of about -0.9), while the wage gap and consumption gap are positively correlated with the cycle (correlation coefficients of around 0.8). The profit gap has a somewhat lower correlation (0.6), driven by a period in the late 1990s.

Figure B7. Correlation between Output and Other Economic Gaps



In view of the high correlation of gap measures with the output gap, the adjustment resulting from output composition effects is not expected to differ significantly from the adjustment for the output gap (Figure B8 and Table B4). In addition, since the cyclically adjusted balances track the unadjusted aggregate over the entire sample period (Box 2), the same can be expected for the adjustment for output composition effects. In fact, this series displays less cyclical effects compared with the disaggregated adjustment for the output gap. The disaggregated analysis of each revenue item with respect to its tax base and the stable pattern over time yield a smaller cyclical correction.

Figure B8. Disggregated Output and Output Composition Effects
(in percent of potential GDP)

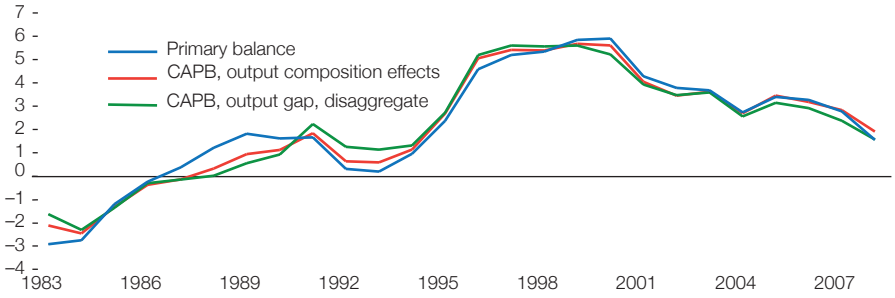


Table B3. Correlation Matrix of Gap Measures

	Output gap	Unemp. gap	Wage gap	Profit gap	Consump. gap
Output gap	1				
Unemployment gap	–0.89	1			
Wage gap	0.79	–0.70	1		
Profit gap	0.63	–0.65	0.12	1	
Consumption gap	0.81	–0.71	0.86	0.35	1

The differences between the standard cyclical adjustment and the adjustment for output composition effects appear more pronounced in the period 2006-08, with estimates ranging between 2.4 and 2.9 percent of GDP for 2007. In this latter period, the effect of housing prices on levels appears most significant, while the adjustment for output composition effects moves the adjusted balance closer to the observed primary balance. As argued above, this can be attributed to the high correlation of the various cycles. In fact, if cycles are highly correlated with the output gap, the adjustment for output composition effects may not differ significantly from standard aggregated adjustment methodologies for the output gap alone.

Table B4. Adjusting for the Output Gap and Output Composition

(in percent of potential GDP)

	1989–1993									2006–2008				
	Level					Changes				Level			Changes	
	1989	1990	1991	1992	1993	1990	1991	1992	1993	2006	2007	2008	2007	2008
Primary balance	1.8	1.6	1.7	0.3	0.2	–0.2	0.0	–1.4	–0.1	3.3	2.8	1.6	–0.5	–1.2
CAPB, output gap, disaggregate	0.6	0.9	2.3	1.3	1.2	0.4	1.3	–1.0	–0.1	2.9	2.4	1.6	–0.5	–0.8
CAPB, output composition effects	1.0	1.1	1.9	0.7	0.6	0.2	0.7	–1.2	0.0	3.2	2.9	1.9	–0.3	–0.9
Memo item														
GDP (real annual growth)	2.6	0.2	–2.1	0.9	2.3	–2.4	–2.3	3.0	1.5	2.8	2.2	0.5	–0.6	–1.7
Output gap	4.4	2.3	–2.0	–3.4	–3.5	–2.1	–4.3	–1.4	–0.1	1.5	1.7	–0.1	0.2	–1.8

IV. Some Practical Tips

34. Based on the discussions in the preceding sections and the lessons from the empirical applications, the following are some practical tips that may help when computing structural fiscal balances.

Inspecting the data

35. The following points may help deciding if and what adjustments of fiscal aggregates for economic cycles are warranted:

- Is the output gap large, especially in the recent past? Computing cyclically adjusted and structural balances has a significant impact only when gaps are large (but the trade-off is that when output gaps are large, both estimates of gaps and elasticities are less reliable).
- Has the composition of output changed over time? If gap measures for macroeconomic aggregates such as consumption and net exports differ markedly in phasing and/or size, this is an indication that output composition effects may be present. This can be assessed by computing correlation coefficients between gap measures, possibly for subsample periods.
- Are there significant movements in asset prices and terms of trade? If prices deviate substantially from their fundamental values and if, in addition, asset and commodity related fiscal revenues are a significant source of revenues, an adjustment for these price movements may be necessary. Disaggregated tax data can help assess the share of such revenues in overall revenue. However, indirect effects may also be present and can be gauged through regression analysis at the aggregate level.
- How reliable are gap estimates? The quality of adjustment is limited by the quality of information regarding the gap estimate. Alternative gap measures and additional information can help determine the deviation from equilibrium values.

Estimating the elasticities

36. Once the relevant cycles are established and the necessary macroeconomic and tax data are collected, one may proceed to estimate the elasticities. The basic setup is discussed in Box 1. In addition, the following considerations may be helpful in finding the best specification.

- When estimating the disaggregated revenue response to changes in the tax bases, or when estimating the response of aggregated revenue or expenditure to gap measures, some adjustments may be necessary:
  - ✓ Underlying time series should be adjusted for one-off factors first (Appendix I). This reduces noise in the time series and, if not removed, could affect elasticity estimates.
  - ✓ Changes in the tax or benefit system can lead to structural breaks in the time series. Where available, this could be addressed by using tax and benefit series computed based on constant tax or benefit systems, which for some countries is provided by the national tax authorities. For most countries, however, this information is absent,

and the only practical way for addressing this is by manual correction for tax policy changes, choosing an appropriate sub-sample period or introducing dummy variables to reflect policy changes. To assess whether elasticities are stable, rolling regressions can be used.

- Specification tests should be carried out but are specific to the time series at hand. Keeping in mind that the goal is to determine a long-run relation between the two variables, different time series techniques need to be employed as appropriate. For example, if the variables are non-stationary and no co-integration relation is present, one would proceed to estimate the relation in first differences. In some cases, an error correction model with appropriate lag structure may provide the best fit. Note that any lags that were significant in the estimation of the elasticity may also be needed when computing structural balances. For example, if corporate revenues have a lag of one year to the tax base, then the structural balance calculation would have to reflect this lag as well.
- Appropriate scaling of the variables is important. Revenue and expenditure values are usually expressed using the log of the real aggregate, gaps are presented as percentage deviation from equilibrium, and bases as a percent of potential GDP. While this scaling is recommended, alternative methods are possible. However, it is important that the elasticities derived from a particular specification and using a specific transformation of variables be employed in a consistent way when computing structural balances.

Computing the structural balance

37. The elasticity regressions, combined with the examination of charts, should guide the choice of the adjustment method:

- The choice between the *aggregate* and *disaggregate* approach should build on the stability of the elasticity estimates obtained from the aggregate approach. If there are signs of significant instability of elasticities, the disaggregate approach is likely to be a better choice, because the instability is likely to be more narrowly confined to only one revenue or benefit type (e.g., this would be the case if the instability results from a change in the tax code for one specific tax). If elasticity estimates of individual taxes or benefits also show signs of significant instability over time, one practical solution (besides other adjustments discussed below) is to rely on elasticity estimates from the literature and to limit the computation of the structural balance to a relatively recent period. However, limiting the elasticity estimate to a sub-sample also limits the comparability of structural balance estimates over time.
- The question whether output composition effects matter should be decided by considering the co-movement of consumption and other cycles with the output gap (see Figure 4) and whether elasticity regressions incorporating output composition effects are substantially more stable than those based on the output gap (i.e., disaggregate approach).

- The question whether asset prices and terms-of-trade effects should be adjusted for depends on (i) whether there are large price movements (see above), (ii) whether price deviations from fundamentals can be reasonably well established, and (iii) whether these effects are significant, which can be gauged by the statistical significance of the corresponding coefficient in the aggregate regression.
- Finally, whatever method and elasticity estimate is chosen, the elasticities should be compared to findings in the literature (for example ECB or OECD country work), as well as standard assumptions on elasticities.
- Once elasticities are established, the computation of structural balances is straightforward by computing cyclically adjusted revenues and expenditures using actual revenues and expenditure, the estimated (or assumed) elasticities, and the various gap measures, according to the formula above. Cyclically adjusted and structural balances are usually expressed as percent of potential GDP.

V. Conclusions

38. Practical considerations influence the choice between computing cyclically adjusted or structural balances. Structural balances contain powerful information, as they weigh country-specific circumstances to arrive at a measure of underlying fiscal positions that would prevail if various economic variables of interest (asset prices, commodity prices) were at some "normal" level. However, reliance on country-specific information makes structural balances less suitable to standardized applications across countries than cyclically adjusted balances. In addition, subjective judgment is needed to arrive at a benchmark for what constitutes "normal" asset or commodity prices, output composition, etc., required to determine to what extent there is a temporary deviation in these variables. In contrast, cyclical adjustment is relatively straightforward, since potential output is a natural benchmark against which to measure output variations.

39. Which indicator and what type of adjustment should one use? This note discusses various methodologies available in the literature to adjust fiscal balances for transitory factors beyond the business cycle. The note suggests first eliminating one-off factors from the fiscal balance when information is available on the transitory nature of these factors. It then proposes a generalized framework that extends the adjustment for the business cycle to other economic cycles, and analogously builds on gap measures and budget elasticities. Which approach to follow and the decisions to make along the way will depend on a number of factors. This precludes strict quantitative guidelines. Nevertheless, this notes provides the following principles and rules of thumb, which should be helpful in guiding the decision on which approach to use:

- *Purpose of the analysis*. Structural balances provide an analytical concept, not a statistical definition. As such, the purpose of the analysis and the fiscal policy questions at

hand will be the decisive factor in determining if such an adjustment is warranted and which questions should be answered in the analysis. For example, when the analysis requires a standardized treatment across a number of countries, comparability may justify keeping the analysis simple and using a uniform methodology for cyclical adjustment only.

- *Data availability*. Data availability will often limit the options available. Adjustments at the aggregated level may be possible with relatively little additional data requirements.
- *Relevance*. Do factors beyond the output gap matter? How important is the tax revenue derived from such factors? Availability of data alone does not justify complicated adjustment techniques.
- *Time horizon*. Forecasting structural balances involves additional challenges, as an assessment of equilibrium, or "normal", values beyond the business cycle is needed. In the absence of well-founded price forecasts and benchmarks, parsimony and sensitivity analyses are recommended. When the analysis is backward looking, computing structural balances may be easier to accomplish, and be preferred over an adjustment for the business cycle alone, as they provide a richer analysis.
- *Accuracy of elasticity estimates*. Validating own elasticity estimates with available estimates for comparable countries is also recommended.

Appendix I. Dealing with One-Off Fiscal Operations

While seemingly straightforward, there are no universally accepted criteria for identifying one-off or temporary fiscal measures. From a practical standpoint, a number of considerations help in determining when a fiscal transaction can safely be labeled one-off:

- They typically involve large, non-recurrent operations, whose impact on fiscal balances usually falls predominantly in the year when the related operations are recorded (Joumard et al, 2008)—with no sustained change in the intertemporal budget position and hence no implications for fiscal sustainability.[13] This consideration applies to both revenue windfalls (such as receipts from the sale of concessions) and exceptional spending interventions (for example, emergency relief after a natural disaster). For example, most sales of telecommunication licenses fall in this category.[14]
- Capital transfers are most likely to be associated with one-offs. They can be both balance improving (e.g., the proceeds of tax amnesties, payments by corporations transferring pension obligations to the government, or proceeds from favorable court decisions) or balance deteriorating (e.g., debt assumptions or cancellations or deposit insurance-related expenditures). Examples of noncapital-transfer one-offs include temporary tax receipts resulting from shifts in the timing of tax payments.[15]

While these criteria may help identify one-offs, a number of considerations make their use subject to considerable judgment. Perceptions about the likely temporary nature of the measures vary. While one-offs may not be easily reversed, or specific one-off transactions may reflect an underlying, recurring pressure or risk, policymakers may be tempted to retain in adjusted fiscal balances one-off revenue-enhancing measures and exclude balance-deteriorating measures (such as tax cuts or spending programs).[16] In addition, removing certain discretionary one-off measures, even if intended to be temporary, may not be warranted from an analytical perspective, as structural balances (or measures of structural revenues and expenditures) aim to highlight discretionary fiscal policy positions. Box A1 includes examples on one-offs typically encountered in country work.

[13]There are also one-off operations that affect debt positions but not the measurement of fiscal balances, for example, reevaluation of financial assets and liabilities due to exchange rate changes. While these operations are outside the scope of this note, they are nonetheless important, especially in cases when large and systematic discrepancies arise between fiscal balance flows and changes in debt stocks (Girouard and Price, 2004).

[14]This choice also depends on accounting practices and cash versus accrual reporting. The rationale for excluding from fiscal balances the sale of telecommunication licenses as one-offs is that the related receipts are often exceptional and non-recurring.

[15]For example, in Italy, when the possibility of paying capital gain taxes in installments was removed in 2001 (estimated to have generated 0.3 percent of potential GDP); and in Japan, when tax payments on postal savings accounts were deferred (in 2000, amounting to 0.5 percent of potential GDP, and in 2002, amounting to 0.1 percent of potential GDP). For more detail, see Joumard et al. (2008).

[16]One-off measures have often been used as "accounting tricks" to comply with fiscal rules (see Koen and van der Nord, 2005, for a review, Larch and Turrini, 2009, and IMF (2011), Appendix 2).

Box A1. Adjustment for One-off Fiscal Operations in Country Work

- **Budgetary financial support to ailing banks or companies or capitalization of state-owned financial (or non-financial) institutions.** Often these transactions involve acquisition of assets that do not change government net worth, at least initially, and are not recorded in the headline fiscal balance (Fouad and Martin, 2008). However, in some cases these operations may camouflage unrequited interventions without any expectations of recovering the ensuing claims (for example, recapitalization of a non-financially viable company). As these operations result directly in a reduction in government net worth, they should be recorded as regular spending (current or capital transfer) above the line.
- **Acquisition of a single, large capital item, such as the purchase of military equipment or the construction of facilities for international sporting or conference events.** These operations should not be excluded, as they reflect discretionary policy intentions. A further consideration is that large capital investment projects give rise to recurrent maintenance and operation spending. Although country authorities may suggest exclusion, a better option would be to show these items transparently to facilitate assessment of the fiscal position with and without the large transaction.
- **Costs associated with clean up or recovery from an environmental or natural disaster.** There is scope to treat these as exceptional spending, especially if the expenditure is concentrated in a short period of time (say, one year). Earthquake and hurricane relief are common examples.
- **Clearance of budgetary arrears, including for wages or suppliers.** If these are exceptional operations, they could be treated as one-offs. However, if they have a recurrent nature (say, every few years), they should be included in fiscal balances. After all, arrears represent spending that has been committed in the past. Their treatment, above or below the line, also depends on whether the accounting is based on cash or accrual principles.

A few Fund G-20 country teams have accounted for one-offs in providing structural balance series for the World Economic Outlook. Recent corrections included: sale of oil concessions, exclusion of proceeds from a specific tax introduced and abolished over a short period from the estimation of revenue elasticities, exclusion of one-off expenditures related to bank bailouts and legal cases, and exclusion of asset repurchases and earthquake-related spending.

Crisis-related discretionary fiscal stimulus should not be excluded from reported structural balances. These measures have had an impact on domestic demand and may prove difficult to reverse. Including them in fiscal balances also provides a more accurate measure of the authorities' policy intentions. Typically, when reporting cyclically adjusted or structural balances that include short-term discretionary fiscal stimulus, Fund staff analysis has pointed out that a component of the structural fiscal position includes discretionary revenue and expenditure measures that are expected to be reversed when the crisis wanes.

While computing one-offs is bound to be a subjective exercise, transparency of reporting (so that the adjustments are clear and evident) and parsimony in their treatment should guide the analysis. Information about the nature and size of fiscal operations will help identify one-offs.

A balance needs to be struck between no adjustment and over-adjustment for one-offs. In light of incentives to seek compliance with deficit and debt targets under the Stability and Growth Pact through accounting gimmickry, the European Commission has spelled out some principles to identify one-off measures, aiming at ensuring consistency and equality of treatment (Larch and Turrini, 2009). Common features include: (i) size (only measures having a significant impact, assumed to be above 0.1 percent of GDP, on the general government balance should be considered; (ii) duration (the impact of one-offs should be concentrated in one single year or a very limited number of years); and (iii) nature (one-offs are typically, but not exclusively, included in capital transfers). Notably, because the assessment of the non-recurring nature of certain expenditure is particularly difficult, the EC suggests that deficit-increasing measures should not be regarded as one-offs. The rationale is that spending measures intended to be temporary often become permanent.

Based on the above, the following "rules of thumb" could help guide the identification and treatment of one-offs:

- Be wary of one-offs that make fiscal balances look better (such as exclusion of tax cuts and spending increases). These may prove recurrent.
- Treat as one-offs fiscal operations that affect the fiscal balance only for a short time, typically not beyond the current fiscal year.
- Adjust for one-offs sparingly. If in doubt, do not make any exclusion. Parsimony also helps ensure comparability of treatment across countries.
- If adjustments are made, report fiscal balances with and without one-offs. Transparency involves providing more information and supports more consistent analysis and sounder decision-making.

Appendix II. Data Sources and Methodological Notes

Annual data for the empirical application to Canada were taken from "Fiscal Reference Table 2009" (FRT 2009) available at http://www.fin.gc.ca/pub/frt-trf/index-eng.asp. Macroeconomic variables, such as output, wage, and unemployment are taken from Statistics Canada and the IMF World Economic Outlook. All real variables were deflated with the GDP Deflator.

Estimation of equilibrium values. The gap was computed for a real variable X as follows:

(i) Take the log of X, call it log X.

(ii) Fit AR(4) for the first difference of log X, and use it to forecast for next 6 years to mitigate the one-sided filter problem.

(iii) Use the HP filter to estimate the gap, with smoothing parameter of 100.

For the housing price gap, the standard smoothing parameter of 1,600 was applied to the housing price index. However, step (ii) was applied using the data up to 2001 and it was used to forecast the series up to 2008 and an additional 6 years to capture better the notion of a bubble. This generated a path for the housing price gap that coincided with available qualitative information. As discussed in Box 4, alternative derivations of equilibrium prices and sensitivity analyses should complement this equilibrium concept.

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