

A Service of

ZBU

Leibniz-Informationszentrum Wirtschaft Leibniz Information Centre for Economics

Jalles, João Tovar

Working Paper Estimating structural budget balances in developing Asia

ADB Economics Working Paper Series, No. 719

Provided in Cooperation with: Asian Development Bank (ADB), Manila

Suggested Citation: Jalles, João Tovar (2024) : Estimating structural budget balances in developing Asia, ADB Economics Working Paper Series, No. 719, Asian Development Bank (ADB), Manila, https://doi.org/10.22617/WPS240087-2

This Version is available at: https://hdl.handle.net/10419/298165

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.



https://creativecommons.org/licenses/by/3.0/igo/

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



WWW.ECONSTOR.EU

ESTIMATING STRUCTURAL BUDGET BALANCES IN DEVELOPING ASIA

João Tovar Jalles

NO. 719

April 2024

ADB ECONOMICS WORKING PAPER SERIES

ADB

ASIAN DEVELOPMENT BANK

ADB Economics Working Paper Series

Estimating Structural Budget Balances in Developing Asia

João Tovar Jalles

No. 719 | April 2024

The ADB Economics Working Paper Series presents research in progress to elicit comments and encourage debate on development issues in Asia and the Pacific. The views expressed are those of the authors and do not necessarily reflect the views and policies of ADB or its Board of Governors or the governments they represent. João Tovar Jalles (joaojalles@gmail.com) is a senior associate professor of economics at the Lisbon School of Economics and Management (ISEG), University of Lisbon.



Creative Commons Attribution 3.0 IGO license (CC BY 3.0 IGO)

© 2024 Asian Development Bank 6 ADB Avenue, Mandaluyong City, 1550 Metro Manila, Philippines Tel +63 2 8632 4444; Fax +63 2 8636 2444 www.adb.org

Some rights reserved. Published in 2024.

ISSN 2313-6537 (print), 2313-6545 (electronic) Publication Stock No. WPS240087-2 DOI: http://dx.doi.org/10.22617/WPS240087-2

The views expressed in this publication are those of the authors and do not necessarily reflect the views and policies of the Asian Development Bank (ADB) or its Board of Governors or the governments they represent.

ADB does not guarantee the accuracy of the data included in this publication and accepts no responsibility for any consequence of their use. The mention of specific companies or products of manufacturers does not imply that they are endorsed or recommended by ADB in preference to others of a similar nature that are not mentioned.

By making any designation of or reference to a particular territory or geographic area, or by using the term "country" in this publication, ADB does not intend to make any judgments as to the legal or other status of any territory or area.

This publication is available under the Creative Commons Attribution 3.0 IGO license (CC BY 3.0 IGO) https://creativecommons.org/licenses/by/3.0/igo/. By using the content of this publication, you agree to be bound by the terms of this license. For attribution, translations, adaptations, and permissions, please read the provisions and terms of use at https://www.adb.org/terms-use#openaccess.

This CC license does not apply to non-ADB copyright materials in this publication. If the material is attributed to another source, please contact the copyright owner or publisher of that source for permission to reproduce it. ADB cannot be held liable for any claims that arise as a result of your use of the material.

Please contact pubsmarketing@adb.org if you have questions or comments with respect to content, or if you wish to obtain copyright permission for your intended use that does not fall within these terms, or for permission to use the ADB logo.

Corrigenda to ADB publications may be found at http://www.adb.org/publications/corrigenda.

ABSTRACT

This paper reviews the current discussions, methods, and practices surrounding the estimation of reasonable proxies for the underlying fiscal position, a useful anchor for fiscal policy. An empirical application to developing Asian economies is carried out. There is no one-size fits all type of approach and the sensitivity and discernment regarding specific economies are important in various stages. The choice of the filter to decompose trends from cycles matters. The way to adjust revenues and expenditures entering the cyclically adjusted balance also matters—choices regarding economy-specific vs. panel estimations or the use of static vs. time-varying approaches need to be made. To deal with one-off operations, a narrative-based approach can complement the suggested identification based on large changes in cyclically adjusted government capital transfers. A discussion of other important factors that can affect the estimates of structural balances such as asset and commodity prices is also provided.

Keywords: budget elasticity, time-varying estimation, trend-cycle decomposition, cyclically adjusted balances, one-off fiscal operations

JEL codes: C33, E62, H30, H60, O53

1. Introduction

For fiscal surveillance and monitoring, it is paramount to assess the state of public finances and fiscal policies, that is, to understand the nature of budgetary developments. Actual budget balances are inadequate measures for these purposes as they are affected by multiple factors that are both temporary and outside the direct control of the government.

Prime amongst these factors are fluctuations in economic activity. The understanding that economic fluctuations, which are transitory in nature, have on the interpretation and evaluation of fiscal developments supported the notion that nominal budgets could not be taken at face value since they combine temporary and permanent disturbances (Larch and Turrini 2009). Disentangling the two elements led to the creation of the concept of the cyclically adjusted budget balance (CAB), which came to live more than 30 years ago in a seminal contribution by Blanchard et al. (1990).¹ The CAB seeks to correct fiscal outcomes for the influence of cyclical movements. In other words, they aim at determining what fiscal position would prevail if the economy operated at its full capacity (ECB 2014).

In addition to the impact of the economic cycle, other aspects that have become progressively important are the one-off measures. These are temporary government measures such as one-off revenues (for instance, stemming from the sale of licenses for telecommunication) or one-off capital transfers (for instance, financial aid to the banking sector).

¹ In fact, Brown (1956) pioneered the extraction of the underlying budget balance by computing the full employment surplus, the predecessor of the CAB. The conceptual advantage of potential GDP of potential output over full employment did not facilitate things in practical terms. The computation of potential output still remains a speculative issue despite many methods and approaches having been developed (Section 3.1).

Stripping the impact of short-term fluctuations and one-offs yield what some international organizations refer to as "structural budget balance" (SB) (International Monetary Fund [IMF]) or the "underlying fiscal position" (European Commission [EC]).² The attraction of the SB sits with its goal to measure, at low cost, the "true" fiscal position corrected of transitory cyclical factors.

However, estimates of the structural balance can be subjected to significant measurements errors as they are surrounded by considerable uncertainty. These errors are related to accurately estimating the output gap—which is an unobservable variable and the nonlinear reactions of tax revenues to sharp changes in real gross domestic product (GDP) growth. The definition or identification of temporary factors can also cause difficulties. These problems complicate the applicability of this concept in economies that are regularly affected by severe shocks (e.g., weather events); those that have a production structure that is not sufficiently diversified and, hence, render the economy hostage of commodity cycles; or those whose growth outlook is characterized by a lack of some anchored predictability. This report aims to review the current discussions surrounding the estimation of reasonable proxies of discretionary fiscal stance by reviewing methods and practices. An empirical application to a selection of developing member economies of the Asian Development Bank (ADB) is carried out but full results are available in the Appendixes.³ We can conclude from the empirical exercises that there is no one-size fits all and desk sensibility and judgment is important in various degrees. The choice of the filter to decompose trends and cycles matters with a preference to avoid

² For the remainder of the document, I will be referring to structural balance as the measure stripped from both cyclical variations and one-off measures.

³ The appendixes are available at <u>https://dx.doi.org/10.22617/WPS240087-2</u>.

the outdated and problematic HP filter in favor of the Hamilton (2018) approach. Moreover, the take on how to adjust revenues and expenditure entering the CB or SB is paramount. There is a plethora of choices to be made, from prior empirical estimation at the economy-specific level, to whether such analysis should be done in a static or timevarying fashion, to which subcomponents of revenues and expenditures are likely to fluctuate with the cycle or be orthogonal to it. Furthermore, if one thinks about one-off operations, then a more narrative-based approach can complement the ad hoc identification of large changes in cyclically adjusted government capital transfers. Finally, there is the discussion of other factors in addition to the cycle, such as asset and commodity prices, which includes changes in housing prices and terms of trade adjustments that can prove to be difficult to be reflected in a measure of the underlying fiscal position. Ultimately, SBs are a useful anchor for fiscal policy, but should not be taken too seriously for real-time policy making.

The remainder of the report is organized as follows. Section 2 elaborates on the rationale behind needing a measure of cyclically adjusted budget balances; Section 3 presents the existing methodologies to do so contrasting pros and cons of each one, the so-called aggregated vs. disaggregated approaches; Section 4 deals with one-off fiscal operations and the issues concerning the passage from cyclically adjusted balances to a measure of underlying balance or structural balance; Section 5 performs several empirical applications on ADB member economies; and the last section concludes.

2. Why Do We Need a Measure of the Cyclically Adjusted Budget Balance or Structural Budget Balance?

Despite the flaws and problems, the CAB (and/or the SB) continues to be one of the main indicators necessary for fiscal policy analysis. More specifically, it is an important concept because it allows:

- (i) splitting the influence of discretionary fiscal policy to a given change in the deficit from the effect of the economic environment while simultaneously allowing automatic stabilizers to operate freely;
- (ii) evaluating fiscal impulses; and
- (iii) assessing if fiscal policy in the long-run is sustainable.

On (i), the discussion in the literature surrounds the role of fiscal policy in macroeconomic stabilization. Calculating the structural balance means splitting the fiscal stance into the cyclical and the structural components. More generally, fiscal policy can help the stabilization of the business cycle by means of three different channels (Silgoner, Reitschuler, and Crespo-Cuaresma 2003). The first refers to the role of the cyclical component, that is, the automatic stabilizers. There is, nonetheless, a second indirect channel related to public spending items that continue fixed, independent of the phase of the business cycle and by not reacting to it also have a stabilizing function. The third, is the use of discretionary fiscal policy (despite most literature pointing to a pro-cyclical bias of these policies and, hence, a destabilizing effect (van den Noord 2000). Changes in the structural balance need policy actions and translate discretionary fiscal policy changes.⁴ While the Global Financial Crisis (and, more recently, the coronavirus disease [COVID-

⁴ To Dos Reis et al. (2007) it is preferable to refer to automatic stabilizers as "a passive policy response to the cycle."

19] pandemic) stressed the relevance of discretionary fiscal policy, the consensus remains that automatic stabilizers have a key role to play under more normal circumstances (Blanchard et al. 2010).⁵

On (ii), the issue is about the identification of the effect of fiscal impulses or shocks on a given macroeconomic (or other) outcome. Changes in structural balances can imply the impact on the economy of discretionary actions (Muller and Price 1984). The research on fiscal multipliers is voluminous (for instance, Batini et al. 2014 discuss this). A variety of methods can be used to measure the ("discretionary") fiscal impulse from "natural experiments" (Barro 1981, Ramey and Zubairy 2018), to forecast errors approaches (Auerbach and Gorodnichenko 2013a, 2013b; Abiad et al. 2016; Furceri and Li 2017) used to overcome the problem of "fiscal foresight" (Forni and Gambetti 2010, Ben Zeev and Pappa 2015), to cyclically adjusted methods (Adarov et al. forthcoming) especially in the context of studies looking at fiscal consolidations episodes (Giavazzi and Pagano 1996, Afonso and Jalles 2014, Clements et al. 2022).

On (iii), the concept of CAB is the most important to fiscal sustainability defined as the level to which the debt–to-GDP ratio converges in the long-term given the potential of the economy.⁶ Fiscal sustainability can be evaluated based on debt dynamics resulting from the structural fiscal stance (Escolano 2010). In one compares the structural balance

⁵ When economic activity slows down, revenues are negatively affected, and spending may increase automatically —leading to a rise in the fiscal deficit. Empirical studies acknowledge the difficulties in come up with reliable estimates of fiscal stabilizers, but they also recognize the necessity to have some approximations (Cotis et al. 1998, Auerbach and Feenberg 2000). Recent contributions on computing and employing estimates of fiscal stabilizers include: Furceri et al. (2020), Furceri and Jalles (2019, 2018), and Jalles (2020, 2018).

⁶ The concept of fiscal sustainability revolves around determining the future primary budget surpluses necessary to stabilize the debt-to-GDP ratio. This debt ratio is influenced by the relative values of the implicit nominal interest rate and the nominal growth rate of GDP, as highlighted in Blanchard et al. (1990). When considering the financial perspective, it may be more appropriate to shift our attention towards the government's borrowing requirements, encompassing borrowing for financial transactions, rather than solely focusing on the structural or underlying fiscal balance. In such a scenario, it becomes valuable to concentrate on the government's balance sheet when evaluating its implications for fiscal sustainability, as suggested by Moriyama and Milesi-Ferretti (2004).

against a benchmark (for instance, the debt-stabilizing budget balance), can allow one to understand to what extent the current fiscal policy path can be sustained (Bornhorst et al. 2011). This also translated a proxy of the fiscal effort needed to correct any fiscal imbalances. The structural balance, by correcting for short-term cyclical factors and oneoffs, is suitable for this purpose.

Adjustments beyond the business cycle require some additional judgement, such that the use of the standard filtering techniques should be soundly motivated. The difficulty originates from the determination of the "normal" state of economic variables other than output. When looking at issues such as asset or commodity prices, the sources of economic fluctuations are relevant. If shocks come from the demand side of the economy, then the filtering techniques will pinpoint both the cyclical and trend components. However, if shocks are supply-driven, their effect is expected to be permanent, making any trend-cycle filtering approach deceptive.

3. Methodologies to Obtain Cyclically Adjusted Balance

3.1 Aggregated vs. Disaggregated Approach

The range of methodologies for obtaining the CAB or SB can be resumed to essentially three possibilities. The first, was developed by Blanchard (1990) and it involves estimating cyclically adjusted measures of revenues and expenditures directly from regressions. Later applications of this first approach rely on structural Vector Auto Regressions (VARs) (Dalsgaard and de Serres 1999) and unobserved component models (Camba-Mendez and Lamo 2002).

From now, we will apply Blanchard's approach. We can normally group the different methodologies into either the aggregated or the disaggregated approach. The European Commission (EC) and the Organisation for Economic Co-Operation and Development (OECD) respectively apply these two approaches for the cyclical adjustment of government budget balances.

The EC's aggregate approach is based on the response of government expenditure and revenue to the output gap. The cyclical component of the budget balance is then obtained as the product of the output gap and a parameter reflecting the automatic reaction of the government balance to its size. At some moment in time, the IMF also applied this aggregate method (Fedelino et al. 2009). The big advantage of this aggregated approach is that it is a rather simple exercise with minimal data requirements that provides a good basis for cross-economy comparisons. The disadvantage is that it can produce accurate results only if the major fiscal aggregates behave broadly similarly with respect to the output gap and revenues' composition hardly change.

The OECD applies what is known as the disaggregated approach which consists in obtaining estimates of the elasticities of the main components of the budget with respect to the cycle in their relevant tax bases (Bouthevillain et al. 2001). The OECD's approach main advantage is that it explicitly allows the identification of such composition effects, and it enables a more accurate estimate of the underlying fiscal position. Hence, this approach offers more stability and better insights into the cyclical response of various budgetary items, in other words, insights into the composition of automatic stabilizers. Understanding of the different taxes' cyclical sensitivities can also help in evaluating the impact of an economic deceleration on sub-national public finances if taxes are subject to revenue sharing (Bornhorst et al. 2011). The main disadvantage of this disaggregated approach is that it is more data-intensive which can pose a problem for larger cross-sectional samples.

Which Approach to Follow?

Cyclically adjusted fiscal variables computed using the aggregated approach will be similar to those obtained by weighted-averaging disaggregated adjustments of revenue and expenditure items, if at least two conditions are met:

- The composition of expenditures and revenues area kept roughly unchanged. The aggregate method is most effective when there are no significant variations in the cyclical patterns of major tax or spending categories.
- Elasticities for individual budgetary items area kept roughly unchanged. However, alterations in tax policies or adjustments to the social benefit system can impact elasticities, subsequently influencing the sensitivity of fiscal variables to economic cycles (Bornhorst et al. 2011).

Final results from both approaches can differ, however, even when the above-mentioned conditions are verified.

Mutual to either approach is the mathematical stepwise sequencing. A cyclical component of the budget balance, "CC", is first estimated and subsequently subtracted from the nominal budget balance (BB) to get the CAB, so that:

$$CAB_i = BB_i - CC_i \tag{1}$$

where all variables are expressed in percent of GDP (Bornhorst et al. 2011).⁷

⁷ In theory, it is conceptually more accurate to use potential GDP instead of nominal GDP. For instance, changes in the expenditure ratio may occur simply due to fluctuations in nominal GDP, even if the actual spending levels remain

The estimation of the cyclical component CC requires two inputs:

- a measure of the cyclical position of the economy, which is generally measured by the output gap, measure of an economy's cyclical position defined as the distance between actual and potential output (Section 3.1); and
- (ii) a measure of the link between the cycle and the components of the budget, summarized by elasticity parameters representing the percentage change in budgetary items associated with percentage changes in the level of economic activity.⁸ On this aspect of elasticities, some researchers use those provided by others (e.g., Girouard and André 2005) or estimate their own (Section 3.2).

The cyclically adjusted budget balance (CAB) is derived as:

$$CAB_i = BB_i - \varepsilon. OG_i \tag{2}$$

where ε the overall budgetary sensitivity parameter and OG_i is the output gap.

In practice and mathematically equivalent, one way to obtain a measure of the CAB is to compute it as a function of cyclically adjusted revenue (R_i^{CA}) and cyclically adjusted expenditures (G_i^{CA}):

$$CAB_i = R_i^{CA} - G_i^{CA} \tag{3}$$

constant, which wouldn't be the case when ratios are calculated in relation to potential GDP. Although various methods exist for calculating potential GDP and output gaps, they come with several challenges, as discussed in Section 3.1. Generally, potential GDP is a less readily understood concept compared to nominal GDP and is seldom utilized by policymakers and the general public. This is evident in how fiscal analysis typically relies on ratios involving nominal GDP. Consequently, expressing deviations of headline deficits (and fiscal variables) as a percentage of potential GDP may not resonate well with government authorities and the public. Therefore, there is a trade-off between analytical precision (when using potential GDP) and the convenience of commonly used indicators (when using nominal GDP) (Fedelino et al. 2009).

⁸ Discussions about the estimation of tax elasticities can be found in Bouthevillain et al. (2001), van den Noord (2002), Girouard and André (2005), and Wolswijk (2007).

Cyclically adjusted revenue can be calculated by modifying actual revenue figures to account for the impact of the gap between potential and actual output, where the revenue elasticity determines the magnitude of the cyclical impact:

$$R^{CA} = r \left(\frac{Y_*}{Y}\right)^{\rho_{R,Y}} = r(0G - 1)^{-(\rho_{R,Y})}$$
(4)

where *r* denotes the share of revenues in GDP, $\frac{Y*}{Y}$ denotes the output gap defined as the ratio of potential (Y*) to actual GDP (Y). This can relate directly to the more commonly used expression for the output gap, the percentage deviation of actual from potential GDP $(OG = \frac{Y-Y*}{Y*})$ as follows: $\frac{Y*}{Y} = \frac{1}{OG-1}$. Economically, with a higher than one revenue elasticity $(\rho_{R,Y} > 1)$, each percentage increase in the output gap leads to a larger than one percentage change in revenues (Bornhorst et al. 2011).

Analogously, cyclically adjusted expenditures are computed as:

$$G^{CA} = g \left(\frac{Y_*}{Y}\right)^{\rho_{G,Y}} = g(0G-1)^{-(\rho_{G,Y})}$$
 (5)

where g denotes the share of expenditures in GDP.

So, in effect, equation (3) can be rewritten as

$$CAB_i = r(0G - 1)^{-(\rho_{R,Y})} - g(0G - 1)^{-(\rho_{G,Y})}$$
(6)

As budgetary variables are typically expressed in percent of GDP, the elasticities of revenue and expenditure items $\rho_{R,Y}$ and $\rho_{G,Y}$ respectively, are translated into sensitivity parameters in the following way:

$$\varepsilon_R = \rho_{R,Y} \cdot \frac{R}{Y}; \varepsilon_G = \rho_{G,Y} \cdot \frac{G}{Y}$$
(7)

such that the difference $\varepsilon_R - \varepsilon_G$ yields the overall budgetary sensitivity parameter ε used in the equation (2).

Table 1 shows a sample of OECD economies' aggregate budgetary elasticities parameters retrieved from Larch and Turrini (2009).

Table 1: Budgetary Sensitivity Parameters							
Economy	Revenue	Expenditure	Budget	Economy	Revenue	Expenditure	Budget
			Balance				Balance
Belgium	0.47	-0.07	0.54	Hungary	0.45	-0.01	0.46
Bulgaria	0.35	-0.01	0.36	Malta	0.35	-0.01	0.36
Czech Republic	0.36	-0.01	0.37	The Netherlands	0.39	-0.17	0.55
Denmark	0.50	-0.15	0.65	Austria	0.43	-0.04	0.47
Germany	0.40	-0.11	0.51	Poland	0.33	-0.06	0.40
Estonia	0.29	-0.01	0.30	Portugal	0.41	-0.04	0.45
Greece	0.42	-0.01	0.43	Romania	0.28	-0.02	0.30
Spain	0.38	-0.05	0.43	Slovenia	0.42	-0.05	0.47
France	0.44	-0.06	0.49	Slovak Republic	0.27	-0.02	0.29
Ireland	0.36	-0.05	0.40	Finland	0.41	-0.09	0.50
Italy	0.49	-0.02	0.50	Sweden	0.48	-0.10	0.58
Cyprus	0.39	-0.01	0.39	United Kingdom	0.40	-0.02	0.42
Latvia	0.26	-0.02	0.28				
Lithuania	0.26	-0.01	0.27	Euro area	0.42	-0.06	0.48
Luxembourg	0.48	-0.01	0.49	EU27	0.39	-0.04	0.43

Source: Larch and Turrini (2009).

The disaggregated approach finetunes the overall previous sequence of steps by further decomposing the two main budgetary items of revenues and expenditures and estimating individual revenue elasticities. When doing so, one needs to take a stance on revenue or expenditure items that may not require cyclical adjustment. This means that only a subset of revenue components is adjusted, those typically being personal income taxes, corporate income taxes, indirect taxes or value-added taxes and social security contributions. For expenditure, some rely on cyclical adjustment of only current primary expenditures, therefore, excluding interest payments and capital expenditure).⁹ Others simply focus on one item of current primary expenditures, the unemployment benefits.

⁹ Interest expenses may display cyclicality in tandem with fiscal deficits, resulting in increased (decreased) borrowing needs when there is a positive (negative) output gap. This, in turn, can lead to fluctuations in the interest costs incurred. Countercyclical shifts in interest rates have the potential to offset the cyclical nature of borrowing requirements, potentially resulting in a minimal net impact, if any, as suggested by Farrington et al. (2008).

However, they normally account for a small proportion of total or primary spending in most economies (if at all).

Mathematically, this version of the CAB can be expressed as:

$$CAB = \left[\left(\sum_{i=1}^{N} R_i^{CA} \right) - G_U^{CA} + R^{NCA} - G^{NCA} \right]$$
(8)

where R_i^{CA} is the cyclically adjusted component i of revenues, G_{cur}^{CA} is the cyclically adjusted unemployment-related expenditures, R^{NCA} and G^{NCA} denote the non-cyclically adjusted revenue and expenditure components respectively.

For cyclically adjusted revenues, the new $\rho_{R,Y}$ can be obtained as:

$$\rho_{R,Y} = \sum_{i=1}^{4} \rho_{R_i,Y} \frac{R_i}{R}$$
(9)

where $\rho_{R_i,Y}$ is the elasticity of each revenue component with respect to the output gap and $\frac{Ri}{R}$ is the share of each revenue component i in total revenues.

For cyclically adjusted expenditures, the new $\rho_{G,Y}$ can be obtained as:

$$\rho_{G,Y} = \rho_{G,U} \frac{G^U}{G} \tag{10}$$

where $\rho_{G,U}$ is the elasticity of unemployment benefits with respect to the output gap and $\frac{G^U}{G}$ is the share of unemployment benefits in current primary expenditures.

3.2 Potential Output

In addition to being a measure of aggregate supply in the economy, potential output is equally an estimate of trend GDP. GDP's long-term trend is normally upward as more resources—primarily labor and capital—become available and as technological change allows more-efficient use of these resources (Arnold 2009). Alternative measures of potential GDP were originally conceived to influence decisions about monetary and

fiscal policy. If an economy was found to be below potential then monetary or fiscal policy could be used to accelerate the growth of output without risking too much inflationary pressure. The concept of potential output is perceived as a tool to assist policymakers manage aggregate demand and hence keep a steady economic growth path. Different definitions are often used by alternative international organizations (Box 1).

Box 1: Alternative Definitions of Potential Output

European Commission. "Potential output constitutes the best composite indicator of the aggregate supply side capacity of an economy and of its scope for sustainable, non-inflationary, growth.... Potential growth constitutes a summary indicator of the economy's capacity to generate sustainable, non-inflationary, growth."^a

OECD. "Potential gross domestic product is defined in the OECD's Economic Outlook publication as the level of output that an economy can produce at a constant inflation rate. Although an economy can temporarily produce more than its potential level of output, that comes at the cost of rising inflation. Potential output depends on the capital stock, the potential labour force (which depends on demographic factors and on participation rates), the non-accelerating inflation rate of unemployment (NAIRU), and the level of labour efficiency."^b

ECB. "Potential output is a key economic concept as its evolution determines how fast an economy can grow in a sustainable way. It is typically thought of as the highest level of economic activity that can be sustained by means of the available technology and factors of production, in particular labour and capital, without creating inflationary pressure."^c

ECB. "Potential output is generally understood to provide an indication of the medium-to longterm level of sustainable real output in the economy and its rate of growth. It is also referred to as the level of output which can be achieved using available production factors without creating inflationary pressures."^d

IMF. "Potential output is the maximum amount of goods and services an economy can turn out when it is most efficient—that is, at full capacity. Often, potential output is referred to as the production capacity of the economy."^e

ECB = European Central Bank, IMF = International Monetary Fund, OECD = Organisation for Economic Co-operation and Development.

^a European Commission. 2014. "The Production Function Methodology for Calculating Potential Growth Rates & Output Gaps." Economic Papers 535. November.

^b OECD Stat. <u>https://stats.oecd.org/</u> (accessed 2022).

^c Andersson, Malin, Bela Szörfi, Máté Tóth, and Nico Zorell. 2018. "Potential Output in the Post-Crisis Period." ECB Economic Bulletin Issue 7/2018.

^e Jahan, Sarwat, and Ahmed Saber Mahmud. 2013. "What is the Output Gap?" *Finance & Developmen*t 50 (3). IMF. Source: European Parliament. 2020. "Potential Output Estimates and Their Role in the EU Fiscal Policy Surveillance."

There are multiple approaches to obtain estimates of trend GDP. In spite of substantial progress in the econometrics over the years, there is still not a generally accepted method in the economics profession to calculate potential output (Borio et al. 2013, 2014).¹⁰

To summarize, various approaches for estimating the output gap exist, with some based on statistical techniques and others on economic theory-informed models. Each method has its own set of strengths and weaknesses, as outlined in CBO (2004). However, there is a consensus that estimating the output gap in real-time poses significant challenges, as noted by Orphanides and Van Norden (2002). In the following discussion, we will undertake a historical analysis that looks backward in time, primarily focusing on univariate statistical methods. It's important to note that statistical methods are not entirely devoid of theoretical considerations, as highlighted by Bassanetti et al. (2010) and Oksanen (2018). Univariate statistical methods, in particular, rely on the fundamental theoretical assumption that actual output tends to fluctuate around its potential level. In other words, these methods are designed to ensure that actual output, by construction, only temporarily deviates from potential output.

Taking into account the criticisms directed at the widely used Hodrick-Prescott (HP) filter, such as its tendency to identify false cycles (Harvey and Jaeger 1993, Cogley and Nason 1995), a more recent filtering technique introduced by Hamilton (2018) is employed. Hamilton's critique of the Hodrick and Prescott filter revolves around three issues, namely spurious cycles, end-of-sample bias, and arbitrary assumptions concerning the smoothing parameter. As an alternative, Hamilton proposed a regression

¹⁰ For a review of different methods see Gibbs (1995), Giorno et al. (1995), Ladiray et al. (2003), Horn et al. (2007), Bassanetti et al. (2010), Anderton et al. (2014), and Alichi et al. (2017).

filter. However, it is worth noting that Schüler (2018) demonstrates that Hamilton's regression filter shares some of the shortcomings of the HP filter, indicating that it is not a universal solution. Schüler argues that the choice of the "correct" filter depends on the researcher's specific objectives, that is, what aspects of the data they aim to emphasize. To date, only a limited number of studies in addition to Schüler (2018) have empirically evaluated Hamilton's methodology.¹¹ Hodrick (2020) subsequently examined if Hamilton's (2018) alternative approach was actually better than the HP filter at extracting the cyclical component. Hodrick (2020) found that for time series in which there are distinct growth and cyclical components, the HP filter is better at isolating the cyclical component.

3.3 Budgetary Elasticities

To make it simple, many rely on Girouard and Andre's (2005) assumptions of zero expenditure elasticity and one revenue elasticity. In fact, for this group of economies elasticities computed for specific tax categories yield an aggregate revenue elasticity close to 1 (European Commission 2005). Regarding the zero-elasticity assumption on expenditure (meaning that the cyclically adjusted expenditure is equal to actual expenditure, $G^{CA} = g$), this is justified economically because government expenditure is often viewed as discretionary in its entirety, and thus independent from the business cycle. Fedelino et al. (2009), for instance, assumed no adjustment on the expenditure side. While this may be a reasonably good approximation, in practice, some expenditure

¹¹ In the context of New Zealand, Callaghan et al. (2018) employed both the HP filter and Hamilton's (2018) method to calculate labor force participation gaps. Drehman and Yetman (2018) evaluated the effectiveness of a HP trend versus Hamilton's linear projection of the credit-to-GDP gap as an early warning indicator for financial crises. Phillips and Shi (2019) introduced an enhanced HP filter and conducted an assessment of its performance in comparison to Hamilton's approach.

items, such as unemployment benefits, exhibit a cyclical pattern. This method does not separate between the various revenue and expenditure items. However, the loss of accuracy may be acceptable in some cases according to these authors. As Sancak et al. (2010) demonstrate, in some economies, tax buoyancy tends to increase during expansions and go down during recessions. Consequently, in these economies the contribution form automatic stabilizers may be overstated if one/zero elasticities are used to estimate automatic stabilizers.

Against this background, economy-specific elasticities for overall revenue and expenditure should be used whenever possible, either by relying on pre-existing studies or by estimating them in a regression setting.

What Does This Entail?¹²

Concerning revenue, the elasticity of individual revenue categories can be broken down into two components. The first is the output elasticity of tax revenue ($\rho_{R_i,Y}$), which results from multiplying the elasticity of tax revenues concerning the corresponding tax base (ρ_{R_i,B_i}), by the elasticity of the tax base in relation to the output gap ($\rho_{B_i,Y}$):

$$\rho_{R_{i},Y} = \rho_{R_{i},B_{i}} \times \rho_{B_{i},Y} \tag{11}$$

The first step is to assume or derive the value of the tax elasticity with respect to its base. Derivation requires, in addition to statutory tax rates, knowledge of the income distribution. But in practice, one might rely on results of existing studies.

The second step involves an econometric process where we estimate how sensitive the relevant tax bases are to changes in the output gap. This estimation

¹² This section draws heavily from Bornhorst, Dobrescu, Fedelino, Gottschalk, and Nakata (2011).

necessitates the definition of macroeconomic indicators that act as proxies for these tax bases. For instance, wage bills are often used as a proxy for income taxes and social security contributions, corporate profits are employed as a measure of the tax base for corporate income taxes, and private consumption is the basis for indirect taxes. Once these two elasticities are determined, we can then compute the tax revenue elasticities in response to changes in the output gap.

Girouard and Andre (2005) present a table (see Table 2 below) with typical tax elasticities. The elasticities of revenue components concerning changes in the output gap are usually greater than one for income taxes, which is indicative of the progressive nature of many income tax systems. They tend to hover around one for indirect taxes, reflecting the typically uniform indirect (VAT) tax rates. In the case of social security contributions, these elasticities are somewhat lower than one.

	Table 2: 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 tax	1.5–2.0	0.6–0.9	1.0–1.7	
Corporate income tax	1.0	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 Andre (2005).

Regarding expenditures, it's possible to break down the elasticities of current expenditure categories into two components. Current spending, especially for items like unemployment benefits, is more likely to exhibit cyclical behavior due to the nature of the benefit system. In contrast, nominal spending on other items such as public sector wages and consumption of goods and services is likely to be largely unaffected by the business cycle, requiring no adjustment (Bornhorst et al. 2011). The output elasticity of expenditures ($\rho_{G_{cur},Y}$) is then determined by multiplying the elasticity of current expenditures ($\rho_{G_{cur},V}$) concerning its base, which could be unemployment, by the elasticity of that base concerning changes in the output gap ($\rho_{U,Y}$):

$$\rho_{G_{cur},Y} = \rho_{G_{cur},U} \times \rho_{U,Y} \tag{11}$$

Similar to revenues, the elasticities of expenditure concerning their respective bases can either be assumed or derived. In equation (11), if we are considering a specific expenditure category, such as unemployment benefits alone, it may be reasonable to assume a proportional relationship with its base, which in this case is unemployment, resulting in an elasticity of 1. Consequently, the output elasticity of that particular expenditure category is determined by the elasticity of unemployment concerning changes in the output gap. In previous research, due to a lack of additional data, the Okun's method has been employed for this purpose. The elasticity of the unemployment rate in relation to changes in output is essentially the reciprocal of the Okun coefficient. Giorno et al. (1995) and Bouthevillain et al. (2001) adjusted expenditure to account for cyclical effects using an average elasticity of -0.2.

Box 2: Estimating Budgetary Elasticities and the Okun's Coefficient

All these budgetary-output elasticities can be estimated in a regression setting. Elasticities represent the percentage shift in one variable, denoted as X, in response to a one-percentage-point alteration in another variable, Y. A commonly employed method for calculating the elasticity of a time series, X, in relation to a proxy for economic activity, denoted as Y, involves estimating the following equation:

 $\Delta \log (X_t) = a + \rho_{X,Y} \times \Delta \log(Y_t) + \varepsilon$

where Δ is a first difference operator. More specifically, the left-hand-side dependent variable should be expressed in real terms (that is, revenues or expenditures deflated by the GDP deflator) and the right-hand-side key regressor should be real GDP growth (that is, the first difference of the log of real GDP).

The Okun's Law assumes a negative relationship between cyclical fluctuations in GDP and the unemployment rate. Shocks to the economy are assumed to lead GDP to fluctuate around its potential; this, in turn, causes firms to hire and fire workers, changing the unemployment rate in the opposite direction. The estimation of the Okun coefficient is needed in the disaggregated approach for the expenditure side elasticity. Ball et al. (2019) suggest estimating a "changes" version of the original "cyclical" Okun's law, as a relationship between changes in the unemployment rate (u) and the growth rate of output:

$$\Delta u_t = \alpha + \beta \Delta Y_t + \varepsilon_t$$

Our coefficient of interest is β which gives how much a one percentage point increase in output growth translates into a reduction in the unemployment rate. Furceri et al. (2020) estimate an average Okun coefficient in advanced economies of -0.4 while for developing economies it is equal to -0.2.

For the list of Asian Development Bank members, Appendix 2 shows the estimated economy-specific elasticities for those pairs of growth and unemployment rate with at least 15 continuous observations. Coefficients are estimated by ordinary least squares (OLS). For those that came out statistically significant, they vary between -0.02 in Azerbaijan and -0.19 in Fiji with an average of -0.12.

GDP = gross domestic product. Source: Jalles (2019) and Furceri et al. (2020).

4. The Role of Asset and Commodity Cycles

Standard cyclical adjustments can be accompanied with an adjustment—when justified for significant changes in asset or commodity prices (Bornhorst et al. 2011):

- Commodity prices or terms of trade adjustment. In cases where government budgets depend on income generated by commodity exports or are significantly influenced by fluctuations in the terms of trade, it may be beneficial to make adjustments for abrupt shifts in these prices in order to reveal the true fiscal situation beneath.
- Asset price adjustment. The fiscal situation at its core can also be influenced by asset prices, particularly those of real estate and stocks. As demonstrated by Farrington et al. (2008), a sustained 10% rise in asset and housing prices resulted in an annual increase in cyclically adjusted tax revenues ranging from 0.1% to 0.4% of GDP.

How to address empirically the above issues? As with the cyclical adjustment, both aggregate and disaggregate approaches can be used. In what follows, the former will be discussed and employed. Basically, the approach consists in adding a separate term for the deviation of asset prices or terms of trade from their benchmark level, denoted as asset price gap (A^*/A) or terms of trade gap (T^*/T):

$$R^{CA,A} = r \left(\frac{Y*}{Y}\right)^{\rho_{R,Y}} \left(\frac{A*}{A}\right)^{\rho_{R,A}}$$
(12a)

$$R^{CA,A,T} = r \left(\frac{Y*}{Y}\right)^{\rho_{R,Y}} \left(\frac{A*}{A}\right)^{\rho_{R,A}} \left(\frac{T*}{T}\right)^{\rho_{R,T}}$$
(12b)

where $R^{CA,A}$ and $R^{CA,A,T}$ stand for revenues adjusted for the output and asset price gaps and the output, asset prices, and terms of trade gaps, respectively. If the elasticities of revenues with respect to asset prices or terms of trade is $\text{zero}\rho_{R,A} = 0$ or $\rho_{R,T} = 0$, the formulas in equations 12a and 12b go back to the original form; whereas, if the value is positive and significant then such variables affect structural revenues. An important benefit of using this augmented specification is its suitability for empirical testing, as it considers both direct and indirect consequences. A portion of the wealth effect, through its impact on output, is represented by $\left(\frac{Y*}{Y}\right)$, while the remaining portion is attributed to gaps in asset prices and/or terms of trade. It's worth noting that conducting a combined estimation of revenue elasticities is crucial to prevent double counting, as the $\rho_{R,Y}$ may already encompass some of these factors. This could potentially lead to excessive adjustments.

5. From Cyclically Adjusted Balance to Structural Budget Balance: One-offs

Headline fiscal balances often reflect large and non-recurrent fiscal operations ("oneoffs"). Common examples include tax amnesties, government sales of mobile phone licenses, debt assumptions, and lump-sum payments to the government in exchange for the transfer of employees' pension obligations. Over the last decades, one-offs have led to sizeable, but transitory, shifts in fiscal balances, sometimes by more than several percentage points of GDP.¹³ Fiscal one-offs have undermined the accuracy and effectiveness of CAB as a measure of both fiscal sustainability and discretionary fiscal stance. A typically characteristic of one-offs is that their impacts on fiscal balances are disproportionally large (and at best, very limited impact on economic activity) in the year when the operations are conducted, with subsequent yearly impact either nil or far smaller.

¹³ European Commission (2004) surveys the phenomenon for the period 2000–2004 and shows that deficit decreasing one-off measures could reach 1% of GDP or more in a single year.

One-off measures and creative accounting are distinct, even though commonly joint practices (Koen and van der Nord 2005, Larch and Turrini 2009). Abstracting from the aspect of creative accounting, the increasing reliance on one-off measures led to a number of problems in the fiscal surveillance framework.

The straightforward solution of excluding exceptional items from the Current Account Balance (CAB) posed its own set of challenges. Besides revenues generated from the sale of Universal Mobile Telecommunications Service (UMTS) licenses, there were often differing opinions regarding the ongoing impact of these items. In practice, even with an agreed-upon definition, arriving at a consensus regarding what constitutes one-off and temporary measures was not consistently straightforward. The notion of structural balance was born as an augmentation of the CAB by adjusting it for a broader range of factors.¹⁴ That is, the structural balance complements the CAB in interpreting fiscal positions.

The European Commission (2006) suggests a set of common characteristics or fundamental principles to consider, although it doesn't provide an exhaustive list for identifying one-off and temporary measures:

i) Only measures that have a notable impact on the general government balance should be taken into account, with "notable" defined as exceeding one-tenth of GDP.

ii) The temporary, non-recurring nature of fiscal measures is evidenced by their effect on the general government budget balance over time. This

¹⁴ This view of the structural balance is reflected in the IMF's World Economic Outlook (Bornhorst et al. 2011) definition of the structural balance: "*Structural balance* [...] refers to the general government cyclically adjusted balance adjusted for non-structural 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."

means that the impact should be concentrated within a single year or a very limited number of years, without leading to a sustained alteration in the intertemporal budget position, and consequently, it should not have implications for fiscal sustainability (Journard et al 2008). This criterion applies to both windfall revenues (like concession receipts) and exceptional expenditure interventions (such as emergency relief in response to a natural disaster). The majority of telecommunications license sales fall under this category.

The European Commission (2006) suggests several common features or general principles to be considered, despite not allowing for an exhaustive identification of one-off and temporary measures:

- (i) Only measures having a significant impact on the general government balance should be considered, whereby significant is meant to be above the level of one decimal point of GDP.
- (ii) The temporary (non-recurrent) nature of fiscal measures is borne out by its impact on the general government budget balance in time; i.e., the impact is to be concentrated in a single year or a very limited number of years with no sustained change in the intertemporal budget position and hence no implications for fiscal sustainability (Joumard et al. 2008). This applies to both revenue windfalls (such as concessions receipts) and exceptional spending interventions (for example, emergency relief following a natural disaster). Most telecommunication licenses sales fall into this category (Bornhorst et al. 2011).

- (iii) One-offs and temporary measures are non-recurrent and should be evaluated in conjunction with other related fiscal measures.
- (iv) Deficit-increasing measures should not be considered as one-offs and not be excluded from the CAB. Note that measures initially intended to be temporary frequently become permanent.

How to Identify One-offs?

From a practical perspective, analysts need to pinpoint one-offs for each economy to compute (and update) relevant data series. This highlights, at a minimum, three potential issues: (i) definition of criteria for identification of these one-offs, (ii) availability of information, and (iii) degree of complexity.

• Criteria for identification. There is a large consensus for considering some operations as one-offs. However, the list remains open and there is no precise definition of what represents a one-off. Hence, the identification of one-offs may depend on judgement calls, posing risks for cross-economy consistency. Furthermore, to make the process feasible in practice, it would be necessary to establish a threshold below which one-off items would not be subject to adjustment, such as a percentage of GDP. Setting such a threshold inevitably entails a certain level of subjectivity. In cases of uncertainty, it may be preferable not to exclude any items. Keeping the approach straightforward also enhances the comparability of treatment across various economies. It's important to note that discretionary fiscal stimulus measures related to crises should not be omitted from consideration. These measures have had an impact on domestic demand and are

likely to be challenging to reverse. Including them in fiscal balances would better align with the authorities' policy intentions (Bornhorst et al. 2011).

- Information availability. Having details about the type and scale of fiscal activities can assist in recognizing one-off measures. Nevertheless, the extent to which such information is accessible varies significantly among economies, posing challenges in maintaining consistency in cross-economy and, potentially, over time. In certain economies, identifying one-off measures may require extensive data analysis and information gathering. Transparency involves the provision of more information, which fosters a more consistent analysis and facilitates well-informed decision-making.
- Complexity. The procedure would very likely be too complicated to be dealt with on a regular basis.

Ultimately, an equilibrium is needed between no adjustment and over-adjustment for one-offs. Box 3 provides some examples of one-offs, their identification, and discussion in real economy-work.

Box 3: Adjustment for One-off Fiscal Operations in Economy 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 economy 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 (e.g., 1 year). Earthquake and hurricane relief are common examples.

Clearance of budgetary arrears, including wages or suppliers. If these are exceptional operations, they could be treated as one-offs. However, if they have a recurrent nature (e.g., 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."

Source: Bornhorst et al. (2011).

Whenever a case-by-case approach is not possible, other more quantitative-based

methods can be employed.

A shortcut to the list of issues previously identified is that one-offs are largely included in capital transfers. In fact, a very limited number of one-offs are not recorded as capital transfers. Capital transfers can be both balance-improving or balancedeteriorating. Net capital transfers are typically very volatile but if one adjusts for one-offs, they often follow a smoother path. In other words, changes in net capital transfers can play a crucial role in identifying one-offs. More technically, for each economy, there is a level or a trend of net capital transfers considered as "normal" such that large departures of net capital transfers from this benchmark provides a good proxy for one-offs.

Summing up, from an operation point of view, calculating structural balances involves a set of interrelated steps (Figure 1).

- Step 1: Identifying and removing one-offs.
- Step 2: Evaluating the effect of the business cycle by relying on the aggregated or disaggregated approach.
- Step 3: Estimating the effects of other cycles or factors, including those associated with asset prices or commodity prices.

One can still obtain the CAB by omitting step 1.



Figure 1: Steps for Obtaining Structural Budget Balances

Source: Bornhorst et al. (2011).

6. Empirical Application: ADB Membership

6.1 Potential Output

To extract the cyclical and trend components for a nonspecific variable x_t (denoted x_t^c and x_t^τ , respectively) where in our case $x_t = \{GDP_t\}$, we begin by employing the frequently used Hodrick-Prescott filter. This filter minimizes the following function:

$$\min_{\tau_t} \{ \sum_{t=1}^T (x_t - x_t^{\tau})^2 + \lambda \sum_{t=1}^T [(x_t^{\tau} - x_{t-1}^{\tau}) - (x_{t-1}^{\tau} - x_{t-2}^{\tau})]^2 \}$$
(13)

where λ is the smoothing parameter. The larger the value of λ , the bigger is the penalty on variations of the trend's growth rate. Hodrick and Prescott suggest 100 or 1,600 as a value for λ for annual or quarterly data, respectively. Ravn and Uhlig (2002) argue that λ should equal 6.25 $\left(\frac{1,600}{4^4}\right)$ for annual data and 129,600 (1,600 × 3⁴) for monthly data.

For Hamilton (2018), we estimate:

$$x_{t+h} = \gamma_0 + \sum_{j=0}^{\kappa} \gamma_j + x_{t-j} + u_{t+h}$$
(14)

where $x_t = x_t^{\tau} + x_t^{c}$. The non-stationary part of the regression provides the cyclical component:

$$x^c{}_t = \hat{u}_t \tag{15}$$

while the trend is given by

$$x^{\tau}_{t} = \hat{\gamma}_{0} + \sum_{j=0}^{k} \hat{\gamma}_{j} + x_{t-h-j}$$
(16)

Hamilton (2018) claimed that h and k should be chosen such that the residuals obtained from equation (15) are stationary and suggested that, for broader processes, the fourth differences of a series are stationary. We chose h = 2 and k = 3. Hamilton's (2018) better alternative is, in essence, to use the regression of a variable at date t on the four most recent values as of date t-h since this would achieve "... all the objectives sought by users of the HP filter with none of its drawbacks." (p. 831). In particular, this alternative "... can isolate a stationary component from any I(4) series, preserves the underlying dynamic relations, and consistently estimates well-defined population characteristics for a broad class of possible data-generating processes." (pp. 839–840). Equations (14), (15), and (16) are estimated using ordinary least squares (OLS).

Figure 2 shows for a selected set of ADB member economies the cyclical decomposition of real GDP, that is, the output gap expressed—as common in the

literature—in percent of potential or trend GDP.¹⁵ Evidence seems to suggest that the HP is smoother than the Hamilton-resulting gaps, that is, booms and busts are less pronounced. In the case of the end-points, this is more relevant in the case of HP due to its known limitations and results would imply a more favorable output gap than that obtained using instead the Hamilton approach.

Figure 2: Comparing Output Gap between HP and Hamilton in Selected Member Economies



ADB = Asian Development Bank, GDP = gross domestic product, HP = Hodrick-Prescott. Note: HP filter with lambda=100 and Hamilton filter-based decompositions. Output gaps expressed in percent of respective potential GDP. Source: Author.

Figure 3 plots the potential GDP in national currencies for the same set of selected economies for a shorter period (the last 10 years) for visually better inspect differences.

¹⁵ The reason behind the selection of these four economies relates with representativeness: two are from Southeast Asia and two are from South Asia. Also, size-wise they do not represent small island states as data quality is typically scarcer and poorer and climate-related vulnerabilities makes them unique.

At the end of the period, the Hamilton-based potential GDP is always below that coming

from the HP decomposition.



ADB = Asian Development Bank, GDP = gross domestic product, HP = Hodrick-Prescott. Note: HP filter with lambda=100 and Hamilton filter-based decompositions. Source: Author.

6.2 Budget Elasticities

6.2.1 Output

The primary challenge in calculating measures like the Current Account Balance (CAB), Cyclically Adjusted Primary Balance (CAPB), or the Structural Balance (SB) lies in determining the appropriate fiscal elasticities. A straightforward and simplistic approach would be to adopt Girouard and André's (2005) convention, which assigns an elasticity of one to revenues and an elasticity of zero to expenditures, as previously discussed for the reasons provided.

For the ADB sample of members—Appendix 1 has the complete list—it is likely that the strength of the expenditure side of the budget to react to the economic cycle is small. Specifically, by examining IMF Government Financial Statistics data pertaining to unemployment-related expenses as a percentage of GDP, we can discern that across 17 economies with data spanning the most recent 5-year period (2015-2019, intentionally excluding the years impacted by COVID-19), this figure ranges from 0% (in several economies) to 1.9% of GDP (in Thailand). On average, it stands at 0.36%, in stark contrast to the average current government expenditure, which amounts to 14.85% of GDP. Figure 4 shows the economy-specific values. Additionally, one can estimate the aggregate expenditure elasticity with respect to a proxy of economic activity as detailed in Box 2. Doing so for a sample of 38 ADB member economies with available data yields the coefficients displayed in Figure 5. Elasticities vary from 0.809 (in Myanmar¹⁶) to 2.422 (in Timor-Leste) with an average value of 1.23. The majority of the members have an elasticity of zero (27 out of 38 economies). Against this evidence, it seems very reasonable to assume then for this sample of economies, at least as a starting point for our exercises, a budgetary spending elasticity of zero.

¹⁶ Effective 1 February 2021, ADB placed a temporary hold on sovereign project disbursements and new contracts in Myanmar.

Figure 4: Unemployment-related Benefits, Member Economies with Available Data: Average, 2015–2019



ADB = Asian Development Bank, GDP = gross domestic product, IMF = International Monetary Fund. Note: ADB placed on hold its regular assistance in Afghanistan effective 15 August 2021. Effective 1 February 2021, ADB placed a temporary hold on sovereign project disbursements and new contracts in Myanmar.

Source: IMF Government Financial Statistics.



Figure 5. Total Expenditure to Output Elasticity Coefficients of Member Economies

ADB = Asian Development Bank

Notes: OLS estimation of the change in real total expenditure revenues against real GDP growth. Only economies with at least 15 observations for real total government revenues were considered. Economies with no bars denote insignificant coefficient estimates (replaced by zero). ADB placed on hold its regular assistance in Afghanistan effective 15 August 2021. Effective 1 February 2021, ADB placed a temporary hold on sovereign project disbursements and new contracts in Myanmar. Source: Author.

Now, regarding the revenue side, one can estimate the aggregate revenue elasticity with respect to a proxy of economic activity as detailed in Box 2. Doing so for a sample of 38 ADB member economies with available data yields the coefficients displayed in Figure 6. Elasticities vary from 0.55 (in Papua New Guinea) to 2.5 (in Kazakhstan) with an average value of 1.6. The majority of the economies have an elasticity relatively close to 1 from above.



Figure 6: Total Revenues to Output Elasticity Coefficients of Member Economies

ADB = Asian Development Bank.

Notes: OLS estimation of the change in real total government revenues against real GDP growth. Only economies with at least 15 observations for real total government revenues were considered. Economies with no bars denote insignificant coefficient estimates (replaced by zero). ADB placed on hold its regular assistance in Afghanistan effective 15 August 2021. Effective 1 February 2021, ADB placed a temporary hold on sovereign project disbursements and new contracts in Myanmar. Source: Author.

6.2.2 Asset Prices and Terms of Trade

Let us begin by plotting the time series for real housing prices (from Bank for International Settlements, BIS) and the real terms-of-trade-adjustment (from World Bank, World Development Indicators, WDI) for our sample of ADB members for which these series have at least 15 continuous observations. Figures 7 and 8.1 plot the log of each series together with the log of real GDP in the secondary right hand side (RHS) axis for comparison.¹⁷ Looking at Figure 7 for housing price dynamics, we observe that in some economies, both patterns seem to go relatively hand-in-hand (e.g., Malaysia and Singapore) while in others, they seem disjoint (e.g. Indonesia and Thailand).



ADB = Asian Development Bank, GDP = gross domestic product, In = natural logarithm. Source: Author.

¹⁷ According to the World Bank, the list of commodity exporters that are part of the ADB membership are: Brunei Darussalam, Myanmar, Indonesia, Timor-Leste, Solomon Islands, Fiji, Papua New Guinea, Armenia, Azerbaijan, Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan, Uzbekistan, Mongolia. Many of these are islands and others are economies for which there is no available data to conduct a serious analysis.



Figure 8.1: Real Terms-of-Trade Adjustment Prices and Real GDP (logs) Over Time of Member Economies

ADB = Asian Development Bank, GDP = gross domestic product, In=natural logarithm, TOT = terms of trade. Source: Author.

Now let us estimate jointly the elasticity of revenue accounting additionally for housing and terms-of-trade. Results in Table 3 seem to suggest that, while the coefficient on real GDP growth is positive and significant as one would expect from a revenue elasticity (even if different from those displayed in Figure 6 as the underlying specification is not the same), the growth of real housing prices does not seem to have an effect on revenues (all coefficients for the 6 economies for which we can estimate with some degree of strength are statistically insignificant). In Table 4, we expand the specification used in Table 3 to also include the real terms-of-trade-adjustment growth. Here, the common set dictates an even smaller sample of only four ADB member economies. Still, in general, the role of housing prices remains orthogonal to revenues in these economies and only in Indonesia it seems that terms-of-trade have a certain role to play. In particular, the coefficient is positive and significant, but in terms, the one from real GDP growth

changes from more than 1 in Figure 6 to a negative and large value in absolute terms.

This surely warrants caution so I would dismiss the relevance of either housing or terms

of trade in this case.

This evidence suggests—at least for these economies for which we have data—those equations (12a) and (12b) will simplify to the baseline cyclically adjusted revenues baseline equation.

Table 3: OLS Estimation of Revenue Elasticities Controlling for Real Housing Prices Growth for Member Economies						
Specification	(1)	(2)	(3)	(4)	(5)	(6)
Regressors			Republic			
Economies	PRC	Indonesia	of Korea	Malaysia	Singapore	Thailand
Real GDP	2.440***	2.607**	1.187***	0.891**	1.234***	1.703***
growth	(0.531)	(1.058)	(0.308)	(0.382)	(0.375)	(0.200)
Real Housing	-0.549	-0.199	-0.064	0.109	0.112	0.239
prices growth	(0.405)	(0.541)	(0.164)	(0.273)	(0.160)	(0.201)
Observations	16	19	26	31	23	26
R-squared	0.636	0.312	0.418	0.234	0.444	0.770

ADB = Asian Development Bank, GDP = gross domestic product, OLS = ordinary least squares, PRC= People's Republic of China.

Note: Constant omitted for reasons of parsimony. Standard error in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively. Source: Author.

		•		
Specification	(1)	(2)	(3)	(4)
Regressors		Republic of		
Economies	Indonesia	Korea	Singapore	Thailand
Real GDP growth	-3.933*	1.413**	0.801	1.669***
	(0.412)	(0.500)	(0.424)	(0.222)
Real Housing prices	-0.338*	-0.341	0.576	0.240
growth	(0.051)	(0.263)	(0.303)	(0.249)
Real ToT	0.099**	-0.023	0.010	0.006
adjustment growth	(0.007)	(0.024)	(0.015)	(0.006)
Observations	5	12	10	17
R-squared	0.998	0.517	0.739	0.830

Table 4: OLS Estimation of Revenue Elasticities Controlling for Real Housing Prices Growth and Real Terms-of-Trade Adjustment Growth for Member Economies

ADB = Asian Development Bank, GDP = gross domestic product, OLS = ordinary least squares, ToT = terms of trade.

Note: Constant omitted for reasons of parsimony. Standard error in parenthesis. *, **, *** denote statistical significance at the 10, 5 and 1 percent levels, respectively. Source: Author.

While following the evidence just obtained one would not need to use filtering techniques to obtain the asset price gap (A^*/A) or the terms of trade gap (T^*/T) (as the zero elasticity exponents in equations 12a and 12b would render these to be one), we can still plot the cyclical component of each against that of real GDP (obtained using the HP filter). Figure 8 shows the results and exemplifies that, looking at Figure 8.1 for housing, in cases such as Thailand, both GDP and housing price cycles seem to correlate positively, while in others such as Singapore, they are mostly orthogonal to one another. In Figure 8.2 for terms-of-trade, the evidence seems to be of asynchronism between the two cycles. All in all, and noting that due to data limitations, our quest could not be exhaustive for the ADB membership, results suggest that perhaps asset and commodity cycles are not that important to account for when constructing the CAB or SB. In Sections 6.3 and beyond, such aspects will not be taken into consideration.

Figure 8.2: Comparing HP–Output Gap with Housing Price and Terms of Trade Adjustment Gaps in Selected Member Economies



ADB = Asian Development Bank, GDP = gross domestic product, HP = Hodrick-Prescott. Note: HP filter with lambda=100. Gaps expressed in percent of respective trends. Source: Author.

6.3 CAB and CAPB

In this section we will provide estimates of the CAB and CAPB, using the aggregated approach, that result from the following assumptions:¹⁸

- (1) Girouard and Andre (2005) "0-1" elasticities for expenditures and revenues respectively. This means that effectively, we multiply government revenues by the factor [1/(1+OG/100)] to get REV_{adj} (adjusted government revenues), with OG denoting the output gap computed using the HP or Hamilton filters. Mathematically, we have: $CAB = REV_{adj} - EXP$ or $CAPB = REV_{adj} - PEXP$, with EXP and PEXP denoting expenditure and primary expenditure, respectively.
- (2) Elasticity of zero for expenditures, and estimated elasticities for revenues for those economies with significant coefficients, otherwise the value of unitary elasticity is assumed.
- (3) Estimates elasticities for expenditures and revenues for those economies with significant coefficients, otherwise Girouard and Andre (2005) "0-1" elasticities are assumed.
- (4) Elasticity of zero for expenditures and time-varying revenue elasticities. We generalize the first equation in Box 2 by adding the assumption that the regression coefficients can vary as time elapses. A rolling window of 10 years is used.

¹⁸ Since at the end of the exercise the overwhelming majority of evidence will point to an absence of the need to consider other than the simple Girouard-Andre's "0-1" elasticity assumption, the disaggregated approach to compute the CAB (SB) would render itself unnecessary and, in fact, useless.

1

Starting with (1), we obtain the CAB (not shown) and the CAPB depicted in Figure 9.1. In my view, showing the CAPB is more insightful than the CAB, also for the purpose of assessing the fiscal stance (as contractionary or expansionary, net of interest payment influence). The CAPB is expressed in percent of nominal GDP to better compare with the primary balance (PB), also expressed in the same manner. We can observe that both CAPBs are similar to one another. However, in general, the CAPB based on the Hamilton filter takes lower values in absolute terms and departs more from the PB and CAPB based on the HP filter. This varies from economy to economy, being truer for Indonesia and the Philippines than for Bangladesh or Pakistan. If one uses the HP-based CAPB for policy purposes in Indonesia and the Philippines when in reality the true depiction of the state of the fiscal stance is given instead by the Hamilton-based CAPB, fiscal retrenchment policies will be lighter than would be needed/required. This suggests that HP-based CAPB would paint a "rosier" fiscal stance (vis-à-vis that stemming from the Hamilton based CAPB) and this would have an influence in the policies and fiscal strategies that would unfold. From a political economy point of view, the HP-based CAPB would perhaps be preferred as it would entail less a stringent fiscal adjustment which is typically hard to sell to the government's constituents. In sum, this should highlight the need to be cautious when employing the HP filter and jumping at (fiscal) policy implications from it.



Figure 9.1: CAPB (% GDP) in Selected Member Economies (Alternative Filters)

ADB = Asian Development Bank, CAPB = cyclically adjusted primary balance, GDP = gross domestic product, HP = Hodrick-Prescott, PB = primary balance. Source: Author.

In Figure 9.2, we plot the yearly change in the CAPB, which can more clearly give us an indication of the expanding and contracting years from a fiscal standpoint. The correlation between the two filtering approaches is positive and high in the economies depicted. Table 5 complements that information by identifying the consolidation years in both approaches, HP and Hamilton.



Figure 9.2: First Differenced CAPB (% GDP) with "0-1" Elasticities in Selected ADB Economies (alternative filters)

ADB = Asian Development Bank, CAPB cyclically adjusted primary balance, GDP = gross domestic product, HP = Hodrick-Prescott. Source: Author.

Table 5: Consolidation Years in Selected Member Economies
Based on Changes in the CAPB

Approach	HP	Hamilton
Economy	Fiscal Consolidation Years	Fiscal Consolidation Years
	1991, 1993, 1999, 2002, 2003	1991, 1993, 1999, 2002, 2003,
Philippines	2006, 2007, 2009, 2010, 2012,	2006, 2007, 2009, 2010, 2012,
	2014, 2016, 2020	2014, 2016, 2020
	1994, 1995, 1998, 1999, 2001,	1994, 1995, 1996, 1998, 1999,
Indonasia	2002, 2004, 2005, 2006, 2008,	2001, 2002, 2004, 2005, 2006,
Indonesia	2011, 2014, 2016, 2017, 2018,	2008, 2010, 2011, 2014, 2016,
	2021	2017, 2018, 2021
	1994, 1997, 1998, 1999, 2000,	1994, 1997, 1998, 1999, 2000,
Pakistan	2001, 2003, 2009, 2013, 2014,	2001, 2003, 2009, 2014, 2016,
	2016, 2020, 2021	2020
	1990, 1991, 1992, 1993, 1994,	1990, 1991, 1992, 1993, 1996,
Bangladesh	1996, 2001, 2003, 2004, 2005,	1998, 2001, 2003, 2004, 2005,
	2006, 2008, 2011, 2013, 2014	2006, 2008, 2011, 2012, 2014

ADB = Asian Development Bank, CAPB = cyclically adjusted primary balance, GDP = gross domestic product, HP = Hodrick-Prescott.

Source: Author.

For completeness, the charts equivalent to Figure 9.1 for all individual ADB member economies—for which it is possible to obtain the CAPB—are available in Appendix 3 Figure A3.1. Underlying data is available upon request.

2

Turning to exercise (2), we now use the estimated revenue elasticities from Section 6.2.1 to obtain the CAPB. The result is shown in Figure 10. As only Indonesia and the Philippines have elasticities that are different (for Pakistan and Bangladesh, the assumption of unitary revenue elasticity is applied), only these two economies are shown. Compared to Figure 9.1 for the Philippines, the lines seem to be closer to one another, while in the case of Indonesia, this is true only for the post-GFC period.

Figure 10: CAPB (% GDP) with Estimated Revenue Elasticities in Selected ADB Member Economies (Alternative Filters)



ADB = Asian Development Bank, CAPB = cyclically adjusted primary balance, GDP = gross domestic product, HP = Hodrick-Prescott, OB = overall balance. Source: Author.

3

Regarding (3), instead of assuming a zero-expenditure elasticity, we estimated these economy-by-economy similarly to what we did for revenues, again recall Section 6.2.1. Results of these elasticities were shown in Figure 5 where missing bars denote

statistically insignificant coefficients. As previously noted, most economies are characterized by the zero-expenditure elasticity. That said, the new resulting CAPB for Bangladesh and Pakistan is shown in Figure 11 (note that now the cases of Indonesia and the Philippines are the reverse of (2); they have insignificant expenditure elasticities, which in effect would yield the result shown in Figure 10).

Figure 11: CAPB (% GDP) with Both Revenue and Expenditure Estimated Elasticities in Selected ADB Member Economies (Alternative Filters)



ADB = Asian Development Bank, CAPB = cyclically adjusted primary balance, GDP = gross domestic product, HP = Hodrick-Prescott, PB = primary balance. Source: Author.

4

Finally, for (4), we now return to a zero-expenditure elasticity but now revenue elasticities are estimated in a time-varying fashion for each economy. Results of these elasticities are shown in Figure 12 where we add the 90% confidence bands. For the Philippines, revenue elasticity has been mostly positive and significant over the 1990–2021 time

period. This pattern contrasts with the other three economies for which revenue elasticities have been positive but surrounded by larger uncertainty (with most of the years with confidence bands above and below the zero line, except Indonesia in the last decade). Hence, Indonesia, using a time-varying version of the elasticity coefficient would potentially underestimate the true historical cyclically adjusted revenue, which was positive and around 1 according to Figure 6. For Bangladesh and Pakistan static and time-varying evidence is consistent as Figure 6 also shows an insignificant coefficient estimate.

For completeness, the charts equivalent to Figure 12 for all individual ADB member economies are available in Appendix 3 Figure A3.2. Underlying data is available upon request.



ADB = Asian Development Bank. Source: Author.

Figure 13: CAPB (% GDP) with Time-varying Revenue Estimated Elasticities in Selected Member Economies (Alternative Filters)



ADB = Asian Development Bank, CAPB = cyclically adjusted primary balance, GDP = gross domestic product, HP = Hodrick-Prescott, PB = primary balance. Source: Author.

To conclude this section, we plot in Figure 14 the comparison of the Hamiltonbased CAPB against the PB for each of the four exercises and the four economies under scrutiny. We see that the CAPB versions that follow closest the primary balance are those from exercises (1) and (3). Exercise (4) with the time-varying revenue elasticities is the one giving the most different time profile and generally suggesting a worse fiscal position (the blue line tends to be below the other ones). Still within each economy there is dispersion among the four lines that is larger at the beginning (end) of the time period of Bangladesh (Pakistan and the Philippines). Hence, no one size fits all can be applied.



Figure 14: CAPB (% GDP) Comparison across the Four Exercises in Selected Member Economies (Hamilton Filter)

ADB = Asian Development Bank, CAPB = cyclically adjusted primary balance, GDP = gross domestic product, PB = primary balance.

Note: "PB" denotes the primary balance (% GDP). "CAPB_ham_i", for i=1,...,4, denotes the resulting Hamilton-based CAPB (% GDP) for exercises 1–4 described earlier in this section. Source: Author.

6.4 Estimating One-Offs

Decomposing net capital transfers into trend and cycle poses its practical problems. First, a net variable can take both positive and negative values that renders impossible the application of logarithm, which is a prior condition, as commonly used in the literature, to apply a statistical filter. That said, since most one-offs are operations that increase net transfers to improve the fiscal stance, we will focus on credits alone. This variable is transformed into real quantities using the GDP deflator, then the logarithm is computed and applied to a given filter. Out of the previous selection of economies, we need to pick a new set as the transfers gap in percent of GDP for the previous group is very small (below 0.1%, which is the value used to consider one-offs). In what follows, we look at Armenia, Bhutan, the Kyrgyz Republic, and Timor-Leste for more heterogeneity.¹⁹ The capital transfers (credit) gap (expressed in % of GDP) is shown in Figure 14 for these four economies. For completeness, the charts equivalent to Figure 15 for all individual ADB member economies for which there is data, are available in Appendix 3, Figure A3.3. Underlying data is available upon request.



Figure 15: Government Capital Transfers-Gap (% GDP) in Selected Member Economies, Alternative Filters, 2000–2021

Continued on the next page

¹⁹ Other eligible economies that have transfers gap in percent of GDP larger than 0.1 include mostly islands in the Pacific: Kiribati, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu.



ADB = Asian Development Bank, GDP = gross domestic product, HP = Hodrick-Prescott. Source: Author.

Table 6 identifies the years for which the change in the transfers (credit) gap is in the economy's top 90th percentile and at the same time, that gap is larger than 0.1% of GDP. Whether or not these years correspond to "true" one-offs, this is something to be confirmed by desk economists and local authorities using a more narrative-based approach. Appendix 4 provides the full list of ADB member economies with identified oneoff years computed using either the HP or Hamilton approaches.

Approach	HP	Hamilton		
Economy	Potential One-off Years	Potential One-off Years		
Armenia	2002, 2018	-		
Bhutan	2010, 2013	-		
Kyrgyz Republic	2002	2002, 2003		
Timor-Leste	2017, 2018	2009, 2011, 2018		

 Table 6: Years of Deficit Reducing One-Offs in Selected Member Economies

 Computed Using Cyclical Capital Transfers (Credit)

ADB = Asian Development Bank, GDP = gross domestic product, HP = Hodrick-Prescott. Note: Years at the top 90th percentile of the distribution of the change in capital transfers gap and with capital transfers gap larger than 0.1% of GDP. Source: Author.

7. Conclusion

This report aims to review the current discussions surrounding the estimation of reasonable proxies of discretionary fiscal stance by reviewing methods and practices. An empirical application to ADB's members is carried out but full results are available in the Appendixes.

The main takeaway is that there is no one way to adjust fiscal balances. We can conclude from the empirical exercises that there is no one-size fits all and desk sensibility and judgment is important in various degrees. The choice of the filter to decompose trends and cycles matters with a preference to avoid the outdated and problematic HP filter in favor of the Hamilton (2018) approach. Moreover, the take on how to adjust revenues and expenditures entering the CAB or SB is paramount. There is a plethora of choices to be made, from prior empirical estimation at the economy-specific level, to whether such analysis should be done in a static or time-varying fashion, to which subcomponents of revenues and expenditures are likely to fluctuate with the cycle or be orthogonal to it. Furthermore, if one thinks about one-off operations, then a more narrative-based approach can complement the ad hoc identification of large changes in cyclically adjusted government capital transfers. Finally, there is the discussion of other factors in addition to the cycle, such as asset and commodity prices, which includes changes in housing prices and terms of trade adjustments that can prove to be difficult to be reflected in a measure of the underlying fiscal position.

Ultimately, I would say that for the selected set of members looked at more closely, asset prices, commodity prices, and one-offs do not seem to be important. Moreover, as the government size is relatively small and stable in most economies, assuming a zero elasticity for this item seems appropriate. As for revenue elasticities, where some fine tuning with economy-specific elasticities can be made, the imposition of a unitary value for simplicity also seems appropriate in most contexts. But if prior economy-specific estimations of revenue elasticities are to be conducted, I would rather go with a static estimation in the aggregated or disaggregated approaches.

REFERENCES

- Abiad, Abdul, Davide Furceri, and Petia Topalova. 2016. "The Macro-economic Effects of Public Investment: Evidence from Advanced Economies." *Journal of Macroeconomics* 50: 224–40.
- Adarov, A., B. Clements, and J. Jalles. Forthcoming. "Growth Effects of Public Investment and Public Consumption: The Role of the Business Cycle, Fiscal Space and Efficiency." World Bank Working Paper.
- Afonso, Antonio, and João Tovar Jalles. 2014. "Assessing Fiscal Episodes." *Economic Modelling*, 37: 255–70.
- Alichi, Ali, Olivier Bizimana, Silvia Domit, Emilio Fernandez Corugedo, Douglas Laxton, Kadir Tanyeri, Hou Wang, and Fan Zhang. 2015. "Multivariate Filter Estimation of Potential Output for the Euro Area and the United States." IMF Working Paper No. 15/253. Washington, DC: International Monetary Fund (IMF).
- Alichi, Ali, Olivier Bizimana, Douglas Laxton, Kadir Tanyeri, Hou Wang, Jiaxiong Yao, and Fan Zhang. 2017. "Multivariate Filter Estimation of Potential Output for the United States." IMF Working Paper No. 2017/106. Washington, DC: International Monetary Fund (IMF).
- Andersson, Malin, Bela Szörfi, Máté Tóth, and Nico Zorell. 2018. "Potential Output in the Post-Crisis Period." ECB Economic Bulletin Issue 7/2018.
- Anderton, Robert, Ted Aranki, Alistair Dieppe, Catherine Elding, Stephan Haroutunian, Pascal Jacquinot, Valerie Jarvis, Vincent Labhard, Desislava Rusinova, and Béla Szörfi. 2014. "Potential Output from a Euro Area Perspective." Occasional Paper Series No. 156. Frankfurt: European Central Bank (ECB).
- Arnold, Robert W. 2009. "The Challenges of Estimating Potential Output in Real Time," Federal Reserve Bank of St. Louis Review. July/August 2009.
- Auerbach, Alan, and Daniel Feenberg. 2000. "The Significance of Federal Taxes as Automatic Stabilizers." *Journal of Economic Perspectives* 14 (3): 37–56.
- Auerbach, Alan, and Yuriy Gorodnichenko. 2013a. "Fiscal Multipliers in Recession and Expansion." In *Fiscal Policy After the Financial Crisis*, edited by Alberto Alesina, and Francesco Giavazzi, 63–98. Chicago: University of Chicago Press/National Bureau of Economic Research (NBER).
- _____. 2013b. "Measuring the Output Responses to Fiscal Policy." *American Economic Journal: Economic Policy* 4 (2): 1–27.
- Ball, Laurence, Davide Furceri, Daniel Leigh, and Prakash Loungani. 2019. "Does One Law Fit All? Cross-Country Evidence on Okun's Law." Open Economies Review 30: 841–74.

- Barro, Robert J. 1981. "Output Effects of Government Purchases." *Journal of Political Economy* 89 (6): 1086–121.
- Bassanetti, Antonio, Michele Caivano, and Alberto Locarno. 2010. "Modelling Italian Potential Output and the Output Gap." Economic Working Paper No. 771. Bank of Italy, Economic Research and International Relations Area.
- Batini, Nicoletta, Luc Eyraud, and Anke Weber. 2014. "A Simple Method to Compute Fiscal Multipliers." IMF Working Paper No. 2014/093. Washington, DC: IMF.
- Ben Zeev, Nadav, and Evi Pappa. 2015. "Chronicle of a War Foretold: The Macroeconomic Effects of Anticipated Defense Spending Shocks." *The Economic Journal* 127 (603): 1568–97.
- Blanchard, Olivier J., and Danny Quah. 1989. "The Dynamic Effects of Aggregate Demand and Supply Disturbances." *American Economic Review* 79 (4): 655–73.
- Blanchard, Olivier, Jean-Claude Chouraqui, Robert Hagemann, and Nicola Sartor.
 1990. "The Sustainability of Fiscal Policy: New Answers to an Old Question."
 OECD Economic Studies 15 (15). Paris: Organisation for Economic Co-operation and Development (OECD).
- Blanchard, Olivier, Giovanni Dell'Ariccia, and Paolo Mauro. 2010. "Rethinking Macroeconomic Policy." IMF Staff Position Note SPN/10/03. Washington, DC: IMF.
- Borio, Claudio, Piti Disyatat, and Mikael Juselius. 2013. "Rethinking Potential Output: Embedding Information about the Financial Cycles." BIS Working Papers 404. Bank for International Settlements (BIS).
- . 2014. "A Parsimonious Approach to Incorporating Economic Information in Measures of Potential Output." BIS Working Papers 442.
- Bornhorst, Fabian, Annalisa Fedelino, Jan Gottschalk, Gabriela Dobrescu. 2011. "When and How to Adjust Beyond the Business Cycle? A Guide to Structural Fiscal Balances." Technical Notes and Manuals 11/02. Washington, DC: IMF.
- Bouthevillain, Carine, Philippine Cour-Thimann, Gerrit Van den Dool, Pablo Hernandez de Cos, Geert Langenus, Matthias Mohr, Sandro Momigliano, and Mika Tujula. 2001. "Cyclically Adjusted Budget Balances: An Alternative Approach." ECB Working Paper No. 77. Frankfurt: ECB.
- Brown, E. Cary. 1956. "Fiscal Policy in the Thirties: A Reappraisal." *American Economic Review* 46 (5), 857–79.

- Callaghan, Michael, Jamie Culling, and Finn Robinson. 2018. "Ageing Is a Drag: Projecting Labour Force Participation in New Zealand." Reserve Bank of New Zealand Analytical Notes Series AN2018/10. Wellington: Reserve Bank of New Zealand.
- Camba-Mendez, Gonzalo, and Ana Lamo. 2002. "Short-Term Monitoring of Fiscal Policy Discipline." ECB Working Paper No. 152. Frankfurt: ECB.
- Clements, Benedict, Sanjeev Gupta, João Tovar Jalles, and Victor Mylonas. 2022. "Why Do Governments Cut Their Deficits? Lessons for High-Debt Countries in a Post-Pandemic World." Center for Global Development Working Paper No. 625. Washington, DC.
- Cogley, Timothy, and James M. Nason. 1995. "Effects of the Hodrick-Prescott Filter on Trend and Difference Stationary Time Series: Implication for Business Cycle Research." *Journal of Economic Dynamics and Control* 19 (1–2): 253–78.
- Congressional Budget Office (CBO). 2004. A Summary of Alternative Methods for Estimating Potential GDP. Background Paper.
- Cotis, Jean-Philippe, Bruno Crépon, Yannick L'Horty, and Bruno Méary. 1998. "Les Stabilisateurs Automatiques Sont-Ils Encore Efficaces? – Le Ca de la France dans les Années '90." *Revue d'économie Financière* 45: 95–118.
- Dalsgaard, Thomas, and Alain De Serres. 1999. "Estimating Prudent Budgetary Margins for 11 EU Countries: A Simulated SVAR Model Approach." OECD Economics Working Paper No. 216. Paris: OECD.
- Demiroglu, Ufuk, and Matthew Salomon. 2002. "Using Time- Series Models to Project Output over the Medium Term." CBO Working Paper 2002-1. Congressional Budget Office.
- Dos Reis Laura, Paolo Manasse, and Ugo Panizza. 2007. "Targeting the Structural Balance." Working Paper No. 598. Washington: IDB Research Department.
- Drehmann, Mathias, and James Yetman. 2018. "Why You Should Use the Hodrick-Prescott Filter—At Least To Generate Credit Gaps." BIS Working Paper No. 744.
- Dupasquier, Chantal, Alain Guay, and Pierre St-Amant. 1997. "A Comparison of Alternative Methodologies for Estimating Potential Output and the Output Gap." Working Paper 97-5. Ottawa: Bank of Canada.
- ECB. 2014. "The Structural Balance as an Indicator of the Underlying Fiscal Position." ECB Monthly Bulletin. September.
- Escolano, Julio. 2010. "A Practical Guide to Public Debt Dynamics, Fiscal Sustainability, and Cyclical Adjustment of Budgetary Aggregates." IMF Technical Note and Manuals 10/02.

- European Commission. 2006. Public Finances in EMU 2006. European Economy No. 3. Bruxelles.
 - . 2005. "New and Updated Budgetary Sensitivities for the EU Budgetary Surveillance." Information Note for the Economic and Policy Committee, ECFIN/B/6(2005) REP54508, September. Brussels.
- _____. 2004. "Public Finances in EMU–2004." European Economy No. 3. Brusells.
- European Parliament. 2020. "Potential Output Estimates and Their Role in the EU Fiscal Policy Surveillance."
- Farrington, S., J. Mc Donagh, C. Colebrook, and A. Gurney. 2008. "Public Finances and the Cycle." Treasury Economic Working Paper No. 5. Washington, DC: IMF.
- Fedelino, Annalisa, Anna Ivanova, and Mark A. Horton. 2009. "Computing Cyclically Adjusted Balances and Automatic Stabilizers." Technical Notes and Manuals 2009/05. Washington, DC: IMF.
- Forni, Mario, and Luca Gambetti. 2010. "Fiscal Foresight and the Effects of Government Spending." CEPR Press Discussion Paper No. 7840. Centre for Economic Policy Research (CEPR).
- Furceri, Davide, and Grace B. Li. 2017. "The Macroeconomic (and Distributional) Effects of Public Investment in Developing Economies." IMF Working Paper 2017/217. Washington, DC: IMF.
- Furceri, Davide, João Tovar Jalles, and Prakash Loungani. 2020. "On the Determinants of the Okun's Law: New Evidence from Time-Varying Estimates." *Comparative Economic Studies* 62 (4): 661–700.
- Furceri, Davide, and João Tovar Jalles. 2019. "Fiscal Counter-Cyclicality and Productive Investment: Evidence from Advanced Economies." *The B.E. Journal of Macroeconomics* 19 (1): 1–15.
- _____. 2018. "Determinants and Effects of Fiscal Counter-Cyclicality." *Ensayos Sobre Política Económica* 36 (85): 137–51.
- Giavazzi, Francesco, and Marco Pagano. 1996. "Non-Keynesian Effects of Fiscal Policy Changes: International Evidence and the Swedish Experience." *Swedish Economic Policy Review* 3: 69–103.
- Gibbs, D. 1995. "Potential Output: Concepts and Measurement." *Labour Market Bulletin* 1: 72–115.
- Giorno, Claude, Pete Richardson, Deborah Roseveare, and Paul van den Noord. 1995. "Estimating Potential Output, Output Gaps and Structural Budget Balances." OECD Economics Department Working Paper No. 152. Paris: OECD.

- Girouard, Nathalie, and Cristophe André. 2005. "Measuring Cyclically Adjusted Budget Balances for OECD Countries." OECD Economics Department Working Paper No. 434. Paris: OECD.
- Hamilton, James D. 2018. "Why You Should Never Use the Hodrick-Prescott Filter." *Review of Economics and Statistics* 100 (5): 831–43.
- Harvey, Andrew, and Albert Jaeger. 1993. "Detrending, Stylized Facts and the Business Cycle." *Journal of Applied Econometrics* 8: 231–47.
- Hodrick, Robert J. 2020. "An Exploration of Trend-Cycle Decomposition Methodologies in Simulated Data." NBER Working Paper 26750.
- Hodrick, Robert J., and Edward C. Prescott. 1997. "Post-War U.S. Business Cycles: An Empirical Investigation." *Journal of Money, Credit, and Banking* 29 (1): 1–16.
- . 1981. "Post-War U.S. Business Cycles: An Empirical Investigation." Discussion Papers 451. Northwestern University, Center for Mathematical Studies in Economics and Management Science.
- Horn, Gustav, Camille Logeay, and Silke Tober. 2007. "Methodological Issues of Medium-Term Macroeconomic Projections—The Case of Potential Output." IMK Studies No. 04-2007. Hans Boeckler Foundation, Macroeconomic Policy Institute.
- Jahan, Sarwat, and Ahmed Saber Mahmud. 2013. "What is the Output Gap?" Finance & Development 50 (3). Washington DC, IMF.
- Jalles, João Tovar. 2020. "A New Look into Fiscal Countercyclicality: Expectations, Shocks, and the Business Cycle." *FinanzArchiv*: *Public Finance Analysis* 76/3, 240-265.
- _____. 2019. "On the Time-Varying Relationship between Unemployment and Output: What shapes it?". Scottish Journal of Political Economy, Vol. 66(5), pp. 605-630.
- _____. 2018. "Fiscal Rules and Fiscal Counter-cyclicality." *Economics Letters* 170: 159–62.
- Joumard, Isabelle, Makoto Minegishi, Christophe Andre, Chantal Nicq, and Robert Price. 2008. "Accounting for 'One-off' Operations when Assessing Underlying Fiscal Positions." OECD Economics Department Working Paper No. 642. Paris: OECD.
- Koen, Vincent, and Paul van den Noord. 2005. "Fiscal Gimmickry in Europe: One-off Measures and Creative Accounting." OECD Economics Department Working Paper No. 417 Paris: OECD.

- Kuttner, Kenneth N. 1994. "Estimating Potential Output as a Latent Variable." *Journal of Business and Economic Statistics* 12: 361–68.
- Ladiray, Dominique, Gian Luigi Mazzi, and Fabio Sartori. 2003. "Statistical Methods for Potential Output Estimation and Cycle Extraction." Working Papers and Studies, European Commission Association.
- Larch, Martin, and Alessandro Turrini. 2009. "The Cyclically-Adjusted Budget Balance in EU Fiscal Policy Making: A Love at First Sight Turned Into a Mature Relationship." European Commission Economic Paper No. 374.
- Laxton, Douglas, and Robert Tetlow, 1992. "A Simple Multivariate Filter for the Measurement of Potential Output." Technical Report No. 59 Ottawa: Bank of Canada.
- Moriyama, Kenji, Milesi-Ferretti, Gian M. 2004. "Fiscal Adjustment in EU Countries: A Balance Sheet Approach." IMF Working Paper No. 2004/143. Washington, DC: IMF.
- Muller, Patrice, and Robert Price. 1984. "Public Sector Indebtedness and Long-Term Interest Rates." Paper presented at the World Bank-Brookings workshop.
- Oksanen, Heikki. 2018. "New Output Gap Estimates for Assessing Fiscal Policy with Lessons for Euro Area Reform." CESifo Working Paper No. 7287. Munich: Center for Economic Studies and ifo Institute (CESifo).
- Okun, Arthur M. 1962. "Potential GDP: Its Measurement and Significations," Cowles Foundation Paper 190, 1962 Proceedings of the Business and Economic Statistics Section of the American Statistical Association. Reprinted in Arthur M. Okun. 1970. *The Political Economy of Prosperity* 132–45. New York: Norton.
- Organisation for Economic Co-operation and Development (OECD). OECD Stat. <u>https://stats.oecd.org</u> (accessed 2022).
- Orphanides, Athanasios, and Simon van Norden. 2002. "The Unreliability of Output Gap Estimates in Real Time." *Review of Economics and Statistics* 84 (4): 569–83.
- Phillips, Peter C. B., and Zhentao Shi. 2019. "Boosting the Hodrick-Prescott Filter." Cowles Foundation Discussion Paper No. 2192.
- Ramey, Valerie, and Sarah Zubairy. 2018. "Government Spending Multipliers in Good Times and in Bad: Evidence from US Historical Data." *Journal of Political Economy* 126 (2): 850–901.
- Ravn, Morten O., and Harald Uhlig. 2002. "On Adjusting the Hodrick–Prescott Filter for the Frequency of Observations." *Review of Economics and Statistics* 84 (2): 371–6.

- Sancak, Cemile, Jing Xing and Ricardo Velloso. 2010. "Tax Revenue Response to the Business Cycle." IMF Working Paper No. 2010/071. Washington, DC: IMF.
- Schüler, Yves S. 2018. "On the Cyclical Properties of Hamilton's Regression Filter." Deutsche Bundesbank Discussion Paper No. 03/2018.
- Silgoner, Maria Antoinette, Gerhard Reitschuler, and Jesus Crespo-Cuaresma. 2003. "The Fiscal Smile: The Effectiveness and Limits of Fiscal Stabilizers." IMF Working Paper No. 2003/182. Washington, DC: IMF.
- St-Amant, Pierre, and Simon van Norden. 1997. "Measurement of the Output Gap: A Discussion of Recent Research at the Bank of Canada." Technical Report No. 7. Ottawa: Bank of Canada.
- van den Noord, Paul. 2002. "Automatic Stabilizers in the 1990s and Beyond." In The Behaviour of Fiscal Authorities—Stabilization, Growth and Institutions edited by Marco Buti, Jurgen von Hagen, and Carlos Martinez Mongay. Basingstoke, Palgrave.
- . 2000. "The Size and Role of Automatic Fiscal Stabilizers in the 1990s and Beyond." OECD Economics Department Working Paper No. 230. Paris: OECD.
- Vetlov, Igor, Tibor Hlédik, Magnus Jonsson, Henrik Kucsera, and Massimiliano Pisani. 2011. "Potential Output in DSGE Models." ECB Working Paper Series No. 1351. Frankfurt a. M.: European Central Bank.
- Wolswijk, Guido. 2007. "Short- and Long-Run Tax Elasticities: The Case of the Netherlands." ECB Working Paper No. 763.

Estimating Structural Budget Balances in Developing Asia

This paper reviews the current discussions, methods and practices surrounding the estimation of reasonable proxies for the underlying fiscal position, a useful anchor for fiscal policy. An empirical application to developing Asian economies is carried out. There is no one-size fits all type of approach and the sensitivity and discernment regarding specific economies are important in various stages.

About the Asian Development Bank

ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 68 members —49 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.



ASIAN DEVELOPMENT BANK 6 ADB Avenue, Mandaluyong City 1550 Metro Manila, Philippines www.adb.org