CHAPTER 2

# CAN FISCAL POLICY STABILIZE OUTPUT?

*Fiscal policy is often used to smooth fluctuations in economic activity, particularly in advanced economies. Because it reduces macroeconomic volatility, fiscal policy can boost real GDP growth. Specifically, a plausible increase in fiscal stabilization—measured as the sensitivity of the overall budget balance to the output gap—could boost annual growth rates by 0.1 percentage point in developing economies and 0.3 percentage point in advanced economies. Automatic stabilizers are an important component of fiscal stabilization, but many countries tend to suppress their impact in good times, leading to a significant buildup of public debt. Fiscal frameworks that promote fiscal stabilization through the cycle can foster more stable and higher growth while supporting debt sustainability. Countries seeking higher fiscal stabilization should avoid undermining automatic stabilizers with procyclical measures. Those seeking to enhance automatic stabilizers should do so without unduly increasing the size of the public sector or creating undesirable distortions (such as high marginal tax rates).*

Interest in how taxes and public spending can be used to cushion economic downturns and curb excesses often increases when the ability to use monetary policy for that purpose weakens or disappears. For example, options for national monetary policy can weaken when the room for monetary maneuvering is constrained by interest rates that approach the zero lower bound, or can disappear when countries deliberately abandon independent monetary policies to join a currency union or to adopt a fixed exchange rate.

A need to rely more heavily on government budgets to stabilize economic activity immediately raises the question of how best to do this. There is a broad consensus that *automatic stabilizers*—variations in taxes and transfers that occur automatically in response to changes in output and employment—have an important role to play (Baunsgaard and Symansky 2009). Automatic stabilizers include business and personal taxes and such transfers as unemployment benefits, food and housing supports, and other similar social support mechanisms. Because most tax payments by individuals or corporations move in sync with income and spending, they reduce disposable income during upswings and boost it during slowdowns. Likewise, certain social transfers increase during economic downturns and decrease when growth picks up. Automatic stabilizers help ensure a timely and predictable fiscal reaction that effectively absorbs some of the shocks to disposable income and private expenditure.

There is less agreement about whether governments should use discretionary measures beyond automatic stabilizers to limit fluctuations of macroeconomic conditions. The fiscal response of the advanced economies to the global financial crisis showed the importance of discretionary actions in mitigating the effects on activity of a severe and protracted slump. However, it also illustrated one of the limitations of discretionary fiscal measures, namely that "they come too late to fight a standard recession" (Blanchard, Dell'Ariccia, and Mauro 2010, 15).

Against this backdrop, this chapter examines experience with fiscal stabilization during the past three decades in a broad sample of 85 advanced, emerging market, and developing economies in order to draw lessons and implications for the future conduct of fiscal policy. It seeks to disentangle the respective roles of automatic stabilizers and other sources of fiscal reaction, such as discretionary policy decisions. The chapter addresses the following specific questions:[1]

- How stabilizing is fiscal policy? Does its contribution to smoothing output fluctuations vary across countries or groups of countries or between different phases of the business cycle?
- What is the relative importance of automatic stabilizers?

[1] So far, postcrisis policy discussions have focused on the experience of advanced economies with discretionary fiscal measures, including the stimulus packages of 2009–10 (see the April 2012 and April 2014 *Fiscal Monitor*), the subsequent consolidations (see the October 2010 *World Economic Outlook*), and the potential benefits of boosting public investment (see the October 2014 *World Economic Outlook*). Fatàs and Mihov (2013) and the April 2014 *Regional Economic Outlook: Western Hemisphere* are among the few other studies that also examine automatic stabilizers.

- What is the impact of fiscal stabilization on the level and volatility of economic growth?
- Are there adverse side effects to using fiscal policy to pursue economic stabilization? And are there ways to mitigate them?

The main findings can be summarized as follows:

- Fiscal policies have generally been more stabilizing in advanced economies than in emerging market and developing economies. This largely reflects the latter's specific features, such as less potent fiscal instruments, and the prominence of policy objectives other than output stability.
- Automatic stabilizers are an effective tool for fiscal stabilization. However, other discretionary fiscal measures are often introduced to suppress automatic stabilizers in good times, preventing the building (or restoration) of fiscal buffers that can be used during downturns and contributing to unhealthy accumulation of public debt over time. In addition, automatic stabilizers can also be associated with certain government activities and funding means with undesirable side effects (such as high marginal tax rates and extensive subsidies).
- A number of countries have strengthened fiscal stabilization over time. This reflects their efforts to avoid measures that run counter to the operation of automatic stabilizers as well as deliberate efforts to top up automatic stabilizers with discretionary actions.
- Fiscal stabilization reduces the volatility of growth over the business cycle. An advanced economy moving from average to strong fiscal stabilization could potentially lower the overall volatility of growth by about 20 percent, and an emerging market or developing economy could reduce growth volatility by about 5 percent.
- Because it dampens volatility, greater fiscal stabilization is associated with higher medium-term growth. An average strengthening of fiscal stabilization—that is, an increase in the fiscal stabilization measure by one standard deviation in the sample—could on average boost annual growth rates by 0.1 percentage point in developing economies and 0.3 percentage point in advanced economies.

What can be done to fully reap the potential benefits of more stabilizing fiscal policies? The conduct of fiscal policy could in many cases better incorporate the impact of fiscal measures on output in relation to the state of the business cycle. Specifically:

- The shortcomings of discretionary stabilization—including decision and implementation lags—can be mitigated, as suggested by the effective use of nonautomatic stabilization measures in a number of countries. One possibility is to rely more on temporary and well-targeted adjustments in tax or transfer parameters, such as the duration of unemployment benefits or the extent of investment deductions, or to move quickly to identify easy-to-implement capital and maintenance spending.
- Avoiding procyclical actions would allow countries to take better advantage of automatic stabilizers—which should be allowed to operate as freely in bad times (when they are most needed) as in good times (when rebuilding fiscal buffers is essential). In many countries, this could substantially increase fiscal stabilization without affecting the size and design of existing government programs. It could also help ensure that public debt remains at sustainable levels.
- Policymakers should be aware that automatic stabilizers can have adverse side effects. For instance, the stabilization dividend from more generous unemployment insurance should be weighed against the weakening of individual incentives to find work. Practical measures can be taken to boost stabilizers while mitigating such side effects. Depending on the state of the economy, these could include making certain tax deductions or exemptions, such as the investment tax credit or the mortgage interest deduction, less procyclical. Introducing automatic adjustments in certain entitlements, such as the duration of unemployment benefits, can be envisaged. Longer duration could temporarily apply during downturns, avoiding permanent effects on incentives to work.
- Sound fiscal institutions can help. Well-designed fiscal rules and medium-term frameworks can promote good expenditure control over the cycle and promote a flexible response to variations in output. They can also enable continued access to financing by supporting a credible commitment to long-term sustainability.

The next section briefly describes basic concepts and the empirical approach. This is followed by an overview of fiscal stabilization and its determinants. The chapter concludes with a discussion of the dividends of fiscal stabilization and draws policy implications.

## How Fiscal Policy Influences Economic Activity

To stabilize output in the near term, governments can affect economic activity and jobs by influencing domestic demand for goods and services.[2] They can do this directly by changing public investment and consumption or indirectly by adjusting taxes and transfers. The impact of fiscal policy on output is greater when monetary policy works in the same direction as the fiscal stance.

The change in the overall budget balance (the difference between revenue collection and spending) provides a good approximation of the short-term impact of fiscal measures on demand (see, for example, Blanchard 1993). The budget balance captures the difference between the resources subtracted from private sector income (mainly through taxation) and what the budget contributes to aggregate expenditure in a given year.[3] A decline in the budget balance reflects a positive fiscal contribution to aggregate demand.

To be stabilizing, the fiscal balance needs to increase when output rises and to decrease when it falls. That way, fiscal policy generates additional demand when output is weak and subtracts from demand when the economy is booming. Therefore, a measure of the stabilizing (or destabilizing) role of fiscal policy is the average change in the overall fiscal balance (in percent of GDP) that is associated with a 1 percentage point variation in output.[4] The resulting "stabilization coefficient" is positive when the average fiscal policy response is stabilizing and is negative when it is not (Box 2.1).

The exercise warrants a number of caveats. The stabilization coefficient quantifies the relationship between the change in policies as implemented and the variation in economic activity. Because the variation in economic activity already incorporates the impact of the fiscal policy response to the original yet unobservable output shocks, the coefficient likely underestimates the actual size of the response.[5] On the other hand, the stabilization coefficient could overestimate the size of the fiscal response because it also captures the impact on the budget of other economic and financial variables that move along with output, such as asset prices and interest rates (see, for example, Bénétrix and Lane 2013).

Despite estimation challenges, the stabilization coefficient is a useful metric to gauge the overall contribution of fiscal policy to output stability. It takes into account the fact that many revenue and expenditure items respond to the state of the economy even though the underlying provisions or programs were primarily designed for other reasons than output stabilization, including redistributive or other economic or political motives. Monitoring the relationship between the budget balance and the output gap would help policymakers understand how much their action contributes to output stability, including in comparison to other countries. Policymakers could usefully set benchmarks for the coefficient as a way to explicitly incorporate output stabilization in the conduct of fiscal policy.

The stabilization coefficients are used throughout this chapter to: (1) assess the extent of fiscal stabilization in the sample; (2) evaluate the relative contribution of automatic stabilizers; (3) explore potential determinants of fiscal stabilization; and (4) quantify the impact of fiscal stabilization on output volatility and medium-term growth. The estimated relationships between policies and macroeconomic outcomes are not necessarily causal. The reason is that the policy response to any disturbance affecting the economy is influenced by the nature of the disturbance itself, blurring the direction of causality between policies and outcomes. To the extent possible, econometric techniques were selected to minimize that risk (Annex 2.1).

Furthermore, even when output stabilization is beneficial, it is not always a priority or even a desirable objective for fiscal policy. In some countries, the overarching policy goal may be to restore sustainable public finances through a credible consolidation, particularly if low credibility limits access to or raises the cost of borrowing. Even when access to financing

[2] Of course, many fiscal instruments—such as specific features of tax and transfer systems—influence individual decisions to work and invest and thus affect the aggregate supply. However, supply-side fiscal measures primarily serve the economic-efficiency objective of public finances, even though they have implications for the strength of automatic stabilizers.

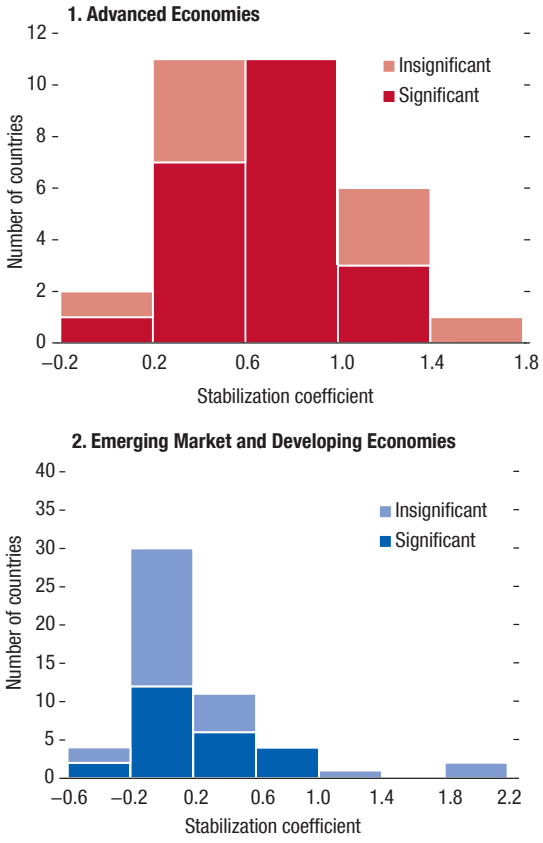
[3] Because economic agents are forward looking, fiscal policy should also affect aggregate demand through future anticipated deficits and the stock of public debt (Blanchard and Summers 1984; Blanchard 1985). The evidence reported in this chapter focuses on the overall fiscal balance, but the results carry through when a measure of the fiscal balance augmented by expectations is used (Furceri and Jalles forthcoming).

[4] More specifically, the estimates capture the sensitivity to the output gap. See Box 2.1.

[5] The downward bias is evident from panel regressions: average fiscal stabilization coefficients are larger for both advanced and emerging and developing economies when corrections for the effect of fiscal policy on the output gap are implemented. Annex 2.1 discusses data sources and methodologies and presents the detailed results.

### Figure 2.1. Distribution of Fiscal Stabilization Coefficients

Fiscal policy appears to contribute more to output stability in advanced economies than in emerging market and developing economies. However, the quality of available data may complicate efforts to estimate output gaps in the latter economies.




Sources: European Commission; Organisation for Economic Co-operation and Development; and IMF staff estimates.
Note: "Significant" is defined as a coefficient with a *p*-value less than 0.10. Emerging market and developing economies include emerging market and middle-income economies as well as low-income developing countries. For a list of countries in each group, see Economy Groupings in the Methodological and Statistical Appendix.

is not constrained, fiscal policy may be directed to the pursuit of valuable objectives other than stabilization. For instance, in many emerging market and developing economies, high-quality fiscal expansions can promote economic development and help meet social needs that clearly trump cyclical considerations.

## What Shapes Fiscal Stabilization?

Fiscal stabilization, as measured by the stabilization coefficients, appears to be much more widespread among advanced economies than among emerging market and developing economies. Fiscal policy has played a stabilizing role in about three-fourths of advanced economies (Figure 2.1), compared with slightly more than one-fourth of emerging market and developing economies. In about two-thirds of the latter, there is no systematic relationship between the output gap and the fiscal balance. Those weaker results could partly reflect data quality issues, including the difficulty of estimating output gaps in these countries.

The difference is even more pronounced when looking only at the countries for which there is clear evidence of fiscal stabilization (those for which stabilization coefficients are precisely estimated). However, there is also considerable heterogeneity across countries (Figure 2.2). Interestingly, three oil exporters (Algeria, Kuwait, Norway) exhibit strongly stabilizing fiscal policies, as demonstrated by extremely large coefficients. Saved commodity revenues provide buffers that prevent procyclical adjustments in spending because the fiscal balance can more easily absorb even very large swings in oil prices and other shocks. However, this is far from being a systematic feature of other oil and commodity exporters, whose fiscal policy appears to be either weakly stabilizing or even destabilizing (the coefficient is negative). This could indicate a tendency to spend windfalls rather than saving them for stabilization purposes.

### *Automatic versus Discretionary Fiscal Stabilization*

Fiscal stabilization involves a response to output fluctuations that can be automatic or not. Nonautomatic responses include discretionary actions that occur when policymakers take deliberate measures to offset shocks to economic activity. Automatic responses occur through taxes and transfers that automatically vary with output in a way that stimulates aggregate demand during downturns and moderates it during upswings. The stabilizing impact is automatic because taxes are generally levied on amounts that contract and expand in sync with output and income and because certain social transfers, such as unemployment benefits, are designed to expand during downturns. The resulting changes in tax payments and received transfers help shield disposable income from macroeconomic shocks without explicit policy action.

Automatic stabilizers are generally perceived to be the most efficient tool for fiscal stabilization. Operating in real time, they do not suffer from the information, decision, and implementation lags that often impair

the timeliness and relevance of discretionary actions during normal business cycles (Blanchard, Dell'Ariccia, and Mauro 2010). In addition, there is less risk that political and other factors will prevent the necessary retrenchment of such measures when growth rebounds (Baunsgaard and Symansky 2009).

Although the main strength of automatic stabilizers is their timeliness and predictability, automaticity also has its drawbacks. First, not all the automatic adjustments embedded in government budgets contribute to stabilizing output. Some may be inherently destabilizing, such as indexation rules applied to certain expenditure items (including wages or pensions), many tax deductions (including those for mortgage interest payments or certain types of investment), and the earmarking of proceeds from particular taxes for particular spending programs. Through such channels, a booming economy automatically stimulates public expenditure and dampens tax revenues.

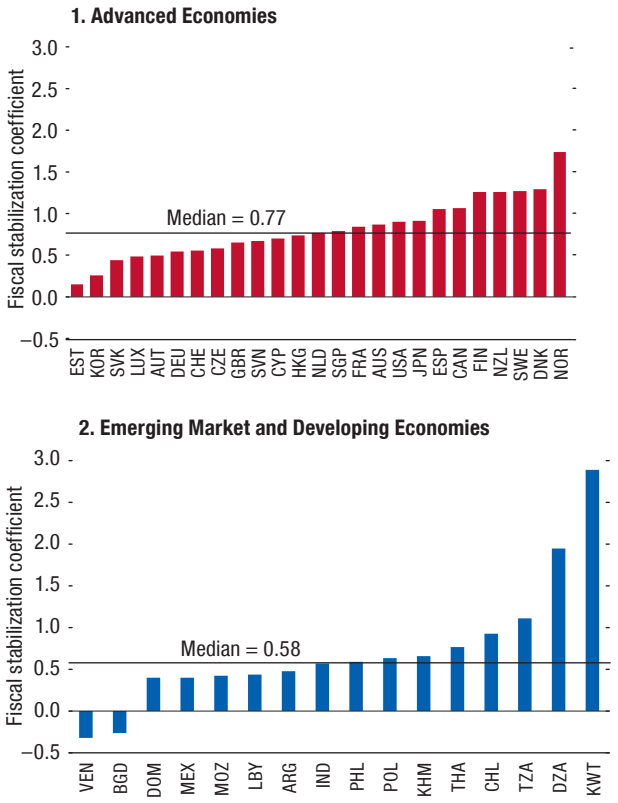
Second, automatic stabilizers on their own do not always deliver an adequate fiscal response to output shocks. This is the case when persistent disturbances originate on the supply side of the economy. For instance, leaving fiscal policy on automatic pilot could unduly delay the necessary reallocation of productive capital and workers following a permanent shock to a particular sector. Even when a shock is broader and affects aggregate demand rather than a particular sector, the scope of automatic stabilizers may be suboptimal, given that they generally emanate from decisions motivated by equity or other considerations (Blanchard, Dell'Ariccia, and Mauro 2010).

The magnitude of automatic stabilizers can be measured by their impact on the overall fiscal balance in response to a given change in economic activity. The most common proxy is the ratio of public expenditure to GDP (Galí 1994; Fatás and Mihov 2001). Assuming that tax revenues evolve strictly in proportion to nominal GDP and that nominal public spending is set by budget law and broadly invariant to real-time movements in output, changes in the overall balance (as a percent of GDP) will mirror those in the ratio between nominal expenditure and nominal GDP. For example, if the ratio of expenditure to GDP is 50 percent, a 1 percentage point contraction in GDP will automatically translate into a deterioration of the overall balance by 0.5 percent of GDP.

In practice, however, the influence of automatic stabilizers on the overall balance can be larger or smaller than suggested by the expenditure ratio depending on specific features of an economy's tax and transfer systems. Measures that can be more stabilizing include certain spending items, such as unemployment benefits and other social transfers that automatically vary with economic activity. More progressive taxes can help stabilize disposable income because they change proportionately more than output and pretax income.[6] Measures that can be less stabilizing include nontax revenues that are loosely related to nominal GDP,

## Figure 2.2. Selected Fiscal Stabilization Coefficients

Among countries for which there is clear evidence of fiscal stabilization, there are large cross-country differences in the extent of fiscal stabilization in both advanced and emerging market and developing economies.

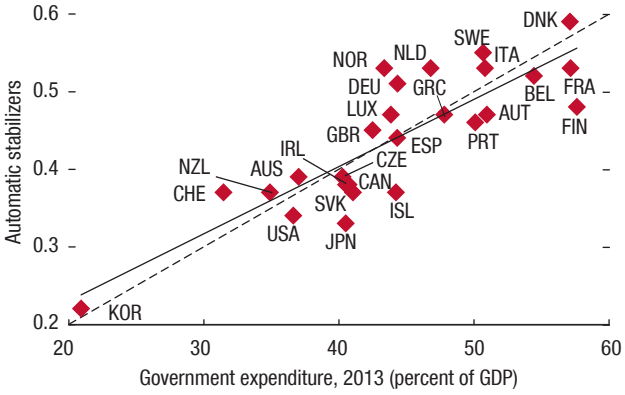



Sources: European Commission; Organisation for Economic Co-operation and Development; and IMF staff estimates.
Note: Only statistically significant coefficient estimates at the 10 percent level or lower are displayed. Coefficients result from country-specific ordinary least squares regressions of the overall budget balance on the output gap. The bars show the estimated impact of a 1 percentage point increase in the output gap on the overall balance-to-GDP ratio. Data labels in the figure use International Organization for Standardization (ISO) country codes.

[6] A strictly proportional tax ensures only that relative variations in disposable and pretax incomes are the same.

### Figure 2.3. Advanced Economies: Government Size and Automatic Stabilizers

The extent of automatic stabilizers is strongly correlated with the relative size of public expenditures.

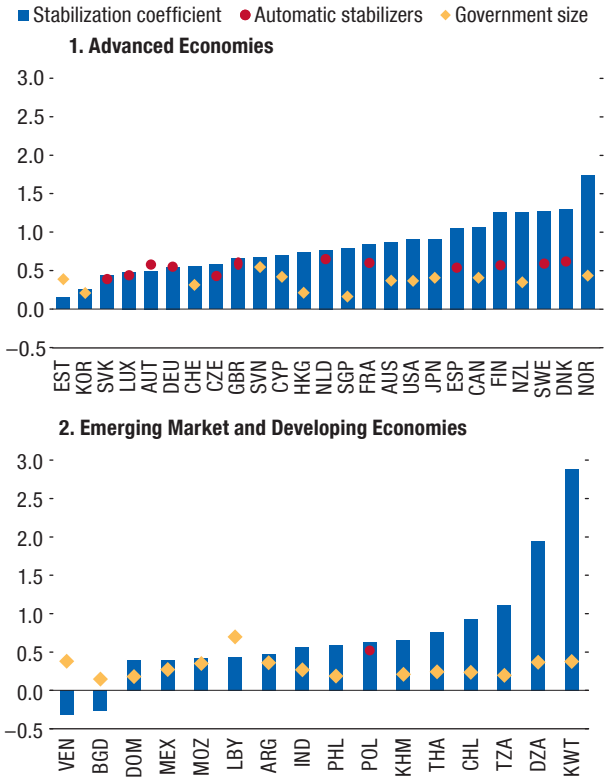



Sources: European Commission; Girouard and André 2005; Mourre, Astarita, and Princen 2014; Organisation for Economic Co-operation and Development; and IMF staff estimates.
Note: The solid line shows an ordinary least squares regression line, and the dashed line shows a 45-degree line. Data labels in the figure use International Organization for Standardization (ISO) country codes.

### Figure 2.4. Selected Countries: Fiscal Stabilization and Automatic Stabilizers

*(Percent of GDP)*

Automatic stabilizers contribute more to overall fiscal stabilization in advanced economies than in emerging market and developing economies.




Sources: European Commission; Girouard and André 2005; Mourre, Astarita, and Princen 2014; Organisation for Economic Co-operation and Development; Price, Dang, and Guillemette 2014; and IMF staff estimates.
Note: See Figure 2.2 for an explanation of the stabilization coefficient. Automatic stabilizers report 2014 estimates where available and 2005 estimates elsewhere. Government size refers to the 2013 general government expenditure-to-GDP ratio. Data labels in the figure use International Organization for Standardization (ISO) country codes.

specific taxes that are infrequently indexed, and taxes that are collected with delays.

Detailed analyses of tax codes and expenditure programs allow for automatic stabilizers to be estimated (see Girouard and André 2005, and OECD 2014, for most advanced economies). While these estimates do not necessarily coincide with the size of government, they remain strongly correlated with the relative size of public expenditure (Figure 2.3). As a result, public expenditures can be used as a proxy by default when more granular estimates do not exist.[7]

### *The Relative Impact of Automatic Stabilizers*

Comparing the size of automatic stabilizers with the stabilization coefficients gives an indication of their relative contribution to overall fiscal stabilization, since other fiscal policy changes can either reinforce or counter their impact on the fiscal balance (Figure 2.4). In advanced economies, automatic stabilizers are often sizable, reflecting relatively large public sectors and well-developed social programs. They account for more than one-half of overall fiscal stabilization in about 60 percent of the advanced economies in the sample. In the emerging market and developing economies, automatic stabilizers account for only about 30 percent of total fiscal stabilization.[8] The median contribution of automatic stabilizers to overall fiscal stabilization among the countries in the sample slightly exceeds two-thirds in advanced economies and one-third in the others.

Even when automatic stabilizers account for a large share of overall fiscal stabilization, the extent to which they are allowed to play out is ultimately a policy

[7] The underlying assumption of proportionality between tax revenues and nominal GDP does not apply with equal strength to all shocks on economic activity. In particular, during the global financial crisis, revenues fell more than proportionately to GDP, particularly in countries experiencing booms in asset prices or real estate.

[8] Note that these contributions are an upper bound, given the likely underestimation of stabilization coefficients.

choice. Figure 2.5 confirms that the link between overall stabilization and the size of automatic stabilizers is relatively loose. The influence of automatic stabilizers on the fiscal stance seems to be systematically suppressed in some countries and reinforced in others. Canada, Japan, New Zealand, Singapore, and the United States seem to routinely top up a below-average level of automatic stabilizers to deliver broader countercyclical fiscal outcomes. The Nordic countries, which have an above-average level of automatic stabilizers, also exhibit strongly stabilizing fiscal outcomes over and above the impact of automatic stabilizers. The three oil exporters discussed earlier (Algeria, Kuwait, Norway) stand out because fiscal stabilization is much greater than implied by the extent of their automatic stabilizers. Of the 48 countries with meaningful fiscal stabilization, fiscal stabilization is broadly in line with the size of their automatic stabilizers only in 14 (12 advanced and 2 emerging market and developing economies).[9]

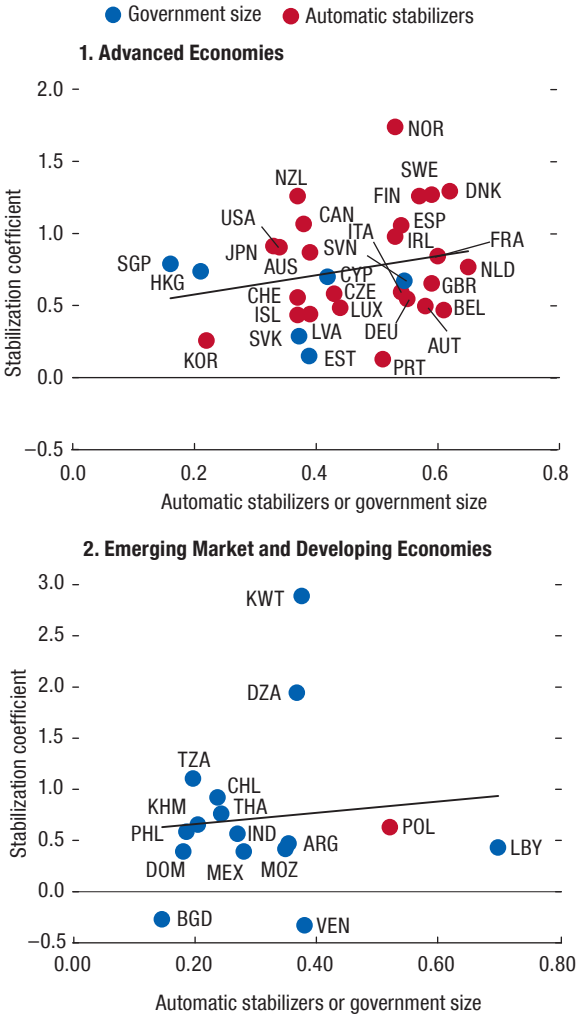
A closer analysis of the determinants of fiscal stabilization confirms that the latter does not mechanically reflect the magnitude of automatic stabilizers.[10] In advanced economies, the size of government spending and the relative share of social spending in total outlays have the expected positive influence on stabilization coefficients (Figure 2.6), in line with the well-documented countercyclical behavior of social expenditures (Auerbach and Feenberg 2000; Cohen and Follette 2000; Darby and Mélitz 2008; Furceri 2010; Afonso and Jalles 2013). However, the quantitative effect of a given increase in automatic stabilizers on fiscal stabilization is small. This result is consistent with the fact that the primary purpose of these programs is not their stabilizing properties. On average over the sample, countries with smaller fiscal stabilizers have managed to provide more stabilization through other means. Interestingly, various indicators of financial stress or debt-financing costs—aimed at capturing the potential impact of borrowing constraints—do not appear to have any impact on stabilization coefficients (Annex 2.1). Thus on average from 1980 to 2013, access to borrowing has not prevented advanced economies from providing the desired levels of fiscal stabilization.

[9] The criterion for identifying these countries is that the ratio between the size of their automatic stabilizers and their fiscal stabilization coefficient ranges between 0.8 and 1.2.

[10] Time-varying stabilization coefficients are used here to capture the possibility that some of these determinants change over time (such as government size or the design of unemployment insurance programs). A panel analysis allows the most meaningful determinants of fiscal stabilization to be isolated and minimizes the risk of omitting important explanatory factors by taking into account unobserved country-specific characteristics, as well as common developments across countries. Annex 2.1 provides methodological details.

## Figure 2.5. Automatic Stabilizers and Fiscal Stabilization: Cross-Country Correlations

Policy choices affect the influence of automatic stabilizers on overall fiscal stabilization. Discretionary measures tend to suppress stabilizers in some countries and to reinforce them in others.

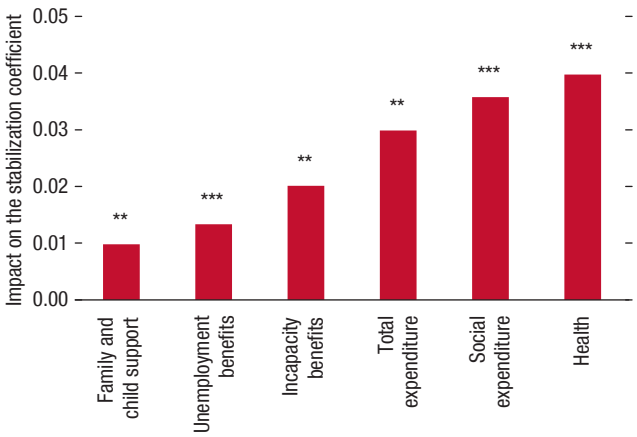



Sources: European Commission; Girouard and André 2005; Organisation for Economic Co-operation and Development; Price, Dang, and Guillemette 2014; and IMF staff estimates.
Note: See Figure 2.2 for an explanation of the stabilization coefficient. Automatic stabilizers report 2014 estimates where available and 2005 estimates elsewhere. Government size refers to the 2013 general government expenditure-to-GDP ratio. The black line shows an ordinary least squares regression line. Data labels in the figure use International Organization for Standardization (ISO) country codes.

**Figure 2.6. Advanced Economies: Determinants of Fiscal Stabilization**

*(Impact of a 10 percent increase in selected outlays on stabilization coefficients)*

The size of government spending and the relative share of social spending have positive but relatively small effects on fiscal stabilization in advanced economies.




Sources: European Commission; International Country Risk Guide; Organisation for Economic Co-operation and Development; and IMF staff estimates.

Note: Figure estimates reflect panel weighted least squares, with weights inversely proportional to the estimation error of the stabilization coefficients. Additional conditioning variables include output volatility, openness, GDP per capita, and the government debt-to-GDP ratio. Country and time fixed effects are also included. For a list of advanced economies, see Economy Groupings in the Methodological and Statistical Appendix.

** $p < 0.05$; *** $p < 0.01$.

In emerging market and developing economies, no robust link could be found between stabilization coefficients and their potential determinants—including the size of automatic stabilizers and, most surprisingly, indicators of borrowing conditions. This could mean that fiscal stabilization is not a policy priority in many of these countries, regardless of the borrowing constraints they may face, or that fiscal stabilization is enabled through funding from other sources such as saved commodity revenues, aid, and official financing.

A related question is whether the marked increase in the size of government and the extent of social programs in advanced economies during the 1980s and 1990s (see Figure 2.7, panels 3–6) is associated with a steady and widespread rise in stabilization coefficients (Debrun, Pisani-Ferry, and Sapir 2008). A comparison of stabilization coefficients in these advanced economies at two points in time (1995 compared with 1980; 2013 compared with 1995) shows that the coefficients change rather infrequently. In many countries—those on the 45 degree line in Figure 2.7, panels 1 and 2—larger automatic stabilizers did not translate into greater fiscal stabilization. Yet when they occurred, the changes in the coefficient tended to be large. During the first half of the sample period (Figure 2.7, panel 1), fiscal policy in Finland, Japan, Norway, and the United Kingdom appears to have become more stabilizing, while in the second half of the sample period, the most notable increases occurred in Korea, Norway, and the United States (Figure 2.7, panel 2).[11] In both cases, fiscal policy outside automatic stabilizers either became more actively stabilizing or interfered less or not at all with automatic stabilizers. An important caveat, however, is that the rise in stabilization coefficients could also reflect, at least in part, a greater budgetary impact of financial and asset price cycles.

### *Fiscal Stabilization and the Business Cycle*

Do countries pursue fiscal stabilization to the same extent during downturns as upturns? Downturns triggered by weak aggregate demand provide the best environment for an effective fiscal response, but recoveries present opportunities to withdraw fiscal support to aggregate demand. Symmetry in the fiscal response between good and bad times is important for three main reasons: (1) rebuilding buffers ahead of the next cyclical downturn; (2) reducing the risk of overheating; and (3) avoiding a ratcheting up of public debt over successive cycles.

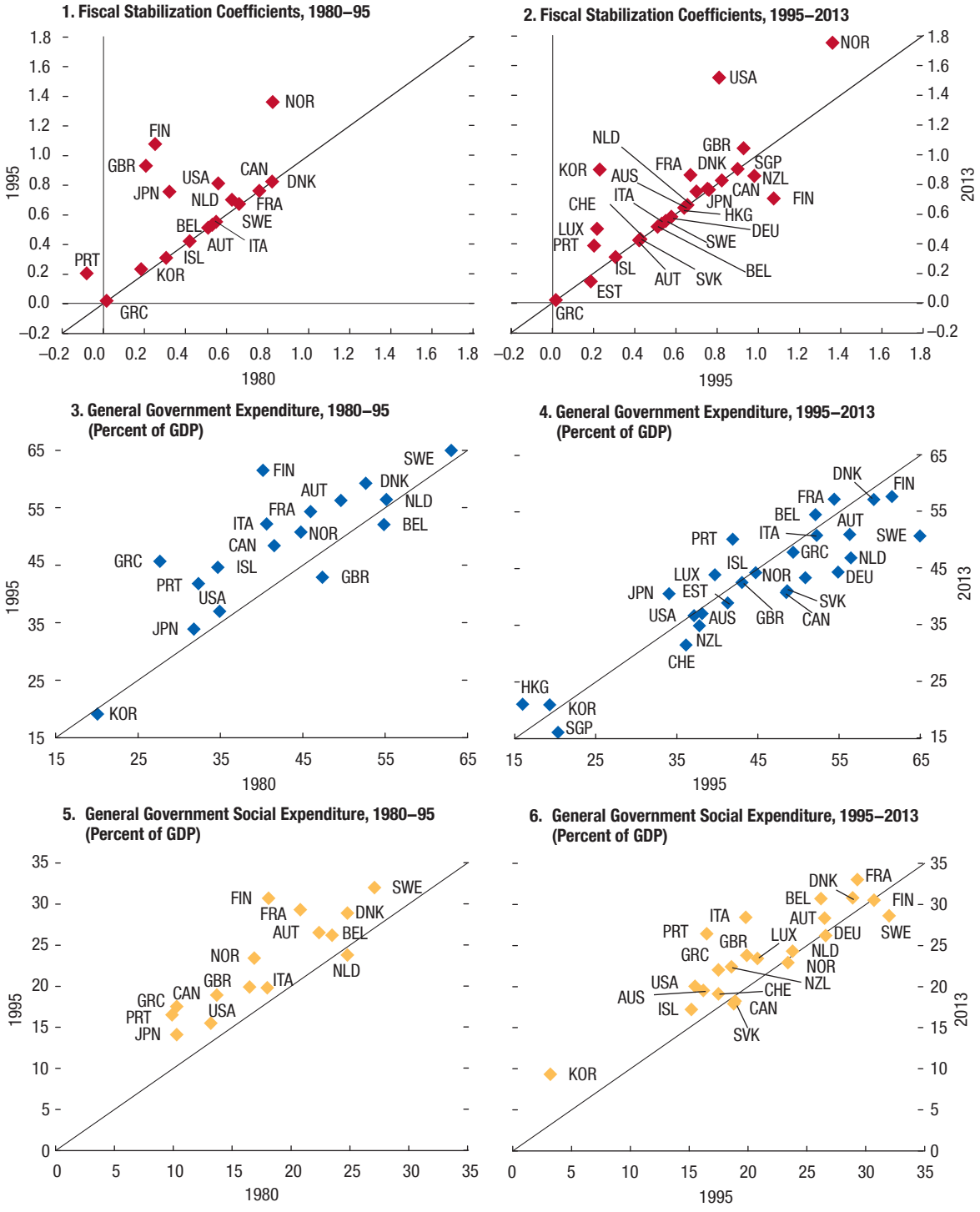
Fiscal stabilization tends to operate mostly during recessionary episodes and is virtually absent during expansions (Figure 2.8, panel 1).[12] Automatic stabilizers have the expected countercyclical effect regardless of country group, although the effect is clearly smaller in emerging market and developing economies (Figure 2.8, panel 2). Comparing the results for overall and automatic stabilization, changes in fiscal policy unrelated to automatic stabilizers seem weakly related to

[11] Interestingly, some of these shifts toward more stabilizing fiscal policies coincide with reduction in the room for monetary policy maneuver. In Japan, the stabilization coefficient rose from 0.6 in 1991 to 0.8 in 1997, when policy rates fell from 7.5 percent to less than 0.5 percent. In the United States, the coefficient rose steadily from 1.1 to 1.5 between 2000 and 2013, while monetary policy rates hovered around 2 percent during 2001–04, and close to zero since 2008. Finally, in France, the stabilization coefficient increased from 0.7 to 0.9 since it joined the euro area in 1999; Portugal and Luxembourg share this pattern.

[12] For the purpose of this exercise, the impulse related to automatic stabilizers has been estimated in the same fashion as the fiscal stabilization coefficient, using the cyclical balance (instead of the overall balance) as the variable to explain in the econometric model. See Annex 2.1 for details.

## Figure 2.7. Advanced Economies: Fiscal Stabilization Coefficients and General Government Expenditure over Time

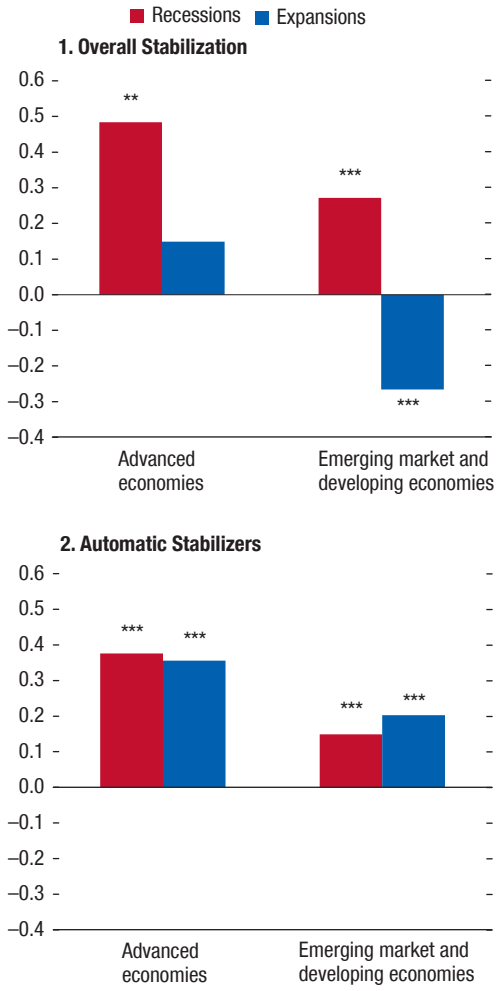
The extent of fiscal stabilization is relatively stable over time, but when it does change, the shift tends to be large.




Sources: European Commission; Mauro and others 2013; Organisation for Economic Co-operation and Development; and IMF staff estimates.
Note: The time-varying coefficients model, shown in panels 1 and 2, has a two-sided alternative to the Kalman-Bucy one-sided filter (Schlicht 1985, 1988; and Appendix 2.1). The first observation comes after 1980 for the following countries: Australia (1988), Estonia (1995), Germany (1991), Hong Kong SAR (1991), Israel (1998), Luxembourg (1990), Singapore (1990), Slovak Republic (1995), and Switzerland (1983). Data labels in the figure use International Organization for Standardization (ISO) country codes. The solid line shows a 45-degree line.

### Figure 2.8. Fiscal Stabilization over the Cycle

Fiscal stabilization tends to be more pronounced during recessions and is virtually absent during expansions.




Sources: European Commission; Organisation for Economic Co-operation and Development; and IMF staff estimates.
Note: Recessions and expansions are defined using an approach equivalent to the smooth transition autoregressive model developed by Granger and Terasvirta (1993). The figure displays ordinary least squares regressions with country and time fixed effects and robust standard errors. To reduce heterogeneity in the panel, commodity exporters have been excluded. Emerging market and developing economies include emerging market and middle-income economies as well as low-income developing countries. For a list of countries in each group, see Economy Groupings in the Methodological and Statistical Appendix.
** $p < 0.05$; *** $p < 0.01$.

the cycle during downturns—likely averaging out cases in which governments top up stabilizers and cases that offset them—but have procyclical effects during expansions. In emerging market and developing economies, fiscal policy is on average procyclical (the coefficient is negative) during expansions, fueling aggregate demand when the economy is already growing above potential. That strong asymmetry between different phases of the cycle explains in part why the country-specific estimates of fiscal stabilization—which cannot differentiate between recessions and recoveries because of the small sample size—are smaller and statistically less significant in emerging market and developing than in advanced economies.

Various factors can explain the procyclical bent of fiscal policies in good times. First, a rapidly growing pool of revenues complicates efforts to keep a tight lid on total expenditure, as individual ministries compete for resources. Second, because potential output is unobservable, policymakers might be tempted to interpret temporary revenue gains as permanent, leading to higher spending or tax cuts that further fuel booming aggregate demand. Third, a countercyclical fiscal policy may simply be inappropriate. For emerging market and developing economies, good times often translate into easier access to financing and therefore provide an opportunity to deliver on key priorities for growth and poverty reduction. For instance, many low-income countries would likely be better off enhancing their economic and social infrastructure regardless of the cycle in order to boost potential growth. At the same time, slower growth could provide an opportunity to strengthen efforts to mobilize domestic tax revenues and reduce dependence on unpredictable aid flows and commodity-related revenues.

More fundamentally, the desirability for any country of seeking to smooth fluctuations in economic activity depends on the nature of the output shocks and in particular on whether these shocks reflect permanent variations in potential output (supply driven) or the more short-lived fluctuations in aggregate demand that usually shape the business cycle. In principle, fiscal measures can mitigate the impact of shocks that affect aggregate demand, whereas other shocks—such as those that affect relative prices—may not always warrant a fiscal response.

Assessing the sensitivity of stabilization coefficients to different types of shocks is hindered by the difficulty in identifying the nature of such shocks, and any formal analysis of the issue is bound to be tentative. One approach is to identify pure "demand" disturbances using the method of Blanchard and Quah (1989), whose underlying assumption is that "supply" disturbances permanently affect output. Another approach is simply to differentiate between the sensitivity of the fiscal balance to changes in the output

gap or changes in real GDP growth. The underlying presumption is that growth gyrations reflect a mix of supply and demand disturbances, whereas the output gap is expected to mirror the dynamics of temporary demand disturbances. Given the data available, the analysis here is conducted only for advanced economies and is based on the estimated relationship between the overall balance and each variable of interest (all shocks, demand shocks only, real growth, and output gap). Both empirical approaches suggest that the response of the budget balance is stronger in the face of demand shocks (Figure 2.9). The question as to whether this differentiated fiscal policy response reflects deliberate decisions or intrinsic properties of automatic stabilizers would be worth a detailed investigation, although it is beyond the scope of this chapter.[13]

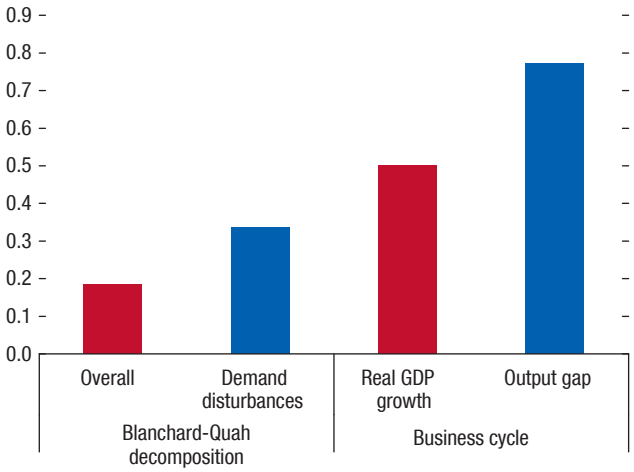
Overall, the picture that emerges is that fiscal stabilization policies seem asymmetric through the cycles.[14] Countries tend to deliver fiscal stabilization when it is expected to be more needed—that is, during cyclical downturns when aggregate demand lags potential output. But during expansions, fiscal policy changes unrelated to automatic stabilizers seem to systematically interfere with automatic stabilizers, particularly in emerging market and developing economies. The failure to mitigate economic recoveries or booms implies not only a higher risk of overheating followed by a bust; it can undermine long-term public debt dynamics if left unchecked. Illustrative simulations suggest that a systematic asymmetric response whereby half of cyclical revenue windfalls is spent during good times while the deficit fully absorbs shortfalls in bad times would be associated with a non-negligible upward drift in the debt-to-GDP ratio (Figure 2.10). Under fairly benign macroeconomic assumptions, asymmetric stabilization could, after 20 years, lead to a debt-to-GDP ratio much higher than with symmetric stabilization.

[13] The fiscal impact of a supply shock through automatic stabilizers is likely to be specific to each shock. For instance, an oil price increase could initially trigger higher energy tax revenues, followed by lower indirect taxes if private expenditure ultimately suffers. Likewise, a broad-based wage increase—also a negative supply shock—would initially trigger a fiscal contraction (higher tax payments), followed by an expansion, if and when job losses materialize. In both cases, the net short-term fiscal effect would be unclear.

[14] Budina and others (2015) find that the asymmetry is even larger when the real estate cycle drives the recovery.

### Figure 2.9. Advanced Economies: Fiscal Stabilization and Demand Shocks

The budget balance appears to respond more strongly to demand shocks in advanced economies.




Sources: European Commission; Organisation for Economic Co-operation and Development; and IMF staff estimates.
Note: The bars represent simple averages of country-specific point estimates.

## Potential Payoffs from Fiscal Stabilization

This section analyzes the link between fiscal stabilization and two of its expected dividends: reduced volatility of output and higher medium-term growth.

### *Does Fiscal Stabilization Reduce Output Volatility?*

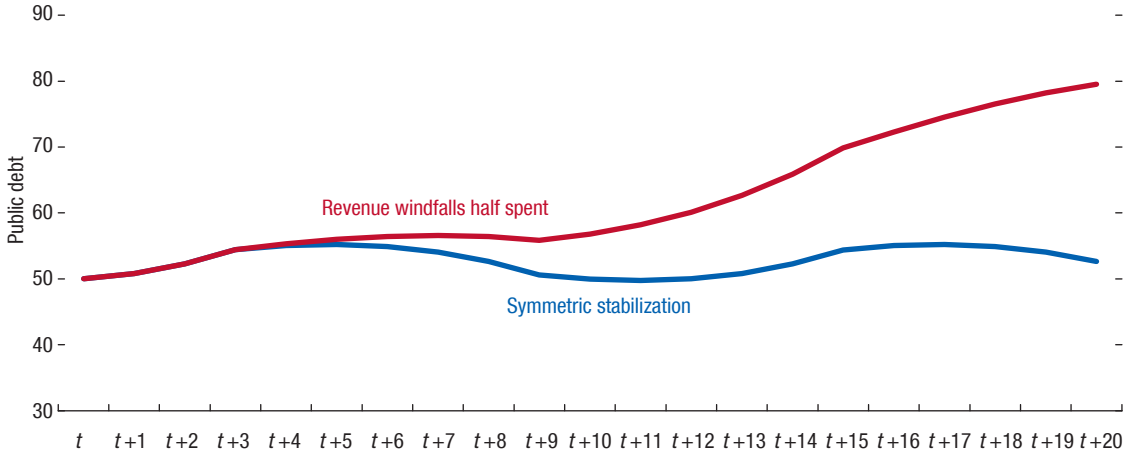
The eventual success of fiscal stabilization depends on how much of a given variation in the fiscal balance ultimately makes its way into GDP. This is a tricky question because of the circularity between output and automatic stabilizers: output affects the budget balance, which in turn affects output. Conventional fiscal multipliers[15] cannot be used here because their estimation requires prior identification of changes in the budget balance that are unrelated to economic activity (Devries and others 2011; April 2012 *Fiscal Monitor*).

Extending Galí (1994), Fatás and Mihov (2001), and Debrun and Kapoor (2010)—who focus on automatic stabilizers—the empirical strategy adopted here is to directly estimate the relationship between fiscal stabilization and output volatility—calculated as the standard deviation of real GDP growth over a fixed period of time. Broad cross-country correlations suggest that greater fiscal stabilization is in general associated with

[15] The fiscal multiplier measures the ratio of a change in GDP to the change in the budget balance that caused it.

**Figure 2.10. Asymmetric Stabilization: Unpleasant Public Debt Arithmetic**
*(Percent of GDP)*

A tendency to spend revenue windfalls during good times and to allow budget balances to reflect revenue shortfalls during bad times leads to an upward drift in the ratio of debt to GDP over time.




Source: IMF staff estimates.
Note: The simulations are based on the stock-flow identity between debt and the overall balance. Other assumptions are nominal potential growth of 4 percent, an automatic stabilization coefficient of 0.5, an implicit interest rate on public debt of 5 percent, and symmetric cycles with the output gap smoothly oscillating between –2 and 2 percent. No fiscal adjustment is built into the scenario. *t* denotes the initial year of the simulation.

lower growth volatility (Figure 2.11, panels 1 and 2). However, there is a marked difference between advanced economies and emerging and developing economies regarding the contribution of automatic stabilizers: in advanced economies, the correlation between government size and output volatility is negative, as expected, while in emerging and developing economies, this correlation vanishes (Figure 2.11, panels 3 and 4).

The contrast between the country groups is even sharper after taking into account a broad range of the potential determinants of growth volatility (see Annex 2.1). Comparing the results for countries of "average" fiscal stabilization (the median in the distribution of stabilization coefficients) with those of countries with "strong" fiscal stabilization (the third quartile in the distribution of stabilization coefficients) can provide a sense of magnitude. Moving from average to strong fiscal stabilization could on average decrease growth volatility by about 20 percent in advanced economies, but only by 5 percent in emerging market and developing economies (Figure 2.12).

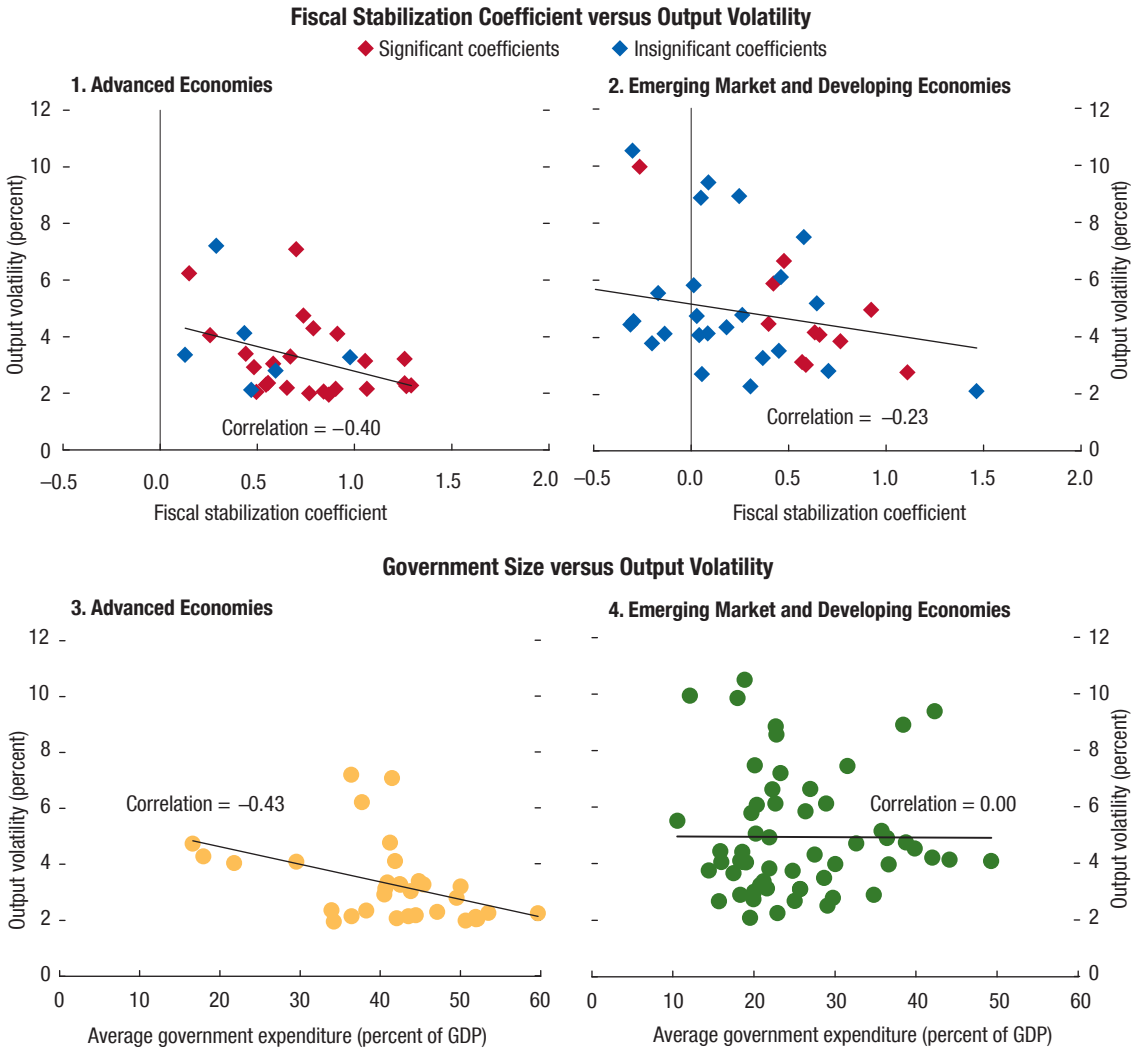
Higher levels of total government spending—the proxy for automatic stabilizers—are associated with lower growth volatility in advanced economies, but with higher growth volatility in emerging market and developing economies. These contrasting results point to the existence of inefficiencies often associated with large governments. A larger government sector could magnify the impact of inefficient public interventions (such as distortive subsidies, high marginal tax rates, red tape, or inadequate regulations), undermining an economy's resilience. Also, bigger governments tend to take fiscal actions that have a larger macroeconomic impact, irrespective of the cycle, which in turn can translate into greater growth volatility (Figure 2.13). Overall, while the stabilizing effect of government size generally dominates in advanced economies, the impact of inefficiencies on the economy's resilience appears to overcome automatic stabilizers in emerging market and developing economies.

Growth volatility may be affected by the design of automatic stabilizers or the ability of policymakers to let them play freely. For instance, at a given size of government, more progressive taxes, fewer procyclical tax deductions, and a greater share of social outlays in total expenditure would increase the effect of automatic stabilization on growth volatility. A look at potential determinants of the stabilizing effect of automatic stabilizers shows that three variables appear to matter (Figure 2.14):[16]

[16] The data needed for this analysis are available only for advanced economies.

## Figure 2.11. Fiscal Stabilization and Output Volatility: Cross-Country Correlations, 1980–2013

In advanced economies, larger governments and greater fiscal stabilization are associated with lower output volatility. In emerging market and developing economies, there is no apparent link between output volatility and government size.

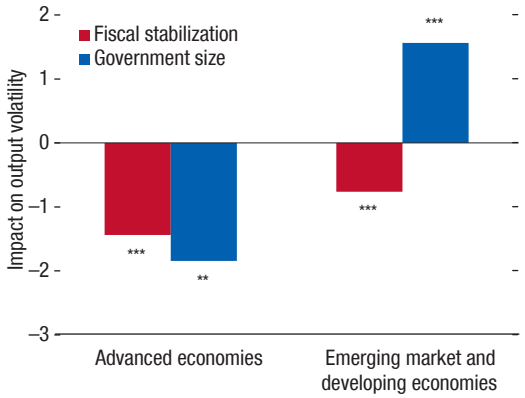



Sources: European Commission; Mauro and others 2013; Organisation for Economic Co-operation and Development; and IMF staff estimates.
Note: Output volatility is defined as the standard deviation of the real GDP growth rate over the sample period. Emerging market and developing economies include emerging market and middle-income economies as well as low-income developing countries. For a list of countries in each group, see Economy Groupings in the Methodological and Statistical Appendix.

- The adoption of a fiscal policy rule aimed at capping public debts, budget deficits, or public expenditures more than doubles the intensity of the negative link between government size and output volatility. One reason is that fiscal rules, when properly designed and implemented, better preserve fiscal space (room for policy maneuver), which can then be used when needed for stabilization purposes. By constraining policy discretion, well-designed fiscal rules can encourage greater reliance on automatic stabilizers and foster a systematically less procyclical stance.
- Openness to trade also matters. An increase in trade flows by 10 percent of GDP is associated with a doubling of the dampening effect of government size on growth volatility. The underlying idea is that more open economies are intrinsically more susceptible to external shocks, which creates public demand for fiscal stabilization and larger government (Rodrik 1998). The argument may also extend

### Figure 2.12. Impact of Fiscal Stabilization and Government Size on Output Volatility
*(Percent)*

After taking into account potential determinants of output volatility, greater fiscal stabilization appears to dampen volatility by a significant amount in advanced economies and by a lesser but still noticeable amount in emerging market and developing economies.

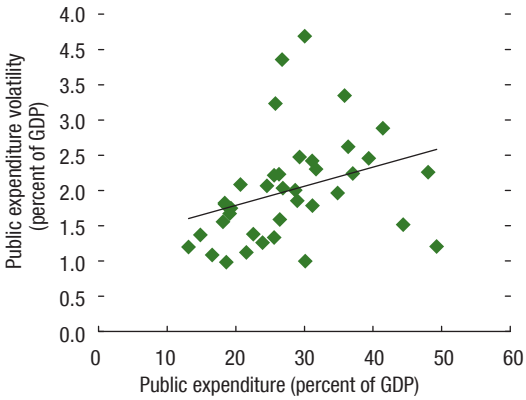



Sources: Mauro and others 2013; World Bank; and IMF staff estimates.
Note: Estimates are based on Arellano-Bond (1991) system generalized method of moments. Output volatility is defined as the standard deviation of the real GDP growth rate over five-year fixed windows. Emerging market and developing economies include emerging market and middle-income economies as well as low-income developing countries. For a list of countries in each group, see Economy Groupings in the Methodological and Statistical Appendix.
** $p < 0.05$; *** $p < 0.01$.

### Figure 2.13. Emerging Market and Developing Economies: Government Size and Output Volatility

In emerging market and developing economies, larger governments tend to exhibit greater expenditure volatility. In turn, more volatile government spending is associated with more unstable output.

**1. Government Size and Public Expenditure Volatility**




**2. Public Expenditure and Output Volatility**


Sources: European Commission; Mauro and others 2013; Organisation for Economic Co-operation and Development; and IMF staff estimates.
Note: Volatility is defined by the average of a five-year rolling window of the standard deviation of the relevant variable, which corresponds to real GDP growth for output. The black line shows an ordinary least squares regression line. Emerging market and developing economies include emerging market and middle-income economies as well as low-income developing countries. For a list of countries in each group, see Economy Groupings in the Methodological and Statistical Appendix.

to the composition of tax and expenditure, which more open economies might deliberately make more stabilizing at a given size of government.[17]

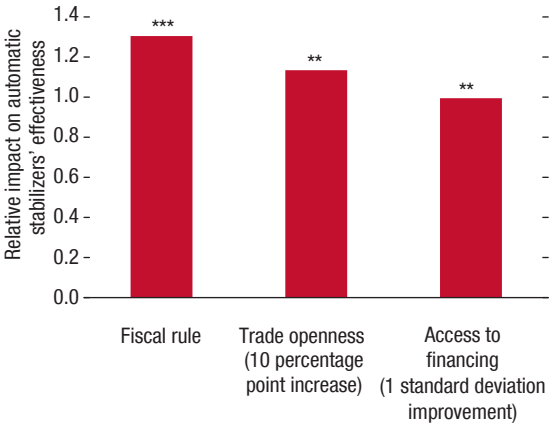
- Easier financing conditions—captured by an index of a country's ability to finance its official, commercial, and trade debt obligations—seem to increase the mitigating effect of government size on output volatility. This result indicates that countries facing easier financing conditions may rely relatively more on automatic stabilizers to provide fiscal stabilization than countries with less stable financing conditions, which would have to rely more on nonautomatic stabilization measures when conditions allow.

To sum up, fiscal policy can substantially reduce output volatility. However, certain costs potentially associated with large governments can negate the benefits of automatic stabilizers in emerging market and developing economies. By contrast, automatic stabilizers seem to have a strong moderating effect on output variations in advanced economies. More broadly, easier financing conditions and fiscal rules—both contributing to fiscal space—seem to create conditions that allow stabilizers to operate more freely.

[17] Direct statistical tests of this conjecture, such as assessing the impact of social spending, proved inconclusive.

### Figure 2.14. Advanced Economies: Factors that Boost the Effectiveness of Automatic Stabilizers

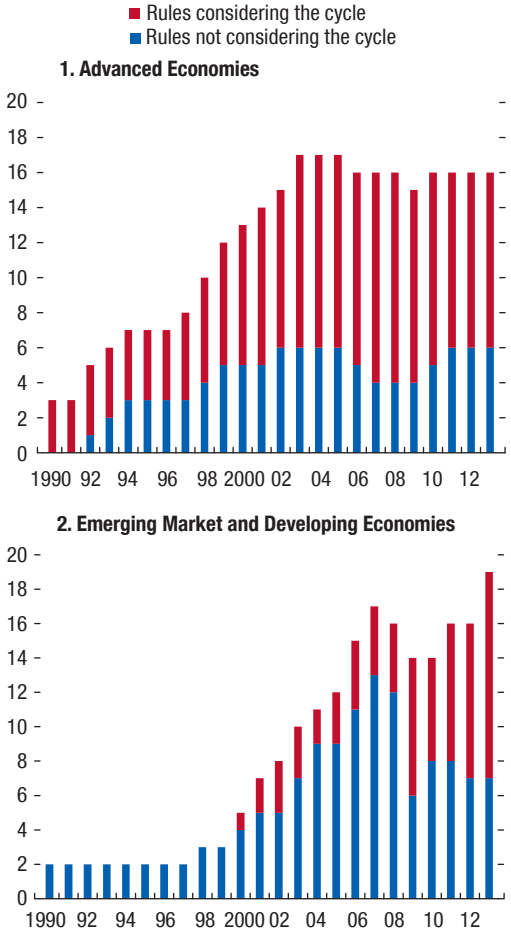
Three factors appear to affect the impact of automatic stabilizers on output volatility: a fiscal policy rule to constrain policy discretion, openness to trade, and a country's ability to access financing.




Sources: IMF Fiscal Rules database; World Bank; and IMF staff estimates.
Note: Figure estimates use weighted least squares, with weights inversely proportional to the estimation error of the effectiveness coefficients. The number on the vertical axis is the ratio of the estimated impact of the scenario specified on the horizontal axis to the average effectiveness coefficient. For a list of advanced economies, see Economy Groupings in the Methodological and Statistical Appendix.
** $p < 0.05$; *** $p < 0.01$.

### Figure 2.15. Budget Balance Rules: Contingent on the Economic Cycle?
*(Number of rules)*

In advanced economies, deficit caps embedded in fiscal rules often vary with the state of the economy, leaving room for automatic stabilizers to operate more freely. A similar trend is apparent in emerging market and developing economies after the global financial crisis.




Source: IMF Fiscal Rules database.
Note: Rules refer to national budget balance rules. They are considered to take into account the cycle if their target is specified in cyclically adjusted or structural terms or if they are associated with a well-specified escape clause.

This analysis has two important policy implications:

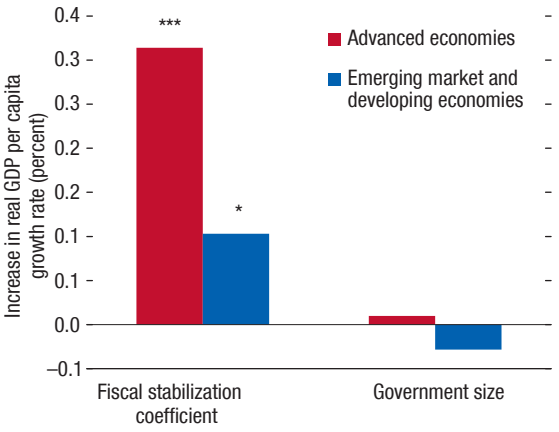
- First, fiscal frameworks aimed at cementing governmental commitment to debt sustainability should explicitly incorporate the flexibility needed to allow for fiscal stabilization in bad times while enforcing strict control over expenditure in good times. This can be achieved by the use of escape clauses or the formulation of such limits in cyclically adjusted terms, as is the case in a growing number of countries (Figure 2.15).
- Second, because automatic stabilizers have adverse side effects, efforts to enhance their effectiveness should focus on modalities that minimize inefficiencies. For instance, raising marginal tax rates to make the tax system more progressive or expanding social transfers could potentially have an adverse impact on individual incentives to work and create jobs. Alternative options discussed in Box 2.2 could include measures to reduce the procyclicality inherent to certain tax deductions (investment or mortgage interest payments) or conditioning the parameters of certain transfers (such as the replacement rate of lost labor income or the maximum duration of unemployment benefits) on the state of the economy or the labor market.

## *Does Lower Volatility Lead to Higher Medium-Term Growth?*

A large body of research suggests that volatility may have detrimental effects on long-term growth (Ramey and Ramey 1995), at least for countries with less well-

### Figure 2.16. Fiscal Stabilization and Medium-Term Growth

Lower output volatility induced by greater fiscal stabilization can boost medium-term economic growth by about 0.3 percentage point a year in advanced economies and 0.1 percentage point in emerging market and developing economies.




Sources: European Commission; Mauro and others 2013; Organisation for Economic Co-operation and Development; and IMF staff estimates.
Note: Emerging market and developing economies include emerging market and middle-income economies as well as low-income developing countries. For a list of countries in each group, see Economy Groupings in the Methodological and Statistical Appendix.
** $p < 0.10$; *** $p < 0.01$.

developed financial markets (Aghion and Marinescu 2008). Because lower macroeconomic uncertainty can encourage investment and boost social capital, the greater output stability attributable to fiscal stabilization could have positive repercussions on the level of growth.[18]

The existing empirical evidence on the links between fiscal stabilizers and growth is mixed. While more activist fiscal policy (which is often procyclical) has been associated with lower growth (Fatás and Mihov 2003, 2013), large governments (which translates into higher automatic stabilization) can also be detrimental to growth (Afonso and Furceri 2010; Afonso and Jalles 2012, forthcoming).

Did the lower output volatility induced by fiscal stabilization have positive consequences for growth in the sample considered here?[19] The empirical relationships between fiscal stabilization and volatility on the one hand and between volatility and growth on the other suggest that stronger fiscal stabilization is good for growth. Specifically, increasing the fiscal stabilization coefficient by one standard deviation (about 0.1) could boost medium-term growth, through its effect on output volatility, by about 0.3 percentage point in advanced economies and by 0.1 percentage point in emerging market and developing economies (Figure 2.16). [20]

## Conclusion

The analyses in this chapter extend a large body of research showing that fiscal policy is an effective tool for smoothing fluctuations in output. When the ability to use monetary policy to stabilize output is more limited, exploiting the stabilizing potential of fiscal policy can yield important benefits—provided, of course, that output stabilization is an appropriate policy priority and that available financing leaves room for policy changes.

The findings in this chapter remain subject to the inherent difficulty of establishing causal relationships between policy variables and economic outcomes. However, they suggest that fiscal policies often contribute to output stabilization. In advanced economies, fiscal stabilization has been the norm, and it has been strengthened over time in a number of countries. In contrast, fiscal policy has rarely been stabilizing in emerging market and developing economies, reflecting in part the nature of their growth dynamics (largely supply driven), and the priority given to developmental needs over aggregate demand management. Countries that use fiscal policy to stabilize output tend to do so when it is most effective—that is, during periods of economic slack (when demand trails potential output) and in response to short-lived output variations. However, fiscal policy is generally not used to mitigate booms. In fact, it is instead used to counteract the operation of stabilizers in good times. Pursuing fiscal stabilization only in bad times can undermine public debt sustainability because governments fail to take advantage of stronger growth to lower deficits and to rebuild fiscal buffers in preparation for future downturns.

Automatic stabilizers play a central role in fiscal stabilization. They account for up to two-thirds

[18] As Chapter 4 of the April 2015 *World Economic Outlook* suggests, depressed private investment observed after the global economic and financial crisis is likely to be less related to uncertainty than that before the crisis.

[19] The sample consisted of panel data using five-year fixed windows. See Annex 2.1 for details.

[20] In addition to showing that fiscal stabilization is good for economic growth, this exercise suggests that the measure of fiscal stabilization is not influenced by output volatility (see Annex 2.1).

of overall fiscal stabilization in advanced economies and one-third in emerging market and developing economies—albeit with substantial differences across countries. Because stabilizers are largely proportional to government size and the relative importance of certain social transfers, they can be associated with significant adverse side effects.

Fiscal stabilization moderates the variability of output, with positive repercussions on medium-term growth, particularly in advanced economies. In these countries, beefing up fiscal stabilization (by one standard deviation of the fiscal stabilization measure) could conceivably boost medium-term growth by about 0.3 percentage point. Easier financing conditions and fiscal rules—which help create room for fiscal maneuvering—foster an environment in which automatic stabilizers can operate more freely.

Overall, countries willing and able to use fiscal policy as a stabilization tool can benefit from letting automatic stabilizers play freely during both downturns and upturns. Mitigating growth accelerations as much as decelerations would augment the contribution of fiscal policy to output stability and growth and suppress a source of upward pressure on public debt. When automatic stabilizers fall short of stabilization needs, governments could consider options to better incorporate stabilization measures into the design of taxes and transfers. Last, but not least, sound fiscal institutions in the form of well-designed fiscal rules and medium-term frameworks can promote fiscal stabilization by enabling uninterrupted access to borrowing at favorable conditions, ensuring expenditure control over the entire cycle, and leaving flexibility to respond to output shocks.

## Annex 2.1. Empirical Methodology

This annex provides details on data sources and empirical methodologies used in this chapter. It also displays the quantitative results discussed in the main text.

### *Data Sources*

The primary sources for this chapter are the IMF's *International Financial Statistics* (IFS), *Balance of Payments Statistics*, *Direction of Trade Statistics*, World Economic Outlook database, *Global Data Source,* and fiscal rules and exchange rate regime databases; the European Commission's AMECO database; the World Bank's *World Development Indicators*; the Macro Data Guide Political Constraint Index Dataset (POLCON); and *International Country Risk Guide* data.

Data for all variables of interest are collected on an annual basis from 1970 to 2013, where available.

### *Fiscal Stabilization—Conceptual Framework and Measurement*

Measuring the stabilizing effect of fiscal policy first requires assessing how fiscal policy affects aggregate demand. The budget-balance-to-GDP ratio is an appropriate proxy for the effect of fiscal policy on aggregate demand (see, for example, Blanchard 1993). The fiscal stabilization coefficients are obtained from simple regressions of the overall budget balance on the output gap.

$$OB_{it} = \alpha + \beta \times gap_{it} + \varepsilon_{it}, \qquad \text{(A2.1.1)}$$

in which $\beta$ captures the degree of fiscal stabilization. This equation is estimated by ordinary least squares for each country for which at least 17 yearly observations are available. To explore whether fiscal stabilization varies depending on the phase of the business cycle, the Granger and Terasvirta (1993) smooth transition autoregressive (STAR) model is applied.[21] Because fiscal policy changes affect the output gap, the relationship (equation A2.1.1) is not causal, and the coefficient estimated by ordinary least squares is biased downward.

Instrumental variables estimates (using growth in trade partners or lagged output gaps as instruments) did not yield satisfactory results for most countries. Panel estimates nevertheless suggest the existence of a downward bias, although its magnitude cannot be ascertained (see Annex Figure 2.1.1).

Annex Tables 2.1.1a and 2.1.1b show the country-specific stabilization coefficients of equation (A2.1.1) for advanced and emerging market and developing economies, respectively.

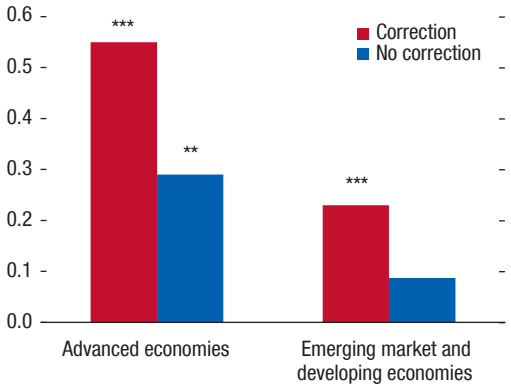
### *Determinants of Fiscal Stabilization*

The determinants of overall fiscal stabilization are assessed by first re-estimating equation (A2.1.1) allowing for time-varying slope coefficients on the growth regressor. This is done using the time-varying coefficients model proposed by Schlicht (1985, 1988). Annex Table 2.1.2 shows the estimated coefficients for selected years (1980, 1995, 2013) in advanced

[21] The following regression is estimated: $OB_{it} = \alpha + \beta^R \times gap_{it} \times G(z_{it}) + \beta^E \times gap_{it} \times [1 - G(z_{it})] + \varepsilon_{it}$, with $G(z_{it}) = [exp(-\gamma z_{it})/(1 + exp(-z_{it}))]$, $\gamma > 0$, in which $z$ is a normalized indicator of the state of the economy with zero mean and unit variance.

### Annex Figure 2.1.1. Impact of the Output Gap on the Fiscal Balance
*(Percent of GDP)*

Panel estimates show that statistical corrections accounting for reverse causality between fiscal policy and output leads to higher stabilization coefficients on average. The country-specific fiscal stabilization coefficients discussed in the main text are thus likely to lie in the lower range of plausible estimates.




Source: IMF staff estimates.
Note: The underlying econometric specification corresponds to equation (A2.1.1) in Annex 2.1. "No correction" denotes an ordinary least squares regression with country and time fixed effects. "Correction" denotes a system generalized method of moments regression with country and time fixed effects, where the output gap has been instrumented by its own lags. Emerging market and developing economies include emerging market and middle-income economies as well as low-income developing countries. For a list of countries in each group, see Economy Groupings in the Methodological and Statistical Appendix.
** $p < 0.05$; *** $p < 0.01$.

economies. The estimated time-varying coefficients ($\widehat{FS}_{it}$) are used as dependent variables in the following regression:

$$\widehat{FS}_{it} = \alpha_i + \gamma_t + \delta X_{it} + \varepsilon_{it}. \qquad \text{(A2.1.2)}$$

$\alpha_i$ and $\gamma_t$ denote country and time fixed effects, respectively. $X_{it}$ is a vector of fiscal variables of interest, including government size (such as total public expenditures), social expenditures, and subcomponents (unemployment benefits, health spending, and so on) as a percent of GDP. Equation (A2.1.2) is estimated with the weighted least squares technique using the inverse of the standard deviation of $\widehat{FS}_{it}$. Annex Table 2.1.3 shows the impact of total social expenditures and their components on fiscal stabilization. The relevance of financing constraints was inspected by including, as a possible determinant of fiscal stabilization, alternative proxies such as a financial stress indicator (Cardarelli, Elekdag, and Kose 2009), sovereign bond yields, real effective interest rates on 10-year bonds, and a financial risk rating index (*International Country Risk Guide*). However, results were not conclusive.

### Annex Table 2.1.1a. Advanced Economies: Country-Specific Estimations

| Dependent Variable: Overall Balance | | |
|---|---|---|
| Regressor | GDP Growth | Output Gap |
| Australia | 0.651*** | 0.869*** |
| Austria | 0.040 | 0.496*** |
| Belgium | 0.392 | 0.469 |
| Canada | 0.433 | 1.065*** |
| Cyprus | 0.468*** | 0.700* |
| Czech Republic | 0.185* | 0.582** |
| Denmark | 0.215 | 1.292*** |
| Estonia | 0.201*** | 0.150* |
| Finland | 0.425*** | 1.258*** |
| France | 0.646*** | 0.842*** |
| Germany | 0.176 | 0.545** |
| Greece | 0.395** | –0.460 |
| Hong Kong SAR | 0.410** | 0.737*** |
| Iceland | 0.678*** | 0.434 |
| Ireland | 1.232*** | 0.978 |
| Italy | –0.608** | 0.594 |
| Japan | 0.601*** | 0.912*** |
| Korea | 0.042 | 0.257** |
| Latvia | 0.309*** | 0.288 |
| Luxembourg | 0.278** | 0.484** |
| Netherlands | 0.395** | 0.767** |
| New Zealand | 0.918*** | 1.258*** |
| Norway | –0.149 | 1.737** |
| Portugal | 0.132 | 0.129 |
| Singapore | 0.667*** | 0.789** |
| Slovak Republic | 0.470*** | 0.441* |
| Slovenia | 0.601** | 0.671* |
| Spain | 1.028*** | 1.055** |
| Sweden | 0.369 | 1.268* |
| Switzerland | 0.492** | 0.556** |
| United Kingdom | 0.537*** | 0.653* |
| United States | 0.548** | 0.903*** |

Source: IMF staff estimates.
Note: Fiscal stabilization coefficients are obtained from ordinary least squares regressions of the overall budget balance on either the output gap or the GDP growth for countries with at least 17 observations. Robust (clustered) standard errors were computed but are not shown. A constant term was included but is not reported for reasons of parsimony. See equation (A2.1.1) in Annex 2.1 for further details.
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

## The Macroeconomic Dividends of Fiscal Stabilization

### *Impact of Fiscal Stabilization on Output Volatility*

The analysis extends the work by Fatás and Mihov (2001) and Debrun and Kapoor (2010). A dynamic panel approach is used to control unobserved country and time fixed effects. The empirical model is as follows:

$$\sigma_{it} = \alpha + \phi_0\sigma_{it-1} + \phi_1\widehat{FS}_{it} + \phi_2 FVOL_{it} + \sum_{j=1}^{J}\lambda_j X_{jit} + \theta_i + \Psi_t + v_{it}. \qquad \text{(A2.1.3)}$$

$i = 1, \ldots N$ denote countries, and $t = 1, \ldots T$ denote non-overlapping, five-year averages. $\sigma_{it}$ is the standard

### Annex Table 2.1.1b. Emerging Market and Developing Economies: Country-Specific Estimations

| Dependent Variable: Overall Balance | | |
|---|---|---|
| Regressor | GDP Growth | Output Gap |
| Algeria | 0.722 | 1.946** |
| Argentina | 0.343** | 0.476* |
| Bangladesh | –0.071*** | –0.264*** |
| Benin | –0.423 | –0.826 |
| Bolivia | 1.640*** | 0.705 |
| Brazil | 0.340** | 0.263 |
| Burkina Faso | –0.158 | 0.461 |
| Cambodia | 0.329* | 0.659*** |
| Chad | –0.059 | 0.221* |
| Chile | 0.493*** | 0.925*** |
| China | 0.084 | 0.042 |
| Colombia | 0.492*** | 0.304 |
| Democratic Republic of the Congo | 0.017 | –0.170 |
| Republic of Congo | 1.716*** | 0.549 |
| Côte d'Ivoire | –0.017 | 0.240 |
| Dominican Republic | 0.428*** | 0.398** |
| Ecuador | 0.320*** | –0.079 |
| Ethiopia | 0.080*** | 0.014 |
| Ghana | –0.074 | –0.312 |
| Guinea | 0.847* | 1.465 |
| Haiti | –0.323** | –0.200 |
| Hungary | –0.365 | –0.135 |
| India | 0.127 | 0.569** |
| Indonesia | 0.107*** | 0.128 |
| Iran | 0.131 | –0.012 |
| Kenya | 0.258 | 0.367 |
| Kuwait | 0.763 | 2.889*** |
| Libya | 0.300*** | 0.437*** |
| Madagascar | 0.306** | 0.085 |
| Malaysia | 0.269 | 0.450 |
| Mexico | 0.074 | 0.398*** |
| Moldova | 0.299*** | 0.247 |
| Mongolia | 0.275** | –0.295 |
| Morocco | –0.009 | 0.181 |
| Mozambique | 0.313** | 0.423* |
| Niger | 0.363 | 0.579 |
| Oman | –0.019 | –0.479 |
| Pakistan | 0.322* | –0.535 |
| Papua New Guinea | –0.180 | 0.030 |
| Philippines | 0.200 | 0.589*** |
| Poland | 0.293* | 0.634** |
| Qatar | 0.228 | –0.010 |
| Rwanda | 0.161*** | 0.051 |
| Sri Lanka | 0.219** | 0.055 |
| Sudan | 0.159 | –0.301 |
| Tanzania | –0.288 | 1.110* |
| Thailand | 0.343*** | 0.766*** |
| Uganda | 0.053 | –0.553 |
| Ukraine | 0.111 | 0.088 |
| Uzbekistan | 0.635 | 0.645 |
| Venezuela | 0.060 | –0.324* |
| Yemen | 0.100 | –0.002 |

Source: IMF staff estimates.
Note: Fiscal stabilization coefficients are obtained from ordinary least squares regressions of the overall budget balance on either the output gap or the GDP growth for countries with at least 17 observations. Robust (clustered) standard errors were computed but are not shown. A constant term was included but is not reported for reasons of parsimony. See equation (A2.1.1) in Annex 2.1 for further details.
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

### Annex Table 2.1.2. Advanced Economies: Time-Varying Coefficients of Fiscal Stabilization, Selected Years

| | 1980 | 1995 | 2013 |
|---|---|---|---|
| Australia | . . . | 0.655 | 0.655 |
| Austria | 0.420 | 0.420 | 0.420 |
| Belgium | 0.510 | 0.511 | 0.511 |
| Canada | 0.760 | 0.760 | 0.760 |
| Czech Republic | . . . | 0.427 | 0.427 |
| Denmark | 0.822 | 0.822 | 0.822 |
| Estonia | . . . | 0.186 | 0.142 |
| Finland | 0.253 | 1.074 | 0.701 |
| France | 0.660 | 0.670 | 0.858 |
| Germany | . . . | 0.577 | 0.577 |
| Greece | 0.017 | 0.017 | 0.017 |
| Hong Kong SAR | . . . | 0.639 | 0.639 |
| Iceland | 0.307 | 0.307 | 0.306 |
| Italy | 0.531 | 0.531 | 0.531 |
| Japan | 0.323 | 0.753 | 0.766 |
| Korea | 0.184 | 0.230 | 0.894 |
| Luxembourg | . . . | 0.216 | 0.496 |
| Netherlands | 0.626 | 0.698 | 0.852 |
| New Zealand | . . . | 0.698 | 0.748 |
| Norway | 0.824 | 1.359 | 1.750 |
| Portugal | –0.081 | 0.202 | 0.384 |
| Singapore | . . . | 0.899 | 0.899 |
| Slovak Republic | . . . | 0.424 | 0.425 |
| Sweden | 0.550 | 0.550 | 0.550 |
| United Kingdom | 0.207 | 0.928 | 1.039 |
| United States | 0.560 | 0.809 | 1.515 |

Sources: European Commission; Organisation for Economic Co-operation and Development; and IMF staff estimates.
Note: Estimates use the time-varying coefficient models by Schlicht (1985, 1988). Columns show selected years' coefficients by country.

deviation of real GDP growth; $\theta_t$ and $\Psi_t$ denote country and period fixed effects. $\sigma_{it-1}$ captures the persistence of output volatility. $\widehat{FS}_{it}$ denotes the estimated time-varying fiscal stabilization or government size (government expenditure in percent of GDP). $FVOL_{it}$ measures the residual volatility of fiscal policy. $X_j$'s are control variables, including trade openness, real GDP per capita growth, private credit as percent of GDP, population size, inflation volatility, and the exchange rate regime. $v_{it}$ is the error term. Potential endogeneity issues are addressed using standard instrumental variables techniques.[22] Annex Table 2.1.4 shows the impact of fiscal stabilization and government size on output volatility using both techniques.

### *Factors that Influence the Effectiveness of Automatic Stabilizers*

The effectiveness of automatic stabilizers is also analyzed through a two-step approach. In the first step, time-varying effectiveness coefficients are estimated for each country following the model:

[22] The system generalized method of moments is used to address this potential bias. Following Fatás and Mihov (2013), institutional variables (lags of constraints on the executive, presidential, parliamentary, proportional, and majority electoral systems) are used as instrumental variables. As robustness checks, the within estimator with country fixed effects is also applied.

## Annex Table 2.1.3. Determinants of Fiscal Stabilization

| | Dependent Variable: Fiscal Stabilization | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Output Volatility | –0.037*** | –0.038* | –0.039*** | –0.038*** | 0.014 | –0.048*** | –0.045** | –0.033** | –0.043** | –0.013 |
| | (0.010) | (0.021) | (0.013) | (0.010) | (0.012) | (0.014) | (0.016) | (0.015) | (0.017) | (0.023) |
| Trade Openness | 0.005 | 0.035 | 0.025 | 0.092 | –0.056 | 0.006 | 0.025 | –0.041 | 0.016 | –0.218*** |
| | (0.090) | (0.085) | (0.095) | (0.093) | (0.101) | (0.099) | (0.096) | (0.103) | (0.096) | (0.035) |
| GDP per Capita | 0.481*** | 0.577** | 0.587*** | 0.558*** | 0.375 | 0.662*** | 0.673*** | 0.679*** | 0.669** | 0.121 |
| | (0.157) | (0.231) | (0.200) | (0.142) | (0.325) | (0.207) | (0.218) | (0.232) | (0.245) | (0.079) |
| Total Social Expenditure | 0.358*** | | | | | | | | | |
| | (0.066) | | | | | | | | | |
| Active Labor Market Policies | | 0.010 | | | | | | | | |
| | | (0.041) | | | | | | | | |
| Family | | | 0.098** | | | | | | | |
| | | | (0.041) | | | | | | | |
| Health | | | | 0.397*** | | | | | | |
| | | | | (0.099) | | | | | | |
| Housing | | | | | 0.010 | | | | | |
| | | | | | (0.035) | | | | | |
| Incapacity | | | | | | 0.201** | | | | |
| | | | | | | (0.079) | | | | |
| Old-Age | | | | | | | 0.156 | | | |
| | | | | | | | (0.095) | | | |
| Other Social Expenditure | | | | | | | | 0.068 | | |
| | | | | | | | | (0.042) | | |
| Survivors | | | | | | | | | 0.003 | |
| | | | | | | | | | (0.055) | |
| Unemployment Benefits | | | | | | | | | | 0.133*** |
| | | | | | | | | | | (0.027) |
| Observations | 747 | 569 | 640 | 651 | 440 | 643 | 643 | 576 | 603 | 630 |
| $R^2$ | 0.863 | 0.859 | 0.852 | 0.869 | 0.889 | 0.859 | 0.851 | 0.845 | 0.833 | 0.446 |

Sources: European Commission; Organisation for Economic Co-operation and Development; World Bank; and IMF staff estimates.
Note: Estimates are based on weighted least squares regression, with the multiplicative inverse of the standard error of the time-varying coefficient estimates of fiscal stabilization as weights. Robust standard errors are in parentheses. A constant term and time fixed effects were included but are not reported for reasons of parsimony.
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

$$\sigma_{it,t+5} = \alpha + \phi_{1it}\, GS_{it} + \vartheta_{it}. \quad \text{(A2.1.4)}$$

$\sigma_{it,t+5}$ is the volatility of GDP growth, and $GS_{it}$ denotes government size of country $i$ in year $t$. Equation (A2.1.4) allows the estimation of a time-varying coefficient $\hat{\phi}_{1_{it}}$ by assigning greater weights to the observations closest to the reference year (see Aghion and Marinescu 2008).[23] In the second step, the coefficients $\hat{\phi}_{1_{it}}$ are regressed on variables that can potentially influence the effectiveness of automatic stabilizers:

$$\hat{\phi}_{1_{it}} = \gamma + \delta^k F^k_{it} + \sum_{j=1}^{j} \lambda_j X_{jit} + \theta_i + \Psi_t + \varepsilon_{it}. \quad \text{(A2.1.5)}$$

$F^k_{it}$ denotes the factors of interest, including fiscal rules, financing constraints, and trade openness. $\delta^k$ captures the marginal impact on the effectiveness coefficients. The $X_j$'s are control variables, including financial depth, inflation volatility, exchange rate regime, population size, and the volatility of fiscal policy. $\theta_i$ and $\Psi_t$ are the country and year fixed effects, respectively. $\varepsilon_{it}$ is the error term. Equation (A2.1.5) is estimated with the weighted least squares technique using the inverse of the standard deviation of $\hat{\phi}_{1_{it}}$. Annex Table 2.1.5 reports the estimates of the determinants of the time-varying estimates of the effectiveness of automatic stabilizers for non-oil advanced economies.

[23] In practice, the local Gaussian-weighted ordinary least squares are applied.

### *Impact of Fiscal Stabilization on Real Output Growth*

This section examines the impact of fiscal stabilization on growth, through its effect on output volatility. A growth equation similar to that of Ramey and Ramey (1995) and Fatás and Mihov (2003) is estimated. The relationship is represented as follows:

## Annex Table 2.1.4. Fiscal Stabilization, Government Size, and Output Volatility

| Dependent Variable: Fiscal Stabilization | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | System Generalized Method of Moments | | | | Within Fixed Effects | | | |
| | AEs (1) | EMDEs (2) | AEs (3) | EMDEs (4) | AEs (5) | EMDEs (6) | AEs (7) | EMDEs (8) |
| Fiscal Stabilization | –1.439*** | –0.763*** | | | –1.385*** | –1.514** | | |
| | (0.467) | (0.176) | | | (0.382) | (0.604) | | |
| Government Size | | | –1.846** | 1.564*** | | | –2.369*** | 0.405 |
| | | | (0.671) | (0.439) | | | (0.841) | (0.760) |
| Lagged Output Volatility | –0.162* | 0.162*** | –0.226** | 0.172*** | –0.163 | –0.117 | –0.177 | –0.122 |
| | (0.093) | (0.026) | (0.089) | (0.027) | (0.108) | (0.074) | (0.104) | (0.073) |
| Trade Openness | 0.005** | 0.009** | –0.001 | –0.003 | 0.012** | 0.013 | 0.012** | 0.013 |
| | (0.002) | (0.004) | (0.003) | (0.006) | (0.005) | (0.016) | (0.005) | (0.017) |
| GDP per Capita Growth | –0.047 | –0.110*** | –0.075 | –0.061*** | –0.242*** | –0.155 | –0.285*** | –0.169 |
| | (0.056) | (0.036) | (0.057) | (0.022) | (0.085) | (0.108) | (0.094) | (0.107) |
| Volatility Inflation | 0.164*** | 0.046*** | 0.192*** | 0.060*** | 0.055 | 0.009 | 0.044 | 0.013 |
| | (0.047) | (0.006) | (0.038) | (0.009) | (0.040) | (0.025) | (0.049) | (0.026) |
| Exchange Rate | 0.203 | –0.006 | –0.249** | –0.151*** | –0.028 | 0.166* | –0.031 | 0.179** |
| | (0.138) | (0.025) | (0.115) | (0.051) | (0.114) | (0.087) | (0.132) | (0.086) |
| Population | –0.022 | 0.148 | 0.003 | 0.19 | –4.275** | –0.358 | –3.910** | –0.666 |
| | (0.145) | (0.092) | (0.326) | (0.115) | (1.751) | (0.902) | (1.752) | (0.934) |
| Credit-to-GDP ratio | 0.042 | 1.957*** | –0.127 | 1.561** | 0.185 | 3.679** | –0.201 | 3.225** |
| | (0.391) | (0.463) | (0.322) | (0.623) | (0.339) | (1.390) | (0.361) | (1.341) |
| Fiscal Volatility | 0.759*** | 0.154*** | 0.482*** | 0.104*** | 0.252** | –0.031 | 0.210* | –0.039 |
| | (0.163) | (0.056) | (0.123) | (0.038) | (0.099) | (0.088) | (0.118) | (0.087) |
| Observations | 154 | 143 | 154 | 143 | 154 | 143 | 154 | 143 |
| $R^2$ | | | | | 0.369 | 0.27 | 0.358 | 0.243 |
| Countries | 29 | 42 | 29 | 42 | 29 | 42 | 29 | 42 |
| Hansen test (*p*-value) | 1.000 | 0.887 | 1.000 | 0.938 | | | | |
| AR(2) | 0.887 | 0.318 | 0.336 | 0.13 | | | | |
| AR(1) | 0.035 | 0.016 | 0.018 | 0.007 | | | | |

Sources: World Bank; and IMF staff estimates.
Note: Estimates are based on Arellano and Bond (1991) system generalized method of moments. Robust standard errors are in parentheses. The Hansen test evaluates the validity of the instrument set; that is, it tests for over-identifying restrictions. AR(1) and AR(2) are *p*-values of the Arellano-Bond autocorrelation tests of first and second order (the null is no autocorrelation), respectively. The set of instruments includes the lags of constraints on the executive, presidential, parliamentary, proportional electoral, and majoritarian electoral systems. A constant term and time fixed effects were included but are not reported for reasons of parsimony. AEs = advanced economies; EMDEs = emerging market and developing economies, which include emerging market and middle-income economies as well as low-income developing countries. For a list of countries in each group, see Economy Groupings in the Methodological and Statistical Appendix.
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

$$\Delta y_{it} = \alpha_i + \gamma_t + \theta\hat{\sigma}_{it} + \tau' X_{it} + \mu_{it}. \qquad \text{(A2.1.6)}$$

$i = 1, \ldots N$ denote countries and $t = 1, \ldots T$ denote non-overlapping five-year averages. $y_{it}$ denotes the logarithm of real GDP per capita; $\hat{\sigma}_{it}$ is the part of output volatility driven by fiscal stabilization (that is, the fitted value of output volatility from a panel regression of the standard deviation of the output gap on the estimated measure of fiscal stabilization).[24] $X_{it}$ denotes a vector of control variables, including the initial level of GDP per capita, government size, human capital, trade openness, price of investment, inflation rate, and output volatility. $\alpha_i$, $\gamma_t$ are country and time effects. $\mu_{it}$ is the error term.

The results presented in Annex Table 2.1.6 show that reduced volatility in output induced by fiscal stabilization has positive consequences for growth. In particular, an increase of one standard deviation in the measure of fiscal stabilization increases output growth, *through its effect on output volatility*, by about

[24]To correct for potential endogeneity, the fiscal stabilization coefficient is instrumented using the lags of constraints on the executive, presidential, parliamentary, proportional, and majority electoral systems; econometric tests validate the use of these instruments. Standard errors are also adjusted in a sequential two-step procedure to account for the use of an explanatory variable that is subject to a known measurement error (since it has been estimated).

## Annex Table 2.1.5. Advanced Economies: Factors Driving the Effectiveness of Automatic Stabilizers

| Dependent Variable: Automatic Stabilizers Effectiveness Coefficients ($\hat{\phi}_{1it}$) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Trade Openness | –0.00278*** | –0.00294*** | –0.00282*** | –0.00304*** | –0.00566** | –0.00270*** | –0.00540** |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) | (0.002) |
| Credit-to-GDP ratio | 0.00047 | 0.00059 | 0.00041 | 0.00045 | 0.00027 | 0.00054 | –0.00020 |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Inflation Volatility | –0.00762 | –0.00673 | –0.00716 | –0.00694 | 0.00497 | –0.00335 | –0.00614 |
| | (0.006) | (0.007) | (0.007) | (0.007) | (0.012) | (0.009) | (0.015) |
| Exchange Rate Regime | 0.00572 | 0.00656 | 0.00465 | 0.00492 | –0.00638 | –0.00016 | –0.00728 |
| | (0.008) | (0.008) | (0.008) | (0.008) | (0.013) | (0.009) | (0.010) |
| Population | 0.04470 | 0.14725 | 0.09089 | 0.10574 | 1.12236* | 0.13997 | 0.41922 |
| | (0.368) | (0.394) | (0.383) | (0.393) | (0.561) | (0.400) | (0.458) |
| Fiscal Volatility | 0.00502 | 0.00186 | 0.00281 | 0.00229 | –0.02067* | 0.00048 | –0.00651 |
| | (0.007) | (0.008) | (0.007) | (0.008) | (0.011) | (0.008) | (0.009) |
| Fiscal Rule | –0.06912*** | | | | | | –0.06214*** |
| | (0.023) | | | | | | (0.020) |
| Expenditure Rule | | –0.05839* | | | | | |
| | | (0.029) | | | | | |
| Balanced Budget Rule | | | –0.06229** | | | | |
| | | | (0.023) | | | | |
| Debt Rule | | | | –0.05631*** | | | |
| | | | | (0.018) | | | |
| Financial Stress Index | | | | | 0.00041 | | –0.00008 |
| | | | | | (0.003) | | (0.003) |
| Financial Risk Rating | | | | | | 0.00662* | 0.00877** |
| | | | | | | (0.003) | (0.003) |
| Observations | 651 | 651 | 651 | 651 | 483 | 678 | 422 |
| $R^2$ | 0.623 | 0.597 | 0.613 | 0.606 | 0.588 | 0.562 | 0.689 |

Sources: European Commission; Organisation for Economic Co-operation and Development; the PRS Group; IMF Fiscal Rules database; and IMF staff estimates.
Note: Estimates are based on weighted least squares regression, with the multiplicative inverse of the standard error of the time-varying coefficient estimates of the effectiveness of automatic stabilizers as weights. Robust standard errors are in parentheses. A constant term and time fixed effects were included but are not reported for reasons of parsimony.
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

0.3 percentage point in advanced economies and 0.1 percentage point in emerging and developing economies.[25]

In addition to showing that fiscal stabilization is good for economic growth, the results in the second column suggests that the measure of fiscal stabilization is not influenced by output volatility. If there was such influence, the relationship between growth and output volatility would not be affected by the instrumentation of the latter. Instead, the estimated effect of output volatility on growth changes sharply and in the expected direction (ordinary least squared estimates are biased toward zero) when fiscal stabilization is used as an instrument.

[25] An increase of one standard deviation in fiscal stabilization reduces output volatility by about 2 percent.

## Annex Table 2.1.6. Fiscal Stabilization and Medium-Term Growth

| Dependent Variable: Per Capita Real GDP Growth | | | | |
|---|---|---|---|---|
| | All Countries | All Countries | Advanced Economies | Emerging Market and Developing Economies |
| Output Volatility | –0.707*** | | | |
| | (0.108) | | | |
| Predicted Volatility | | –1.373*** | –1.478*** | –0.485* |
| | | (0.397) | (0.458) | (0.291) |
| Investment Price | 1.937** | 3.383** | 0.468 | 3.200*** |
| | (0.766) | (1.325) | (1.504) | (1.07) |
| Initial GDP per capita | –9.491*** | –13.587*** | –12.171*** | –14.281*** |
| | (1.428) | (1.207) | (2.42) | (1.404) |
| Human Capital | 7.306*** | 8.651*** | 6.831*** | 13.140*** |
| | (1.528) | (1.863) | (2.369) | (1.161) |
| Trade Openness | 0.040*** | 0.021 | 0.01 | 0.056*** |
| | (0.015) | (0.016) | (0.012) | (0.011) |
| Government Size | –0.177*** | –0.039 | 0.01 | –0.029 |
| | (0.018) | (0.04) | (0.05) | (0.04) |
| Observations | 266 | 199 | 98 | 101 |
| Countries | 79 | 61 | 21 | 40 |
| Hansen test (*p*-value) | 0.345 | 0.458 | 0.451 | 0.380 |

Source: IMF staff estimates

Note: Regressions are based on the difference generalized method of moments estimator a la Arellano and Bond (1991). "Predicted volatility" denotes the fitted values of a regression of output volatility on our measure of fiscal stabilization, where the latter is instrumented by the lags of constraints on the executive, presidential, parliamentary, proportional electoral, and majoritarian electoral systems. "Investment price" denotes the relative price of investment goods, retrieved from the Penn World Tables (PWT, Version 7.1). The PWT data are translated using investment-specific purchasing power parity exchange rates. Following Greenwood, Hercowitz, and Huffman (1988), and consistent with Hsieh and Klenow (2007), innovations in the relative price of investment were interpreted as reflecting investment-specific technology shocks. See the main text for details. The Hansen test evaluates the validity of the instrument set; that is, it tests for over-identifying restrictions. Robust standard errors are in parentheses. A constant term and country and time fixed effects were included, but not reported for reasons of parsimony. Emerging market and developing economies include emerging market and middle-income economies as well as low-income developing countries. For a list of countries in each group, see Economy Groupings in the Methodological and Statistical Appendix.

*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$.

## Box 2.1. Fiscal Stabilization under Alternative Estimates of the Output Gap

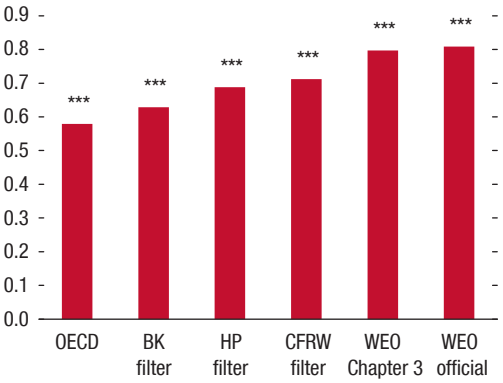
The stabilizing role of fiscal policy can be assessed by estimating the impact of changes in the output gap on the overall fiscal balance. Because the output gap is unobservable, it must be estimated using statistical techniques. This box assesses the sensitivity of stabilization coefficients to different measures of the output gap in a panel of 10 advanced economies from 1990 to 2014.[1]

These measures rely on alternative methodologies to estimate potential output: (1) statistical detrending, such as the Hodrick-Prescott filter, the Baxter-King filter, and the Christiano-Fitzgerald Random Walk filter; (2) estimation of structural relationships, such as the production function from the Organisation for Economic Co-operation and Development,[2] and the multivariate filter (see Chapter 3 of the April 2015 *World Economic Outlook*—WEO);[3] and estimates of the output gaps taken from the WEO database, which are based on assessments by IMF staff economists.

Stabilization coefficients obtained for the panel vary between 0.65 and 0.80 (Figure 2.1.1). Output gaps estimated using the three statistical detrending methods lead to coefficients between 0.65 and 0.70, whereas the two WEO output gaps lead to slightly higher numbers, of around 0.80.

### Figure 2.1.1. Impact of the Output Gap on the Overall Fiscal Balance
*(Percent of GDP)*

Estimates of stabilization coefficients are relatively insensitive to the methodology used to calculate the output gap.




Sources: European Commission; Organisation for Economic Co-operation and Development (OECD); and IMF staff estimates.
Note: Estimates reflect within estimator with country and time fixed effects (with robust standard errors). BK = Baxter King; CFRW = Christiano-Fitzgerald Random Walk; HP = Hodrick Prescott; WEO = April 2015 *World Economic Outlook*.
*** $p < 0.01$.

Overall, estimates of the fiscal stabilization coefficient are not statistically different across alternative measures of the output gap. This reflects the fact that discrepancies between the various estimates are related to the level of the output gap whereas what matters for the estimation of the stabilization coefficients is the rate of change in the output gap over time.

[1] The sample size is dictated by the use of potential output estimates presented in Chapter 3 of the April 2015 *World Economic Outlook*.

[2] See Giorno and others (1995) for details.

[3] Under this approach, estimates of potential output are based on: (1) observations for GDP, inflation, and unemployment; (2) the structural relationships between inflation and unemployment (Phillips curve), and unemployment and output gaps (Okun's law); (3) projected data on growth and inflation to identify shocks, pin down potential growth, and address the end-of-sample problem; and (4) Bayesian estimation. The definition of potential output used in Chapter 3 of the April 2015 *WEO* is GDP consistent with stable inflation.

## Box 2.2. Boosting the Effectiveness of Automatic Stabilizers

Automatic stabilizers effectively smooth output fluctuations without the usual limits associated with discretionary fiscal management (such as implementation delays and irreversibility). However, boosting automatic stabilizers could permanently increase government size and lead to efficiency loss. Based on Baunsgaard and Symansky (2009), this box summarizes possible instruments to automatically trigger stabilization without permanently increasing government size. Accordingly, the legal framework, such as the fiscal code, would include a provision that automatically accelerates fiscal stabilization when a recession threshold is reached and withdraws those measures following a recovery. This "automatizing" mechanism would prevent the need for a political decision and judgment at each phase of the economic cycle.

### *Tax deductions*

*Cyclical investment tax deductions:* Automatic tax credits during recessions are stabilizing because they reduce the cost of capital and stimulate investment (Blanchard, Dell'Ariccia, and Mauro 2013). For instance, in Sweden, cyclical investment tax credits successfully served as countercyclical fiscal measures between the mid-1950s and the mid-1970s (Taylor 1982). During normal times, firms could deduct up to 40 percent of their taxable profit, allocate it to an investment fund, and draw on this fund freely for investment purposes during downturns.

*Cyclical bonus depreciation:* Under this measure, firms may automatically deduct from their taxable profits, as depreciation, a substantial portion of their new investment during recessions (Gravelle 2013). This measure seems to have boosted investment in the United States during the recent global financial crisis and, in particular, provided breathing space to the most liquidity-constrained firms (Zwick and Mahon 2014).

*Cyclical loss-carry backward:* As opposed to loss-carry forward, this measure automatically allows deduction of current corporate losses against past tax payments, leading to immediate refunds. It has been applied in some advanced countries including Canada, France, Germany, the United Kingdom, and the United States. This mechanism can provide hard-hit companies with immediate tax refunds during recessions.

*Uniform personal income tax credits:* Tax credits are preferable to deductions to encourage some socially valued activities (such as education and charitable contributions), while smoothing the economic cycle. The impact of tax credits on disposable income is fixed, whereas the impact of deductions declines during downturns. Uniform credits (that is, an equal credit for all individuals) are recommended because higher-income individuals receive higher effective tax relief under a deduction-based system (Batchelder, Goldberg, and Orszag 2006). This proposed measure applies when the personal income tax rate structure is progressive.

*Cyclical property tax:* To link the collection of property taxes more closely to the real estate cycle, governments could assess property values more frequently. In some cases, such as in Iceland and the Netherlands, this reassessment is carried out annually (Almy 2014). This mechanism would automatically contribute to smoothing the cycle by increasing tax collections during boom periods and reducing taxes during recessions.

*Corporate income tax collections based on current-year estimated income:* As opposed to a corporate income tax based on actual income of the previous year, this approach—which is already in use in many countries—allows linking tax collections to the current state of the economy more closely. The corporate income tax would be expected to play its stabilizing role more quickly as tax collections would be reduced more swiftly following initial signs of downturns and reversed more rapidly during recovery.

### *Expenditure*

*Automatic transfers to local governments:* Subnational governments are often bound by balanced budget requirements, which fuel procyclicality, as local expenditure and revenue move together. Making transfers to local governments more contingent on the cycle would help mitigate the adverse impact of fiscal decentralization on macroeconomic stabilization. The legal fiscal framework could include such a provision, to be triggered when the severity of a downturn reaches a predetermined threshold.

*Cyclical adjustment of unemployment benefits:* Policymakers tend to enhance unemployment benefits (duration and amount) during recessions. However, such discretionary decisions often involve information, decision, and implementation lags. Different levels of generosity could be defined ahead of time, to be applied when specific thresholds on labor market indicators are reached. Such a mechanism would mitigate the risk of permanently increasing the generosity in the system.

**Box 2.2 *(continued)***

The success of all these measures depends on appropriate design. Some countries have already experimented with some of these measures and found that they contributed to timely and effective fiscal stabilization without jeopardizing efficiency. The automatic triggers of these measures can include backward-looking indicators, such as a continuous decline in employment, or forward-looking indicators based on projections. The triggers should be appropriately selected: for instance, by an independent fiscal body, to minimize political interference and maximize technical expertise. The design should also prevent distortion of resource allocations, such as delayed investment in anticipation of a cyclical trigger. To that end, the tax administration would have to monitor closely anomalies in investment. Finally, tax administration capacity, fiscal space, and policy credibility should also be taken into account. For instance, in some emerging markets and developing countries with limited tax administration capacity, a corporate income tax based on current year income could be implemented, while a loss-carry backward would be more likely to lead to abuses.

## References


Afonso, A., and D. Furceri. 2010. "Government Size, Composition, Volatility and Economic Growth." *European Journal of Political Economy* 26 (4): 517–32.

Afonso, A., and J. T. Jalles. 2012. "Fiscal Volatility, Financial Crises and Growth." *Applied Economics Letters* 19 (18): 1821–26.

———. 2013. "The Cyclicality of Education, Health, and Social Security Government Spending." *Applied Economics Letters* 20 (7): 669–72.

———. Forthcoming. "Economic Performance, Government Size and Institutional Quality." *Empirica*.

Aghion, P., and I. Marinescu. 2008. "Cyclical Budgetary Policy and Economic Growth: What Do We Learn from OECD Panel Data?" In *NBER Macroeconomics Annual 2007*, Vol. 22, edited by Daron Acemoglu, Kenneth Rogoff, and Michael Woodford. Chicago: University of Chicago Press.

Almy, R. 2014. "Valuation and Assessment of Immovable Property." OECD Working Papers on Fiscal Federalism, No. 19, Organisation for Economic Co-Operation and Development, Paris.

Arellano, M., and S. Bond. 1991. "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *Review of Economic Studies* 58 (2): 277–97.

Auerbach, A. J., and D. R. Feenberg. 2000. "The Significance of Federal Taxes as Automatic Stabilizers." *Journal of Economic Perspectives* 14 (3): 37–56.

Batchelder, L., F. T. Goldberg, and P. Orszag. 2006. "Reforming Tax Incentives into Uniform Refundable Tax Credits." Policy Brief 156, Brookings Institution, Washington.

Baunsgaard, T., and A. Symansky. 2009. "Automatic Fiscal Stabilizers." IMF Staff Position Note 09/23, International Monetary Fund, Washington.

Bénétrix, A. S., and P. R. Lane. 2013. "Fiscal Cyclicality and EMU." *Journal of International Money and Finance* 34 (C): 164–76.

Blanchard, O. J. 1985. "Debt, Deficits and Finite Horizons." *Journal of Political Economy* 93 (2): 223–47.

———. 1993. "Suggestions for a New Set of Fiscal Indicators." In *The Political Economy of Government Debt*, edited by H. A. A. Verbon and F. A. A. M. Van Winden. Amsterdam: Elsevier Science.

Blanchard, O. J., and D. Quah. 1989. "The Dynamic Effects of Aggregate Demand and Supply Disturbances." *American Economic Review* 79 (4): 655–73.

Blanchard, O. J., and L. H. Summers. 1984. "Perspectives on High World Real Interest Rates." *Brookings Papers on Economic Activity* (2): 273–334.

Blanchard, O. J., G. Dell'Ariccia, and P. Mauro. 2010. "Rethinking Macro Policy." IMF Staff Position Note 10/03, International Monetary Fund, Washington.

———. 2013. "Rethinking Macro Policy II: Getting Granular." IMF Staff Discussion Note 13/03, International Monetary Fund, Washington.

Budina, N., B. Gracia, X. Hu, and S. Saksonovs. 2015. "Recognizing the Bias: Financial Cycles and Fiscal Policy." IMF Working Paper, Washington, forthcoming.

Cardarelli, R., S. Elekdag, and M. A. Kose. 2009. "Capital Inflows: Macroeconomic Implications and Policy Responses." IMF Working Paper 09/40, International Monetary Fund, Washington.

Cohen D., and G. Follette. 2000. "The Automatic Fiscal Stabilizers: Quietly Doing Their Thing." FRBNY *Economic Policy Review* (April): 35–67.

Darby, J., and J. Mélitz. 2008. "Social Spending and Automatic Stabilizers in the OECD." *Economic Policy* 23 (56): 715–56.

Debrun, X., and R. Kapoor. 2010. "Fiscal Policy and Macroeconomic Stability: New Evidence and Policy Implications." *Nordic Economic Policy Review* 1 (1): 35–70. See also IMF Working Paper 10/111, International Monetary Fund, Washington.

Debrun, X., J. Pisani-Ferry, and A. Sapir. 2008. "Government Size and Output Volatility: Should We Forsake Automatic Stabilization?" Economic Papers 316, European Commission, Brussels.

Devries, P., J. Guajardo, D. Leigh, and A. Pescatori. 2011. "A New Action-based Dataset of Fiscal Consolidation." IMF Working Paper 11/128, International Monetary Fund, Washington.

Fatás, A., and I. Mihov. 2001. "Government Size and Automatic Stabilizers: International and Intranational Evidence." *Journal of International Economics* 55 (1): 3–28.

———. 2003. "The Case for Restricting Fiscal Policy Discretion." *Quarterly Journal of Economics* 118 (4): 1419–47.

———. 2013. "Policy Volatility, Institutions and Economic Growth." *Review of Economics and Statistics* 95 (2): 362–76.

Furceri, D. 2010. "Stabilization Effects of Social Spending: Empirical Evidence from a Panel of OECD Countries." *The North American Journal of Economics and Finance* 21 (1): 34–48.

Furceri, D., and J. Jalles. 2015. "Fiscal Stabilization: Determinants and Effects." IMF Working Paper, International Monetary Fund, Washington, forthcoming.

Galí, J. 1994. "Government Size and Macroeconomic Stability." *European Economic Review* 38 (1994): 117–32.

Giorno, C., P. Richardson, D. Roseveare, and P. van den Noord. 1995. "Estimating Potential Output, Output Gaps and Structural Budget Balances." Working Paper 152, Economics Department, Organisation for Economic Co-operation and Development, Paris. http://dx.doi.org/10.1787/533876774515.

Girouard, N., and C. André. 2005. "Measuring Cyclically-Adjusted Budget Balances for OECD Countries," Working Paper 434, Economics Department, Organisation for Economic Co-operation and Development, Paris.

Granger, C. W. J., and T. Terasvirta. 1993. *Modelling Nonlinear Economic Relationships.* Oxford, United Kingdom: Oxford University Press.

Gravelle, J. G. 2013. "Using Business Tax Cuts to Stimulate the Economy." Congressional Research Service, Washington.

Greenwood, J., Z. Hercowitz, and G. Huffman. 1988. "Investment, Capacity Utilization, and the Real Business Cycle." *American Economic Review* 78 (3): 402–17.

Hsieh, C-T, and P. J. Klenow. 2007. "Misallocation and Manufacturing TFP in China and India." *Quarterly Journal of Economics* 124 (4): 1403–48.

Mauro, P., R. Romeu, A. J. Binder, and A. Zaman. 2013. "A Modern History of Fiscal Prudence and Profligacy." IMF Working Paper 13/5, International Monetary Fund, Washington.

Mourre, G., C. Astarita, and S. Princen. 2014. "Adjusting the Budget Balance for the Business Cycle: The EU Methodology." European Economy–Economic Papers 536, Directorate General Economic and Monetary Affairs, European Commission, Brussels.

Organisation for Economic Co-operation and Development (OECD). 2014. "New Tax and Expenditure Elasticity Estimates for EU Budget Surveillance." Working Paper 1174, Economics Department, Paris.

Price R., T. Dang, and Y. Guillemette, 2014. "New Tax and Expenditure Elasticity Estimates for EU Budget Surveillance." Working Paper 1174, Paris.

Ramey, G., and V. Ramey. 1995. "Cross-Country Evidence on the Link between Volatility and Growth." *American Economic Review* 85 (5): 1138–51.

Rodrik, D. 1998. "Why Do More Open Economies Have Bigger Governments?" *Journal of Political Economy* 106 (5): 997–1032.

Schlicht, E. 1985. *Isolation and Aggregation in Economics*. New York: Springer-Verlag.

———. 1988. "Variance Estimation in a Random Coefficients Model." Paper presented at the Econometric Society European Meeting, Munich, 1989.

Taylor, J. 1982. "The Swedish Investment Funds System as a Stabilization Policy Rule." *Brookings Papers on Economic Activity* (1): 57–106.

Zwick, E., and J. Mahon. 2014. "Do Financial Frictions Amplify Fiscal Policy? Evidence from the Business Investment Stimulus." Department of Economics, Harvard University, Cambridge, Massachusetts.