

4. Fiscal Multipliers: How Will Consolidation Affect Latin America and the Caribbean?

Lower global commodity prices, slower growth, and the past use of expansionary policies have contributed to rising public debt in many countries in Latin America and the Caribbean, precipitating a need for fiscal consolidation. But will this policy hinder the region's nascent recovery? Using a new database of fiscal policy actions, fiscal multipliers in the region are estimated to lie between 0.5 and 1.1—suggesting that consolidation will be more contractionary than previously thought. Nevertheless, these estimates are small enough to suggest that consolidations will improve the region's debt dynamics, even in the short run. Since expenditure multipliers vary according to the type of instrument used, consolidation plans should preserve public investment to support growth and employment.

Over the period of 2002–07, many Latin American and Caribbean (LAC) countries took advantage of strong growth and favorable external conditions to lower their public debt levels, which had fallen substantially by the time the global financial crisis struck in 2008–09 (Figure 4.1, panel 1). But things have changed.

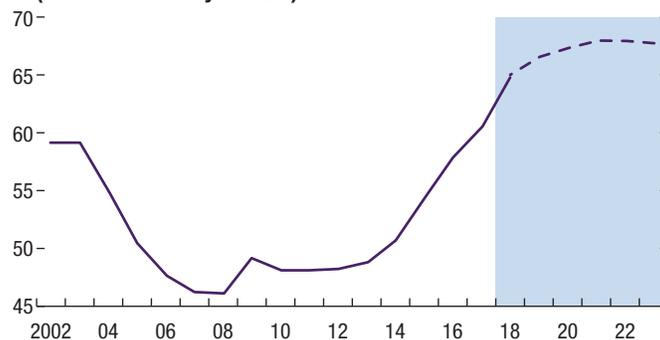
A combination of factors has eroded most of the region's fiscal space. The fiscal stimulus that was deployed in response to the crisis was not fully unwound once the recovery took hold (Celasun and others 2015). The fall in global commodity prices has negatively affected fiscal revenues of LAC countries that produce oil, gas, and agricultural and metal products. The subsequent slowdown in economic activity and the continued growth of real public expenditure (particularly public consumption) have all reduced the region's fiscal buffers (see Figure 2.9 in Chapter 2).

Most LAC countries closed fiscal year 2017 with primary deficits that exceed their debt-stabilizing

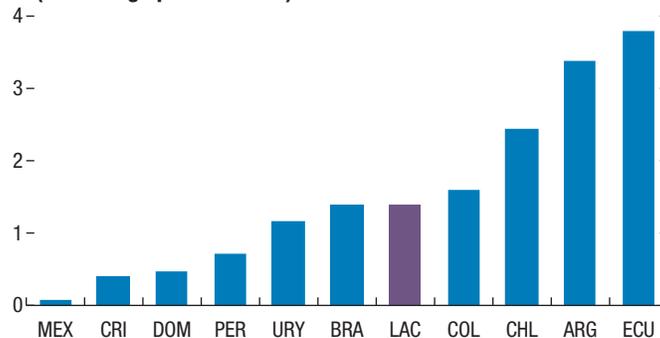
This chapter was prepared by Yan Carrière-Swallow (team leader), Antonio David, and Jorge Restrepo, under the guidance of Daniel Leigh, and with the contribution of Takuji Komatsuzaki. Excellent research assistance was provided by Genevieve Lindow.

Figure 4.1. Fiscal Worries; Plans to Address Them

1. Latin America and the Caribbean: Gross Public Debt¹ (Percent of fiscal year GDP)



2. Expected Change in Cyclically Adjusted Primary Balance, 2016–20² (Percentage points of GDP)



Sources: IMF, World Economic Outlook database; and IMF staff calculations. Note: For International Organization for Standardization (ISO) country codes, see page 115. LAC = Latin America and the Caribbean.

¹US dollar nominal GDP-weighted average.

²LAC aggregate corresponds to US dollar nominal GDP-weighted average of 14 LAC countries listed in footnote 5. For Ecuador, the oil balance and a one-off payment to Occidental Petroleum in 2016 are excluded.

levels, and as a result, public debt continues to rise. At a regional level, debt ratios in LAC have risen sharply and now stand well above the average for other emerging economies. In this context, most LAC countries have presented plans to consolidate their fiscal positions over the next few years, and many have already begun this arduous task. Between 2016 and 2020, the cyclically adjusted primary balance for the region is expected to improve by 1.4 percent of GDP (Figure 4.1,

panel 2), nearly half of which has already been accomplished.

With fiscal adjustment planned or underway in many countries, this chapter will explore the likely macroeconomic impact that these policy decisions can have in the short term, including on income inequality (Box 4.1). It does not address the questions of whether fiscal adjustment is needed, how much is required, and at what pace it should be pursued, all of which are best addressed on a case-by-case basis. Finally, as fiscal consolidation is likely to dampen growth in the short term, the chapter will ask what can be done to formulate the adjustment to minimize its undesirable effects.

The Elusive Search for a Measure of Fiscal Actions

The fiscal multiplier—the change in output caused by a fiscal action, measured in the same units—depends on a long list of characteristics that affect how agents respond to a change in policy. Consider the fiscal multiplier following government spending cuts. If private agents increase their own consumption and investment—for instance, because they anticipate lower taxes in the future—then the fiscal multiplier may be close to zero or even imply an economic expansion. If, on the other hand, private consumption and investment remain unchanged or decrease, then the short-run multiplier would be closer to one, or even larger. If existing distortions are acute or if there is sufficient slack in the economy, it has been argued that multipliers can be very large, perhaps reaching levels as high as 3 or 4 in extreme circumstances.¹

While the size of the drag on growth imposed by fiscal consolidation is a key empirical question in macroeconomics, it is equally difficult to answer due to two main challenges.

¹See Gunter and others (2017) for the case of value-added tax multipliers when the rate of taxation is already very high, and Auerbach and Gorodnichenko (2012) for estimates of the US expenditure multiplier in periods of slack.

First, fiscal revenue and spending are affected by many of the same factors that drive economic growth. This omitted variable problem makes it difficult to isolate the relationship between them. For instance, a fall in commodity prices may reduce fiscal revenues and hurt growth in a commodity-exporting country. It would be wrong to infer from this experience that a growing fiscal deficit is causing lower growth, since both are the product of another factor that is outside the control of policymakers.

Second, decisions about fiscal policy often respond to developments in the economy, and this reverse causality makes it difficult to distinguish the action from the response. For instance, a government facing a recession may expand public expenditure to support demand, or allow a deficit to increase due to a fall in cyclical tax revenue.

In both cases, the data will show a strong correlation between fiscal policy and growth, but in neither will that relationship have been caused by the fiscal policy itself. Thus, to estimate the effect of fiscal policy on other economic variables, one needs to identify movements of fiscal variables that are exogenous to current economic developments.

All Gain, No Pain? Existing Evidence on Multipliers in Latin America and the Caribbean

A large body of empirical work has set out to overcome these challenges, providing estimates for fiscal multipliers in Latin America and the Caribbean and other regions. A review of 132 recently published estimates suggests that the growth impact of fiscal adjustment is smaller in LAC countries, with an average multiplier of 0.3 compared to 0.6 for other emerging market and developing economies and 0.9 for advanced economies (Box 4.2). Some studies even point to fiscal multipliers that are very close to zero in the region, with the tantalizing implication that fiscal consolidation imposes almost no pain on LAC economies.

Is painless consolidation wishful thinking or is there an underlying economic justification? In theory, if fiscal consolidation triggers a surge in confidence, then the public contraction can be offset by vigorous private expansion.² Indeed, LAC has a relatively elevated level of perceived risk of sovereign default, and some structural factors such as high import-to-GDP ratios in some economies would further dampen the drag from fiscal consolidation. However, other characteristics of LAC economies would suggest larger fiscal multipliers, including tight credit constraints facing the private sector and less flexible exchange rates in many economies. Taken together, these theoretical considerations do not provide a clear prediction about the relative size of fiscal multipliers in the region, which ultimately remains an empirical question.

The Story behind the Numbers: Assessing the Motives of Fiscal Actions

One limitation of existing studies that focus on LAC economies is that they rely heavily on a single empirical approach: the structural vector autoregression (SVAR) model. This econometric approach is readily implemented using quarterly data, but has been criticized for a variety of reasons. First, it imposes strong assumptions to identify tax and spending shocks, such as the inability of government spending to respond to news about the economy within a three-month period. Second, it identifies fiscal actions that may have been anticipated by agents, and whose impact would thus have been felt well before the actions were taken. In contrast, estimates for advanced economies now frequently rely on several alternative identification strategies that set out to resolve these concerns.

One of these strategies is the narrative method (Romer and Romer 2010; Guajardo, Leigh, and Pescatori 2014; Alesina and others 2017).

²Such an “expansionary austerity” effect was first identified by Giavazzi and Pagano (1990), and is most commonly proposed in the context of public expenditure cuts.

In this approach, the researcher relies on contemporaneous documents such as budgets, speeches, and third-party reports to assess the motivations that were behind each fiscal policy decision. The fiscal consolidation episodes selected are motivated by considerations such as reducing an inherited budget deficit, reducing public debt levels, or increasing economic efficiency to raise long-term growth. Decisions that are driven by a desire to respond to current or prospective economic conditions are discarded. In principle, this should reduce the endogeneity bias in empirical estimates. However, this strategy relies on the researcher’s judgment to properly assess the motive behind each action taken by economic authorities, and thus requires local knowledge and a variety of sources. In addition, these episodes remain susceptible to having been anticipated by economic agents, either because they were preannounced by authorities, or because they could have been predicted using available information.

In the forecast error approach, fiscal actions are identified using forecast errors for public expenditure.³ This approach has the advantage that the actions—by construction—were not anticipated. But it is also subject to limitations. First, the forecast errors will only be as good as the forecasts themselves, which may suffer from bias, inefficiency, and inaccuracy.⁴ Second, the interpretation of forecast errors as fiscal actions is not direct, since they may reflect alternative factors, such as a change in relative prices or a data revision.

Where data availability allows, this chapter will use all three of these approaches to study the effects of fiscal consolidation in Latin America and the Caribbean within a single, readily comparable

³The forecast error methodology was pioneered by Auerbach and Gorodnichenko (2013, 2017) using forecasts by the Organisation for Economic Co-operation and Development, and employed by Abiad, Furceri, and Topalova (2016) and Furceri and Li (2017) using forecasts from the *World Economic Outlook*. For recent estimates using this method for sub-Saharan African countries, see Arizala and others (2017).

⁴Jalles, Karibzhanov, and Loungani (2015) document how the accuracy of private-sector fiscal forecasts is much lower for emerging economies than for advanced economies.

framework. It makes use of a new database of fiscal actions identified in the narrative record for 14 LAC economies between 1989 and 2016.⁵ It also employs forecast errors for public expenditure, public investment, and public consumption from issues of the IMF's *World Economic Outlook* since 1990.⁶ Finally, it uses fiscal shocks obtained from country-by-country SVARs following Blanchard and Perotti (2002) for eight Latin American countries.⁷

The impact of these identified fiscal actions on the economy—including output, the unemployment rate, the current account balance, and the exchange rate—are estimated using a common local projections specification.⁸ In the estimation, factors that drive fiscal policy and output across the region are controlled for, as is country-specific revenue from the export of commodities. This common machinery generates fiscal multiplier estimates that conform to a consistent definition throughout the chapter: for each unit of fiscal action over h years, by how many units does GDP change?⁹ It also allows for comparing the effects of fiscal actions across groups of countries, types of adjustment, and states of the economy.

The Macroeconomic Effects of Fiscal Consolidation in Latin America and the Caribbean

This section begins by studying the impact of a fiscal adjustment package that raises the primary

balance by 1 percent of GDP, and which can be implemented using any combination of expenditure and revenue measures (Figure 4.2). After two years, output in the sample of 14 LAC economies contracts by an average of 0.9 percent, with a confidence interval between 0.6 and 1.1 at a 90 percent level.¹⁰ Contrary to past evidence, LAC does not appear different from advanced economies—this range of multipliers is consistent with an estimate for a sample of 17 advanced economies, using comparable narrative fiscal consolidations constructed by Guajardo, Leigh, and Pescatori (2014) and Alesina and others (2017).¹¹

Fiscal adjustments in Latin America and the Caribbean are also found to affect other aspects of the economy. In the case of the labor market, each percentage point of GDP in fiscal consolidation raises the unemployment rate by about 0.3 percentage point after two years, which is a somewhat smaller response than what is estimated here for advanced economies (an increase of over 0.5 of a percentage point). The mitigated impact on unemployment in the region may reflect the presence of a large informal sector in many countries, which offers an alternative margin of labor market adjustment following a demand shock. With consolidation putting at least some out of work, an important concern is that these policies may be exacerbating income inequality, which is already high in the region. As discussed in Box 4.1, no impact of fiscal consolidation on different measures of the Gini coefficient is found.

Most LAC economies are relatively open to international trade, making the response of the external sector an important channel for understanding the impact of fiscal policy. In line with the estimates reported here for advanced

⁵The countries included are Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Paraguay, Peru, and Uruguay. Each fiscal consolidation episode is documented and discussed in David and Leigh (forthcoming). The approach is based on the methodology pioneered by Romer and Romer (2010) that was implemented for a large group of advanced economies by Devries and others (2011).

⁶The sample includes 19 LAC countries: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela.

⁷The exercise, which requires quarterly data, is carried out for Brazil, Chile, Colombia, Dominican Republic, Mexico, Paraguay, Peru, and Uruguay.

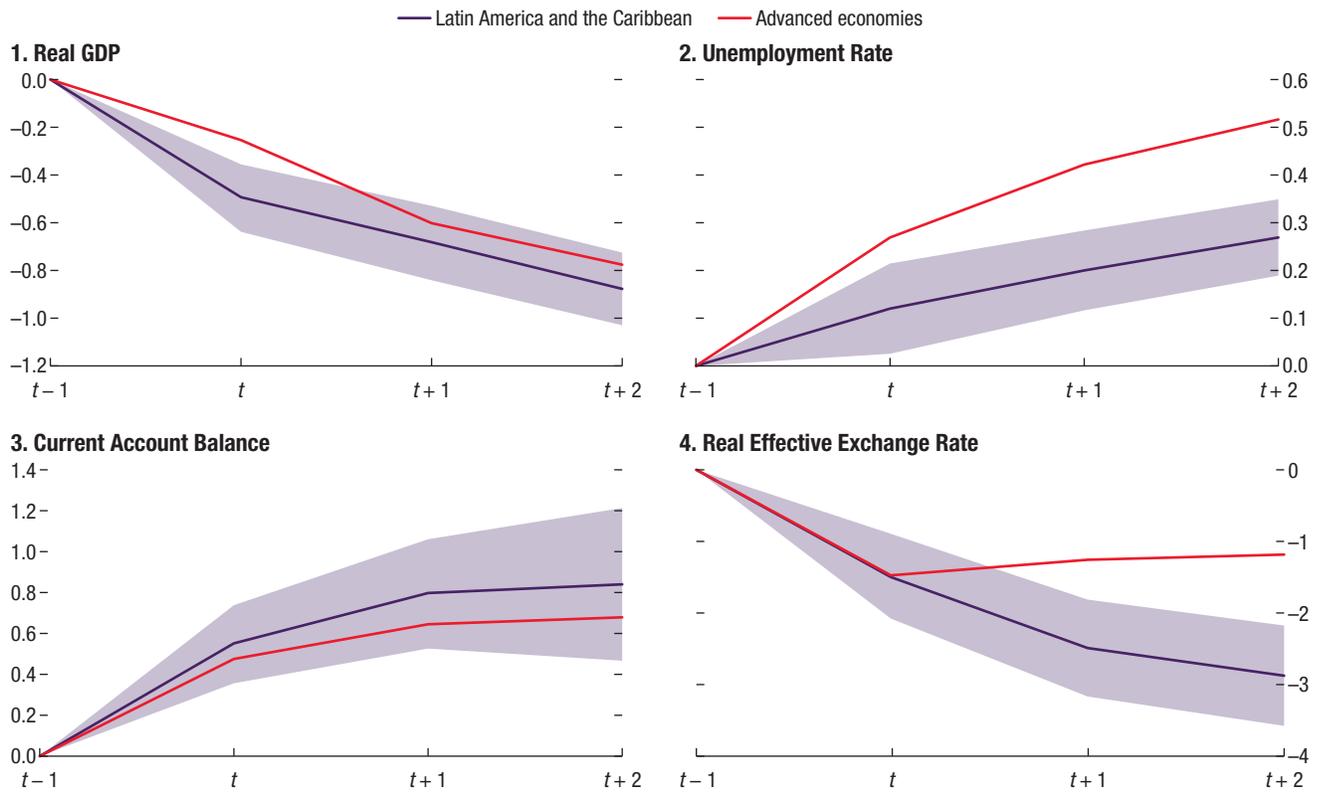
⁸See Annex 4.1 for technical details and the full specification.

⁹This definition of the cumulative fiscal multiplier follows Ramey and Zubairy (2018), who refer to it as the integral multiplier.

¹⁰Jordà and Taylor (2015) argue that narrative shocks for advanced economies can be predicted using observable data. Carrière-Swallow, David, and Leigh (forthcoming) account for this possibility using a propensity-score based matching estimator, and find that multiplier estimates for LAC remain within the confidence interval reported here.

¹¹The advanced economies included are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Portugal, Spain, Sweden, United Kingdom, and the United States.

Figure 4.2. Macroeconomic Effects of Fiscal Adjustment Packages in Latin America and the Caribbean



Sources: IMF, Information Notice System database; IMF, World Economic Outlook database; and IMF staff calculations.
 Note: Estimates based on identification of fiscal actions using narrative approach. Cumulative multiplier functions show deviations in percentage points for a fiscal shock with accumulated impact of 1 percent at each horizon in years. Shaded area indicates ± 1 HAC standard error.

economies, fiscal consolidation in LAC countries leads to an improvement of the external current account balance of approximately one-to-one, in line with the twin deficits view. The evidence also shows that the exchange rate is an important adjustment channel, as fiscal consolidation leads to a depreciation of the real effective exchange rate of close to 3 percent, which is a stronger response than is observed among advanced economies.

There is an unresolved debate as to whether the growth impacts of fiscal policy differ when the economy is in a period of slack. A series of studies on the United States have come to different conclusions in this regard, with some documenting very large multipliers during recessions, and others finding only small differences over the business

cycle.¹² To test this hypothesis for Latin America and the Caribbean, the multiplier estimate is conditioned on the sign of the output gap one year prior to the fiscal shock. No significant differences in the multiplier are found depending on whether the measure is taken when the economy is in a period of slack.¹³

¹²Auerbach and Gorodnichenko (2012) find multipliers of almost 3 in the United States during recessions, but Ramey and Zubairy (2018) demonstrate that this estimate falls to less than 1 when the persistence of the fiscal action is taken into account.

¹³This null result is produced regardless of whether one uses output gap estimates from the World Economic Outlook database or estimates the gap using the Hodrick-Prescott filter.

Does Fiscal Consolidation Trigger Confidence Effects?

If fiscal consolidation is part of a credible plan to stabilize public debt, it may ease financing conditions for the economy, and thus stimulate private demand. Convincing the private sector of such an intent may be easier when the inherited situation is perceived to be dire. This section verifies whether the impact of fiscal consolidations on output in LAC depends on the perceived severity of the fiscal situation when the policy is implemented (Figure 4.3). Following Guajardo, Leigh, and Pescatori (2014), an index of perceived sovereign risk provided by Institutional Investor LLC is used, and the sample is split in half into low- and high-risk bins.

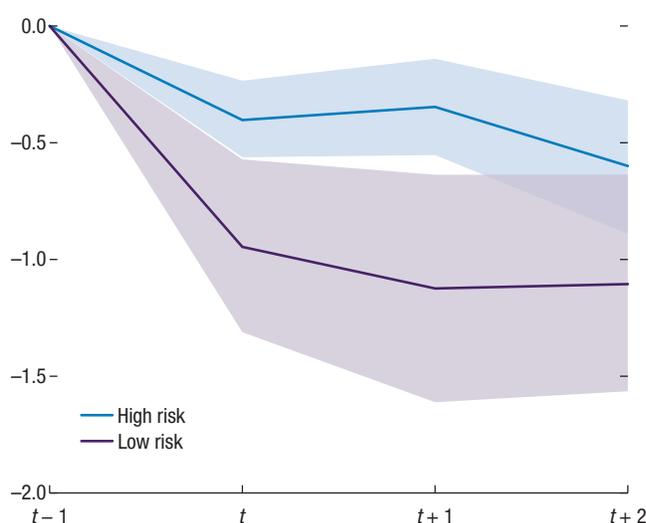
For economies that are perceived to be subject to higher sovereign default risk, fiscal consolidation places a smaller drag on growth, with a multiplier of 0.6 after two years. This compares to a multiplier of 1.1 in those economies that implement fiscal consolidation from a position of relatively low default risk.¹⁴ This is an important finding, because in those LAC economies where fiscal consolidation is most urgently needed to stabilize public finances, taking action tends to have a smaller impact on growth.

One possible channel for this result is the presence of confidence effects, whereby consolidation brings better prospects for fiscal sustainability, triggering lower interest rates, easing fiscal burdens, and crowding in private investment.¹⁵ However, it is important to note that any such effect appears insufficient to fully offset the contractionary impact of the fiscal action: even in countries starting from a position of high perceived sovereign default risk, fiscal consolidation remains contractionary.

¹⁴Given the lower precision of these state-dependent estimates, we are unable to reject a null hypothesis of equal impacts across states at conventional confidence levels.

¹⁵On average across the episodes in the 14 economies for which narrative episodes were identified, we find suggestive evidence of a modest response of the Emerging Markets Bond Index sovereign spread, which falls by about 100 basis points after two years.

Figure 4.3. Confidence Effects Following Fiscal Consolidation Packages in Latin America and the Caribbean?
(Output multiplier, by perceived sovereign risk)



Source: IMF staff calculations.

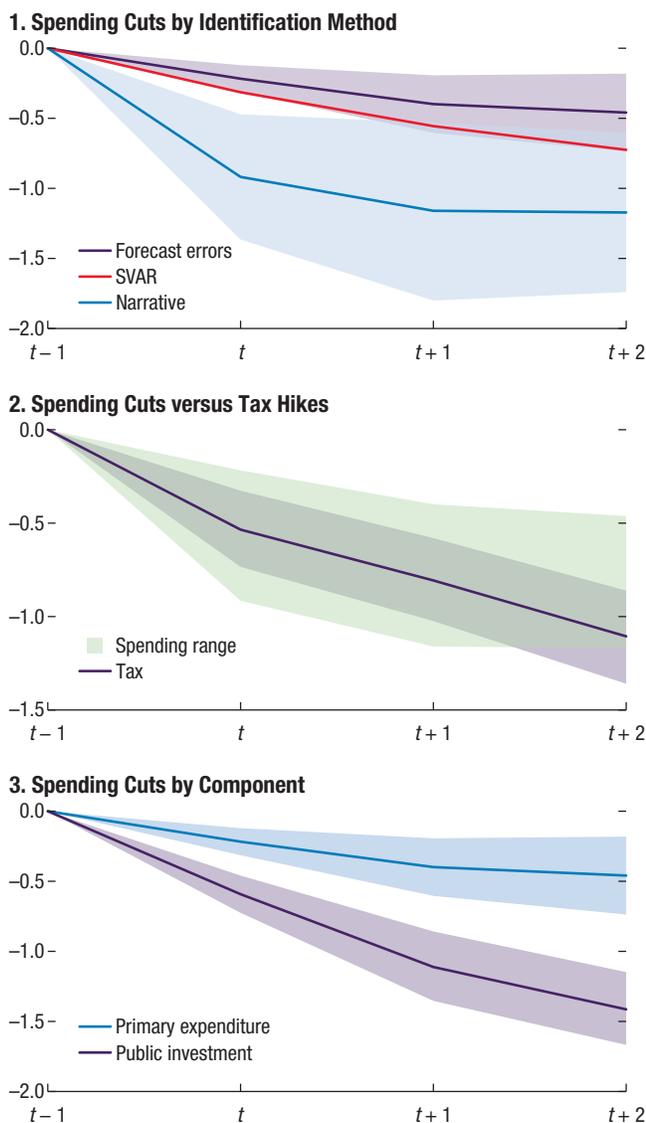
Note: Estimates based on identification of fiscal actions using narrative approach. Shaded area indicates ± 1 HAC standard error. The LAC sample is split at the median of the empirical distribution for the index of perceived sovereign risk constructed by Institutional Investor LLC. LAC = Latin America and the Caribbean.

Protecting Growth while Tightening Belts: Getting the Composition Right

The results presented so far are clear: fiscal consolidation in LAC is likely to have a larger contractionary impact on the economy than may have been expected based on previous empirical studies, with consolidation packages producing an output multiplier between 0.6 and 1.1 after two years. But if consolidation is needed to stabilize public debt, what can policymakers do to minimize the harmful short-term impact of their actions? To explore this question, fiscal actions are distinguished based on the composition of the adjustment.

The analysis begins by considering fiscal actions that affect public spending. Because of ample data availability for primary expenditure, public spending multipliers can be estimated using all three identification strategies: SVAR, forecast errors, and the narrative approach. Results of this comparative exercise are reported in panel 1

Figure 4.4. Fiscal Multipliers in Latin America and the Caribbean by the Composition of Adjustment
(Cumulative multiplier)



Source: IMF staff calculations.

Note: Panel 1 reports spending multiplier estimates for the three identification methods (solid lines). Panel 2 compares the range of spending multiplier estimates with the tax multiplier estimate using the narrative approach. Panel 3 reports estimates based on identification of fiscal actions using forecast errors for a sample of 19 LAC countries. Shaded areas in Panels 1 and 3 indicate ± 1 HAC standard error. SVAR = structural vector autoregression.

of Figure 4.4. While the narrative identification approach tends to yield somewhat larger multipliers than the other two, the width of confidence intervals does not allow for inference about their relative size. Information from all three methods is used to present a likely range for spending multipliers in LAC, which suggests that the expenditure multiplier lies between 0.5 and 1.1 after two years. This range fully encompasses the range of consolidation package multipliers reported above.

Is raising taxes more harmful for growth than cutting spending? Panel 2 of Figure 4.4 compares the range of estimates for expenditure multipliers with the estimate for tax hikes based on the narrative approach. While the estimated multiplier range for tax hikes allows for the possibility of larger multipliers—a result that is consistent with the existing literature from other regions—no compelling evidence is found for a difference between spending cut and tax hike multipliers in LAC.¹⁶

Are all changes to public spending equal? The availability of *World Economic Outlook* forecasts for public investment and consumption since the early 1990s allows for implementing the forecast error methodology for each subcomponent of public expenditure (Figure 4.4, panel 3). The composition of spending measures appears to have major implications for the growth impact of a change in public expenditure: the multiplier for public investment reaches almost 1.5 after two years, compared to only 0.5 for primary expenditures in general, and well outside the range based on three methods reported above. This is much larger than the estimate of the public

¹⁶A comparison of tax and spending multipliers identified using only the narrative approach also leads to the conclusion that they are not significantly different. This finding is also robust to an approach that classifies consolidation packages as tax- or spending-based.

consumption multiplier, which appears close to zero.^{17,18}

Policy Implications

Stabilizing public debt in Latin America and the Caribbean will require some degree of fiscal consolidation in most countries, and governments have laid out plans to implement these actions. On average, LAC countries are expected to undertake fiscal consolidation amounting to 1.4 percent of GDP between 2016 and 2020. This chapter has uncovered four likely implications of these policies.

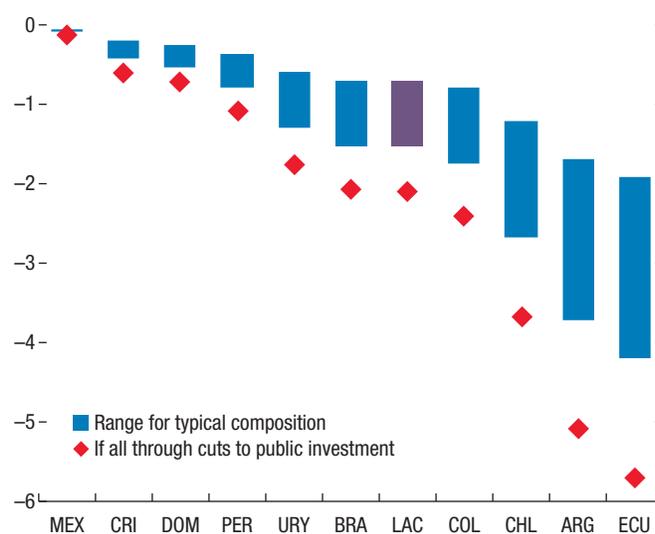
First, fiscal consolidation in the region will hurt, placing a drag on economic growth and employment in the short term. The size of this effect is likely to be larger than has been typically reported in the empirical literature, but also somewhat smaller than the largest multiplier estimates found in recent work (Gunter and others 2016, 2017). The analysis suggests that the impact of fiscal consolidation on the level of regional output will be between 0.7 and 1.5 percent during 2016–20. Across individual countries, this impact will vary depending on the size of their adjustment plans (Figure 4.5).¹⁹

¹⁷The estimate for the public consumption multiplier is not shown in Figure 4.4, but is equal to -0.6 after two years—implying an expansionary effect from cutting this type of spending. However, the use of forecast errors for identification of public consumption shocks is problematic in LAC for at least three reasons: (1) forecast errors are a very weak instrument for actual changes in public consumption, with a relationship of approximately 10 to 1; (2) forecast errors for public consumption are followed by a very strong response of public investment of the opposite sign, suggesting that they are associated with spending shifts rather than cuts; and (3) forecast errors for public consumption do not lead to a change in the cyclically adjusted primary balance, and thus do not capture episodes of fiscal consolidation. None of these concerns apply in the case of forecast errors for primary expenditure and public investment in LAC, nor do they appear to apply to forecast errors for public consumption in the rest of the world.

¹⁸The larger multiplier for public investment than for public consumption is in line with the results reported in Furceri and Li (2017) for a large sample of developing economies, as well as the October 2017 *Regional Economic Outlook: Sub-Saharan Africa*.

¹⁹This period was considered because it captures a broad set of consolidations across the region, and is short enough to be mapped to local-projection estimates presented in the chapter.

Figure 4.5. Expected Impact of Fiscal Consolidation on the Level of Output, 2016–20
(Percentage points of GDP)



Sources: IMF, World Economic Outlook database; and IMF staff calculations.
Note: Calculation uses change in cyclically adjusted primary balance reported in Figure 4.1, panel 2, as measure of fiscal consolidation. For International Organization for Standardization (ISO) country codes, see page 115. LAC = Latin America and the Caribbean.

Second, policymakers can design the composition of their plans to mitigate their drag on growth and thus accelerate progress toward stabilizing the debt-to-GDP ratio. While no large differences are found between fiscal multipliers in LAC when comparing tax and expenditure measures—contrary to some existing evidence for advanced economies—growth effects do differ across expenditure items. Governments should favor plans that preserve public investment where possible. If adjustment is implemented exclusively through public investment cuts, then the short-term impact on regional output would be expected to reach 2.1 percent over the same period (diamonds in Figure 4.5). For many countries, this recommendation aligns with the long-term imperative to close infrastructure gaps (see Chapter 5 in April 2016 *Regional Economic Outlook: Western Hemisphere*).

Third, fiscal consolidation in LAC is likely to help stabilize debt, even in the short term. It is useful to recall that the objective of fiscal

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consolidation is not to stabilize the amount of debt itself, but rather its ratio with respect to output. If the fiscal multiplier were large enough, then the short-term impact on the denominator could dominate the reduction in the numerator, causing the debt-to-GDP ratio to rise. Over time, a sustained fiscal effort will outweigh the one-off contractionary effect on the flow of output. However, the absence of demonstrable improvements in the first few years can endanger the plan's sustained implementation if public support frays. In a simple debt-accumulation exercise, the estimated range of fiscal multipliers in LAC is used to calculate the short-term impact of fiscal consolidation on the debt-to-GDP ratio.²⁰

For the levels of debt and the size of government observed on average in the region, the range of multiplier estimates is not large enough to trigger unfavorable debt dynamics in the short term.

Finally, countries should take into account in their consolidation plans that multipliers in LAC appear to be broadly constant over the business cycle. Moreover, periods of high perceived sovereign default risk are a particularly opportune moment to undertake consolidation, as the contractionary effects tend to be mitigated to some extent, possibly reflecting beneficial confidence effects when policies are deployed to address a dire situation.

²⁰See Eyraud and Weber (2013) for arithmetic that illustrates how the fiscal multiplier impacts the short-run dynamics implied by a simple debt-accumulation equation.

Box 4.1. Fiscal Consolidation and Income Inequality in Latin America and the Caribbean

This chapter has documented substantial aggregate effects of fiscal consolidation on output and unemployment in Latin America and the Caribbean (LAC). Do these policies also have implications for income inequality? In theory, this could happen through effects on the distribution of market incomes, as well as through a change in fiscal redistribution that further affects disposable (that is, post-tax and transfer) income.

For advanced economies, there is evidence that fiscal consolidation tends to increase income inequality, with especially strong effects when the consolidation is spending-based (Ball and others 2013; Furceri, Jalles, and Loungani 2015; Woo and others 2017). There are reasons to suspect that this relationship may be different in LAC, where fiscal redistribution is much less extensive—about 3 percent of GDP in 2015, compared to almost 17 percent in advanced economies—and where tax systems are more reliant on indirect taxes, and spending on transfers is smaller and less targeted (Bastagli, Coady, and Gupta 2015). Indeed, Azevedo and others (2014) do not find an association between fiscal adjustments and disposable income inequality using subnational data from Brazil.

This box provides a first step toward analyzing the effect of fiscal consolidation on income inequality in LAC at the regional level, where evidence to date has been limited. To do so, the analysis makes use of the same fiscal shocks identified by the narrative approach for 14 LAC countries that are used throughout the chapter.¹ It then employs the same local projections specification to estimate the response of market and post-tax and transfer disposable income distributions following fiscal consolidation shocks.² Since inequality is a highly persistent, slow-moving variable, responses to a longer horizon of five years are presented.

Fiscal consolidations have very little effects on income inequality in LAC. Point estimates are positive but very small—the market Gini increases by 0.03 units after two years—and are not statistically significant (Figure 4.1.1, panel 1). This is despite a reduction in output of about 1 percent and an increase in unemployment of 0.3 of a percentage point, as demonstrated in the main text. Focusing on the distribution of disposable income does not affect these results, with the Gini coefficient being relatively insensitive to fiscal consolidation shocks.

Focusing on fiscal consolidation through expenditure cuts, a moderate increase in income inequality is observed (Figure 4.1.1, panel 2). The increase in market Gini is more persistent, and the increase in disposable Gini is larger than for the market Gini in years 0 and 1, implying a decrease in fiscal redistribution. This suggests that expenditure cuts might have worsened inequality by decreasing transfers. In year 2, fiscal redistribution recovers somewhat and partially offsets the increase in market Gini. In any case, any inference about possible mechanisms is impeded by the imprecision of the estimates.

To sum up, fiscal consolidation shocks have very little effects on disposable income in the sample. These results are in contrast to the stronger effects found in advanced economies by Ball and others (2013), Furceri, Jalles, and Loungani (2015), and Woo and others (2017), where spending-based consolidation episodes have significant effects on disposable income inequality. Nevertheless, these findings are in line with those of Azevedo and others (2014) for Brazil.³

This box was prepared by Takuji Komatsuzaki.

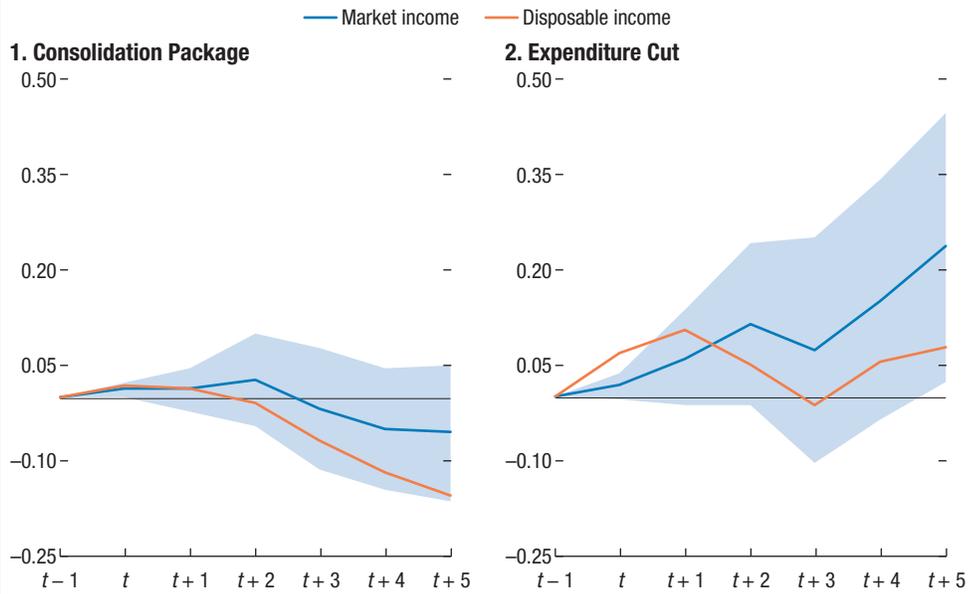
¹See David and Leigh (forthcoming) for details. Countries include Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Paraguay, Peru, and Uruguay.

²Income inequality is measured by market and disposable income inequality in SWIID 6.1 developed by Solt (2016). The period of estimation is 1989–2016.

³The definition of spending-based consolidations used in these papers differs from the approach used here, which makes use only of the spending portion of all consolidation packages.

Box 4.1 (continued)

Figure 4.1.1. Response of Income Inequality Following Fiscal Consolidations in Latin America and the Caribbean
 (Change in Gini coefficient following fiscal action)



Source: IMF staff calculations.

Note: Cumulative change following fiscal shocks of 1 percent of GDP identified using a narrative approach. Shaded area indicates ± 1 HAC standard error.

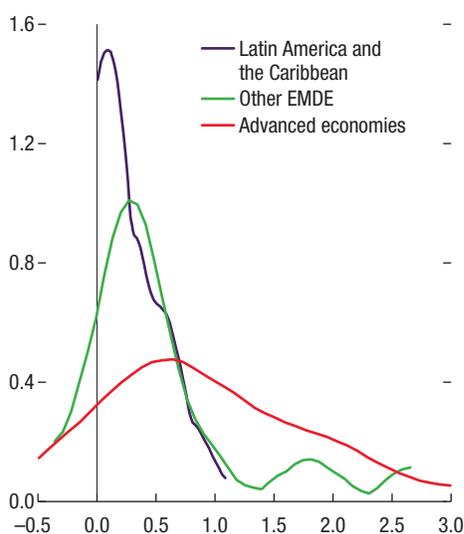
Box 4.2. Existing Empirical Evidence on Fiscal Multipliers in Latin America and the Caribbean

There is a vast empirical literature on the impact of fiscal policy actions on output covering a wide range of countries. This box provides a summary of 132 recent estimates. To facilitate comparison across studies, the fiscal multiplier is defined as the change in GDP over a two-year horizon in response to a fiscal adjustment of 1 percent of GDP.

The meta study finds that estimates for fiscal multipliers in Latin America and the Caribbean (LAC) are typically smaller than in other regions—averaging less than 0.3—with a high proportion of estimates concentrated just above zero (Figure 4.2.1). Estimates for other emerging market and developing economies and for advanced economies average 0.6 and 0.9, respectively.

While structural characteristics of countries in the region might be an important factor explaining these results, methodological choices can also play a role. Most studies surveyed for LAC countries employ timing restrictions in vector autoregressions (VARs) or similar approaches to identify fiscal shocks. But endogeneity bias and measurement error are likely to plague such estimates, biasing the coefficients obtained. In fact, when considering the full sample of estimates, studies using the narrative approach obtained larger multipliers (median multiplier of 1.1) than those that used VAR-based or alternative approaches (median multiplier of 0.4).

Figure 4.2.1. Distribution of Empirical Multiplier Estimates by Country Group
(Density of estimates for fiscal multiplier after two years)



Sources: IMF staff calculations based on a survey of the empirical literature.
Note: EMDE = emerging market and developing economies.

This box was prepared by Antonio David and Daniel Leigh.

Annex 4.1. Technical Details

Estimation of Impacts Using Local Projections

The macroeconomic impacts of fiscal shocks are estimated using the local projections method of Jordà (2005) in a panel setting:

$$y_{c,t+h} - y_{c,t-1} = \alpha_c + \gamma_t + \beta_b \sum_{s=t}^{t+h} Shock_{c,s} + \delta X_{c,t} + \varepsilon_{c,t}, \quad (\text{A4.1.1})$$

where $y_{c,t}$ is the dependent variable (such as real GDP, the unemployment rate, the current account balance as a share of GDP, or the real effective exchange rate), α_c are country fixed effects, and γ_t are year fixed effects. For stationary variables such as the unemployment rate and sovereign risk perception index, $y_{c,t}$ enters in levels. Otherwise, natural logarithms are used.

The vector $X_{c,t}$ contains country-specific control variables, including two lags of the growth rate of the dependent variable, two lags of the fiscal shock, and the contemporaneous growth rate of commodity export revenues as a share of GDP and two of its lags. The latter is calculated using trade data from the United Nations Comtrade database of 33 commodities whose world prices are reported in the IMF's *International Financial Statistics* (Gruss 2014).

Fiscal shocks $Shock_{c,s}$ correspond to externally identified fiscal actions based on one of the three available methods: country-by-country Blanchard-Perotti (2002) structural vector autoregression (SVAR) models; the narrative study described in David and Leigh (forthcoming); and the forecast-error approach. Each is described below. In all cases, the variable is expressed as a percentage of GDP. In the case of shock series identified using the SVAR and forecast-error approaches, the variable is truncated at the 2nd and 98th percentiles.

In the case where the dependent variable $y_{c,t}$ corresponds to real GDP, the estimated parameter $\hat{\beta}_b$ is interpreted as the cumulative fiscal

multiplier at horizon b . The use of the summation operator that accumulates the fiscal shocks makes $\hat{\beta}_b$ equivalent to the ratio of the integrals from t to $t+h$ below the SVAR impulse-response functions for output and for the propagation of the shock on itself.

Identification Using the Narrative Approach

The fiscal consolidation episodes were constructed by examining contemporaneous policy documents to assess the motivation, expected size, and timing of discretionary policy actions. The sources used include reports from multilateral institutions such as IMF staff reports and Organisation for Economic Co-operation and Development Country Economic Surveys, as well as budget-related documents (such as several issues of the *Informe de Finanzas Públicas* for Chile and Paraguay and the *Criterios Generales de Política Económica* for Mexico).

The motivation for a given policy action is a key dimension of the analysis. Following Romer and Romer (2010) and Devries and others (2011), only policy actions that were motivated by a desire to reduce an inherited deficit and/or to address a high level of debt, or for long-run considerations that are unrelated to the economic cycle, were included in the dataset. Episodes that are primarily driven by a response to current or prospective economic conditions were deliberately excluded. Moreover, spending-driven tax changes (that is, tax changes motivated by a change in government spending within the same year, such as a tax increase because the country is fighting a war) were also excluded from the database.

The measures of the magnitude of fiscal policy changes rely on estimates of the revenue or expenditure impact of the given policy action at the time of implementation (expressed in annual terms) and at the prevailing level of GDP. If measures were announced but were not implemented, they are not included in the database, as described in detail in David and Leigh (forthcoming).

Identification Using Forecast Errors

Forecasts are taken from October publications of the IMF's *World Economic Outlook* (WEO), which are available for a large number of countries since 1990, including 19 countries from Latin America and the Caribbean (LAC). To minimize the risk of errors due to changes in data conventions, first-release outcomes are taken from the WEO of the following year. Forecast errors are constructed for the annual growth rate of public consumption (series code *ncg*) and public investment (series code *nfig*), which are deflated by the growth rate of the GDP deflator (series code *ngdp_d*) from the contemporaneous vintages. Forecast errors are then multiplied by the average ratio of nominal spending to nominal GDP (*ngdp*) for each country over the sample period. In line with the convention used in the chapter, the sign of the shocks is inverted so that a positive value corresponds to an unexpected cut to spending. The forecast errors for primary expenditure are constructed as the sum of forecast errors for (real) public consumption and investment.

Do these forecast errors identify exogenous fiscal policy actions? A valid concern is that they are instead capturing inflation surprises or an endogenous response to output shocks. To mitigate these concerns, the analysis here follows Chapter 4 of the October 2017 *World Economic Outlook* by regressing forecast errors on forecast errors of inflation and real GDP growth, using the residuals as the series $Shock_{c,s}$ in equation (A4.1.1).

Identification Using Country-by-Country SVAR Models

Fiscal shocks are identified using country-by-country SVARs following Blanchard and Perotti (2002). The approach uses time-series analysis to identify movements in government spending and tax revenues that are exogenous to the economic cycle.

The strategy consists of unveiling an unobservable structural model starting from a reduced-form vector autoregression $X_t = A(L, q)X_{t-1} + e_t$

where $X_t = [S_t, T_t, Y_t]'$ includes the logarithm of quarterly spending (government consumption and investment), tax revenue (minus transfers and interest payments), and GDP, respectively, in real per capita terms, and e_t is the vector of estimated residuals. To do so, it is first assumed that there is a linear relationship between the reduced-form estimated residuals e_t and the structural shocks u_t :

$$e_t^s = b_1 e_t^y + b_2 u_t^T + u_t^s \quad (\text{A4.1.2})$$

$$e_t^T = a_1 e_t^y + a_2 u_t^s + u_t^T \quad (\text{A4.1.3})$$

$$e_t^y = c_2 e_t^s + c_1 e_t^T + u_t^y. \quad (\text{A4.1.4})$$

As in Blanchard and Perotti's SVAR, it is assumed that unexpected movements in spending (e_t^s) are due to GDP forecast errors ($b_1 e_t^y$), structural shocks to taxes ($b_2 u_t^T$), and structural shocks to government spending (u_t^s). Forecast errors in taxes (e_t^T) are due to surprise movements in GDP ($a_1 e_t^y$), structural shocks to spending ($a_2 u_t^s$), and structural shocks to taxes (u_t^T). Finally, GDP forecast errors (e_t^y) are due to surprise movements in spending ($c_2 e_t^s$), surprise movements in taxes ($c_1 e_t^T$), and structural shocks to GDP (u_t^y).

Since there are more unknown parameters than equations in the system, it is necessary to impose restrictions on some parameters. This annex follows Blanchard and Perotti (2002) in assuming that the government does not change spending as a reaction to what happens to GDP within the quarter, such that $b_1 = 0$. In addition, decisions on spending are taken before those on taxation, and thus $b_2 = 0$. Blanchard and Perotti (2002) then estimate a_1 —the effect of GDP surprises on tax revenues—outside the system. Using regressions for several types of taxes, they obtain the elasticity of the tax base to GDP and the elasticity of tax collection to the base, and combine them. In practice, this elasticity is often assumed to be 1 or slightly larger. A reasonable level for LAC could be between 1 and 2, since economic growth is associated with formalization. For the sake of comparability, the Blanchard and Perotti estimate of 2 is used for all countries, but the identification of the shocks is not very sensitive to the size of this constant. Finally, Blanchard

and Perotti obtained c_1 and c_2 outside the system, using an instrumental variable estimation of equation (A4.1.4). Since causality goes both ways—taxation and GDP affect each other—Blanchard and Perotti use as an instrument in this estimation the cyclically adjusted, reduced-form tax residual $er_t = e_t^T - a_1 e_t^y$, and only estimate a_2 inside the SVAR. However, this external instrumental variable estimation of c_1 and c_2 is not necessary, since those coefficients can also be estimated within the SVAR. Indeed, c_1 and c_2 were obtained within the SVAR, although in some cases one of these coefficients was picked from the respective instrumental variable estimation when it was statistically significant.

The timing assumption at the core of this methodology requires the availability of quarterly data on fiscal variables and real output, which reduces the sample of available LAC countries to eight: Brazil, Chile, Colombia, Dominican Republic, Mexico, Paraguay, Peru, and Uruguay. The variables used were government revenue net of interest payments and part of the subsidies and transfers (subtracted in the spirit of Blanchard and Perotti 2002); government spending, including expenditures on wages and goods and services plus investment and the remaining part of the transfers; and the country's GDP. To control for the effect of commodity and foreign demand on government revenues and spending, the terms-of-trade index and the trade-weighted foreign partners'

GDP were included as exogenous variables in the SVARs.

Description of Fiscal Shocks across Identification Strategies

Each of the three identification strategies described above has benefits and drawbacks. It is useful to consider the different properties of the alternative shock series used as $Shock_{c,s}$ in equation (A4.1.1), and how they compare to each other during overlapping periods. Panel 1 in Table A4.1 reports summary statistics for each shock series over the LAC samples used in the chapter. The narrative shocks display a smaller range and variability than those identified using SVAR and forecast-error approaches.

Panel 2 in Table A4.1 reports contemporaneous pairwise correlations across shock series, and includes the change in the cyclically adjusted primary balance as a reference for fiscal policy effort. Only the shocks identified using the narrative approach have a significant correlation with the change in the cyclically adjusted primary balance, while shocks identified using forecast errors and the SVAR models have very low correlations with all other shocks. This suggests that the alternative identification strategies are capturing different concepts, and that these are not always closely related to the overall change in the fiscal balance.

Annex Table 4.1. Comparing Fiscal Shocks in Latin America and the Caribbean across Methodologies

1. Summary Statistics						
	Countries	N	Mean	Median	Standard Deviation	Range
<i>Narrative</i>						
Packages	14	392	0.2	0.0	0.6	[-0.9, 4.1]
Spending measures	14	392	0.1	0.0	0.2	[-0.5, 2.0]
Tax measures	14	392	0.1	0.0	0.4	[-0.9, 4.1]
<i>Forecast errors</i>						
Primary expenditures	19	532	-0.1	-0.1	1.6	[-7.2, 7.8]
Public consumption	19	570	0.0	0.0	0.9	[-4.1, 4.1]
Public investment	19	672	-0.1	-0.2	1.2	[-4.7, 5.5]
<i>SVAR</i>						
Primary expenditures	8	154	0.0	0.0	1.4	[-2.7, 4.2]

2. Pairwise Correlations								
	<i>Narrative</i>			<i>Forecast errors</i>			<i>SVAR</i>	<i>CAPB</i>
	Packages	Spending	Tax	Primary Expenditures	Consumption	Investment	Primary Expenditures	Change
<i>Narrative</i>								
Packages	1.00							
Spending	0.68	1.00						
Tax	0.91	0.33	1.00					
<i>Forecast errors</i>								
Primary expenditures	0.11	0.12	0.07	1.00				
Consumption	0.05	0.03	0.04	0.56	1.00			
Investment	0.10	0.14	0.05	0.77	-0.01	1.00		
<i>SVAR</i>								
Primary expenditures	0.04	0.07	0.00	-0.03	-0.16	0.09	1.00	
<i>CAPB</i>								
Change	0.38	0.31	0.32	0.13	0.04	0.15	0.04	1.00

Source: IMF staff calculations.

Note: In the case of forecast errors and SVAR shocks, sample has been trimmed at the 2nd and 98th percentiles. CAPB = cyclically adjusted primary balance; SVAR = structural vector autoregression.

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