

Will It Hurt? Macroeconomic Effects of Fiscal Consolidation

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A number of influential studies present evidence that fiscal consolidation can have expansionary effects on economic activity in the short run. This paper questions this view. We show that the statistical criteria used to identifying fiscal consolidation in the literature bias the analysis toward downplaying contractionary effects and overstating expansionary ones. Focusing instead on historical accounts and records of tax hikes and spending cuts motivated by deficit reduction in 17 OECD countries during 1980-2009, we find little evidence of expansionary effects. A fiscal consolidation of 1 percent of GDP reduces GDP by 0.43 percent, and raises the unemployment rate by 0.28 percentage point within two years. The results are strongly significant and robust. Reductions in interest rates, a fall in the value of the currency, and an expansion in net exports usually soften the negative effects of fiscal consolidation. The contractionary effects are larger when the exchange rate is pegged and when the perceived sovereign default risk is low. When consolidation relies on tax hikes, monetary policy typically tightens, and this largely explains why tax-based consolidations are more contractionary than spending-based ones.

JEL Classification Numbers: E32, E62, H20, H5, N10

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¹ The views expressed in this paper are those of the authors and do not necessarily represent those of the IMF or IMF policy. Please do not quote without first obtaining permission from the authors. This paper expands on ideas presented in Chapter 3 of the October 2010 World Economic Outlook (International Monetary Fund, 2010). We are especially grateful to David Romer for valuable feedback. We are also grateful to Laurence Ball, Olivier Blanchard, John Bluedorn, Petya Koeva Brooks, Jörg Decressin, Pete DeVries, Charles Freedman, Douglas Laxton, Andre Sapir, Alasdair Scott, and Ashoka Mody for helpful comments. We are grateful to Pete DeVries for providing us with information on changes in fiscal policy in Canada, and to Alberto Alesina and Silvia Ardagna for sharing their database on cyclically-adjusted fiscal indicators with us. Thanks also to seminar participants at Bocconi University, Johns Hopkins University, the London School of Economics, Trinity College Dublin, HM Treasury, the Ireland Department of Finance, the European Central Bank, Banca d'Italia, the Bank of Spain, the Bank of England, and the International Monetary Fund. Murad Omoev, Min Song, and Jessie Yang provided excellent research assistance. Author's E-Mail Address: jguajardo@imf.org; dleigh@imf.org; apescatori@imf.org.

I. INTRODUCTION

There is widespread agreement that reducing government debt has important long-term benefits, but there is no consensus regarding the short-term effects of fiscal consolidation. The textbook view is that cutting government spending or raising taxes reduces economic activity in the short term. On the other hand, a number of studies present evidence that fiscal consolidation can stimulate the economy even in the short term.

The notion that fiscal retrenchment stimulates growth in the short term is often referred to as the “expansionary fiscal contractions” hypothesis. A key factor explaining such effects is an improvement in household and business confidence.² The papers by Giavazzi and Pagano (1990, 1996), Alesina and Perotti (1995, 1997), and Alesina and Ardagna (1998, 2010) present evidence that fiscal consolidations have expansionary effects on output in the short term if they are based on spending cuts.³ These studies have been highly influential in the debate regarding the consequences of fiscal adjustment, with many subsequent studies adopting the same methodology and finding similar results.⁴

This paper questions this view. In particular, we find that the existing literature usually identifies fiscal consolidations using a statistical concept—the increase in the cyclically-adjusted budget balance (CAPB)—that is a highly imperfect measure of actual policy actions. Importantly, this way of selecting cases of consolidation biases the analysis toward downplaying contractionary effects and overstating expansionary ones. A key problem is that cyclical adjustment methods suffer from measurement errors that are likely to be correlated with economic developments. For example, standard cyclical-adjustment methods fail to remove swings in government tax revenue associated with asset price movements from the fiscal data, resulting in changes in the CAPB that are not necessarily linked to actual policy changes. In addition, the standard approach ignores the motivation behind fiscal actions, which, as we explain below, further biases it toward understating contractionary effects.

To avoid the problems associated with these existing studies, we use an alternative method for identifying periods of fiscal consolidation. In particular, our approach focuses on fiscal policy actions intended to reduce the budget deficit. We identify the size and motivation of legislated tax hikes and spending cuts based on accounts and records such as *OECD Economic Surveys*, *IMF Staff Reports*, *IMF Recent Economic Developments* reports, and country budget documents. Our basic strategy is similar to that of Romer and Romer

² For a summary of how such expansionary effects can arise in the short term, see, for example, Alesina (2010).

³ Note that the literature on fiscal consolidation is part of a broader empirical literature on the effects of fiscal policy, which includes, among others, the work of Blanchard and Perotti (2002), Barro and Redlick (2009), Hall (2009), Ramey and Shapiro (1998), Ramey (2009), and Romer and Romer (2010).

⁴ See, for example, Broadbent and Daly (2010), Tsibouris and others (2006), and Von Hagen and Strauch (2001).

(2010), who examine the effects on U.S. output of changes in U.S. tax rates. As we explain later on, this approach helps us obtain more accurate estimates of the effects of tax hikes and spending cuts on economic activity.

Based on this alternative approach, our main finding is that fiscal consolidation typically has contractionary effects on economic activity. A fiscal consolidation of 1 percent of GDP reduces domestic demand (consumption and investment) by 1 percent and raises the unemployment rate by about 0.28 percentage point within two years. At the same time, an increase in net exports occurs, and this limits the impact on GDP to a decline of 0.43 percent. The results are strongly significant and robust, and contrast starkly with the expansionary effects obtained using the conventional method for identifying cases of fiscal consolidation.

We also find that a number of factors can exacerbate or mitigate the contractionary effects of fiscal consolidation. In particular, reductions in interest rates and a fall in the value of the currency usually support output, lessening the contraction in economic activity. A decline in the real value of the domestic currency typically plays an important cushioning role by spurring net exports and is usually due to nominal depreciation or currency devaluation. In line with the finding, fiscal consolidation has particularly large negative effects in pegged exchange rate regimes. Fiscal consolidations based on spending cuts reduce growth and raise unemployment by less than tax-based consolidations do. This is largely because central banks usually provide substantially more stimulus following spending-based consolidations. Fiscal retrenchment in countries that face a higher perceived sovereign default risk tends to be less contractionary. However, even among such high-risk countries, expansionary effects are unusual. In particular, the episodes of “expansionary fiscal contractions” identified by Giavazzi and Pagano (1990)—Denmark in 1983 and Ireland in 1987—are outliers even among countries with a high perceived sovereign default risk.

The remainder of the paper is organized as follows. Section II documents how we identify periods of fiscal consolidation. Based on this new dataset, Section III reports our baseline estimates of the impact of fiscal consolidation on economic performance, and conducts robustness tests. Section IV investigates how a number of additional factors, such as monetary policy, the exchange rate regime, international trade, the form of the consolidation, and perceived sovereign default risk shape the effects of fiscal consolidation on economic activity. Section V contrasts our estimation results with the existing literature, and Section VI concludes.

II. IDENTIFYING CASES OF FISCAL CONSOLIDATION

This section explains how we identify periods of fiscal consolidation, and contrasts our approach to the standard identification method used in previous studies.

A. The Conventional Approach

The usual approach to identifying historical cases of fiscal retrenchment is to focus on swings in the CAPB. The CAPB is calculated by taking the actual primary balance—non-

interest revenue minus non-interest spending—and subtracting the estimated effect of business cycle fluctuations on the fiscal accounts. For example, Alesina and Perotti (1995) and Alesina and Ardagna (2010) correct the primary balance for year-to-year changes in the unemployment rate.⁵ Cyclical adjustment offers an intuitive way of dealing with the fact that tax revenue and government spending move automatically with the business cycle. The idea is that, once they are cyclically adjusted, changes in fiscal variables reflect policymakers' decisions to change tax rates and spending levels. A sharp increase in the CAPB would therefore provide evidence of deliberate deep deficit cuts.

However, the conventional approach used to identify cases of fiscal consolidation is far from perfect and can bias the results toward finding expansionary effects. The first problem is that cyclical adjustment methods suffer from measurement errors that are likely to be correlated with economic developments. For example, standard cyclical-adjustment methods fail to remove swings in government tax revenue associated with asset price or commodity price movements from the fiscal data, resulting in changes in the CAPB that are not necessarily linked to actual policy changes.⁶ Thus, including episodes associated with asset price booms—which tend to coincide with economic expansions—and excluding episodes associated with asset price busts from the sample introduces an expansionary bias.⁷ For example, in the case of Ireland in 2009, the collapse in stock and housing prices induced a sharp reduction in the CAPB, suggesting a large discretionary fiscal *stimulus*, despite the implementation of tax hikes and spending cuts totaling 4.5 percent of GDP.⁸

The second problem with the standard approach is that it ignores the motivation behind fiscal actions. Thus, it omits years during which fiscal consolidation—tax hikes or spending cuts aimed at reducing the fiscal deficit—were followed by an adverse shock and an offsetting discretionary stimulus. For example, imagine that two countries adopt identical

⁵ In particular, these studies use a method proposed by Blanchard (1990) following which “the cyclically adjusted value of the change in a fiscal variable is the difference between a measure of the fiscal variable in period t computed as if the unemployment rate were equal to the one in $t - 1$ and the actual value of the fiscal variable in year $t - 1$ ” (Alesina and Ardagna, 2010, p. 7). Most studies also use a statistical threshold for identifying large increases in the CAPB. For example, Alesina and Ardagna (2010) identify a period of fiscal adjustment as a year in which the ratio of the CAPB to GDP improves by at least 1.5 percentage points.

⁶As Morris and Schuknecht (2007, p. 4) explain, “asset price movements are a major factor behind unexplained changes in the cyclically adjusted balance, which, if not accounted for, can lead to erroneous conclusions regarding underlying fiscal developments.”

⁷A similar problem occurs during sharp recessions. As Wolswijk (2007) explains, standard cyclical adjustment methods assume that the automatic response (elasticity) of fiscal variables to the business cycle is constant over time. However, there is evidence that sharp recessions have a stronger-than-average automatic effect on fiscal variables. Therefore, if a fiscal consolidation coincides with a sharp recession, it is less likely to be picked up by the standard approach, which searches for an increase in the CAPB.

⁸ See 2009 OECD Economic Surveys: Ireland; EC (2008); and 2009 IMF Staff Report for Ireland (Country Report No. 09/195).

consolidation policies, but then one is hit by an adverse shock and so adopts discretionary stimulus, while the other is hit with a favorable shock. Here, the change in the CAPB would show a smaller increase for the first country than for the second country, despite the presence of identical consolidation measures. The standard approach would therefore tend to miss cases of consolidations followed by adverse shocks, because there may be little or no rise in the CAPB despite the consolidation measures. The case of Germany in 1982 provides a real-world counterpart to this hypothetical example: the CAPB-to-GDP ratio rose by only 0.4 percentage point, despite the fact that the authorities implemented fiscal consolidation measures amounting to about 1.4 percent of GDP.⁹ The impact of these measures on the CAPB was partly offset by countercyclical stimulus measures introduced in response to the recession that year.¹⁰

Moreover, the problems with the usual approach are not just hypothetical or limited to a few specific cases. As we show in Appendix 3, the change in the CAPB-to-GDP ratio is an unreliable guide regarding the presence of fiscal consolidation. The standard approach tends to select periods associated with favorable outcomes but during which no austerity measures were actually taken. It also tends to omit cases of fiscal consolidation associated with unfavorable outcomes such as recessions.

B. The Action-Based Approach

Given the shortcoming of the conventional approach, we measure fiscal consolidation based on policy actions rather than the change in the CAPB. In particular, we identify cases in which the government implemented tax hikes or spending cuts (at the general government level) to reduce the budget deficit and put public finances on a more sustainable footing. Thus, whereas the usual strategy identifies periods of consolidation based on successful (cyclically adjusted) budget *outcomes*, our approach identifies episodes based on fiscal policy *actions* motivated by deficit reduction, irrespective of the outcomes.

Although our action-based approach addresses the problems associated with the conventional approach to identifying fiscal consolidation, both the standard approach and our approach *are* subject to two additional criticisms. First, if countries sometimes postpone fiscal consolidation until the economy recovers, then the consolidation exercise will be associated with good economic outcomes in both the standard approach and our approach.

⁹The source of the data for the CAPB-to-GDP ratio is Alesina and Ardagna (2010). The concept of government used for the CAPB is that of the general government.

¹⁰For similar reasons, the standard approach is likely to identify cases of fiscal tightening that are unrelated to deficit-reduction concerns. For example, imagine that two countries adopt no consolidation measures, but then one is hit by a favorable shock and so adopts countercyclical tightening to cool the economy, while the other does nothing. Here, the change in the CAPB would show tightening for the first country, and no change for the second country, despite the lack of consolidation measures in both countries. The standard approach would therefore tend to include cases associated with economic booms despite the lack of measures aimed at fiscal consolidation.

Second, if a country is committed to a deficit-reduction path and the economy falls into a recession, it may implement additional fiscal consolidation measures, thus associating fiscal consolidation with unfavorable economic outcomes in both the standard approach and our approach. Thus, biases may remain even in our approach, although it is unclear in which direction they would go overall.

In addition, in contrast to some previous studies, we do not focus on periods of “sustained” (multi-year) fiscal consolidation. A key problem with such an approach is that governments may choose to interrupt a program of fiscal consolidation due to unfavorable output developments. For example, Japan’s six-year fiscal adjustment plan, initiated in 1997, was suspended in December 1998 following a sharp economic downturn. In contrast, favorable output developments are likely to help governments complete a sustained fiscal consolidation. Therefore, focusing on cases of sustained consolidation would bias toward finding expansionary effects.

In sum, not only does the standard approach sometimes select years that bear no relation to actual changes in fiscal policy, it also biases the results toward downplaying contractionary effects and overstating the expansionary effects of fiscal adjustment. In contrast, a key contribution of this paper is to reduce these bias problems and therefore allow us to better estimate the causal impact on output of fiscal consolidation.

C. Implementing the Approach

Our approach requires identifying policy actions motivated by deficit reduction. Therefore, we examine accounts and records of what countries actually did. In particular, we analyze *OECD Economic Surveys*, *IMF Staff Reports*, *IMF Recent Economic Developments* reports, and country budget documents. The estimated effect of the measures on the budget deficit is based on these sources. In this respect, our methodology is similar to that of Romer and Romer (2010).¹¹ The analysis also distinguishes between permanent and temporary measures. Temporary measures are recorded as generating positive savings when they are introduced and negative savings when they expire. A companion paper, Guajardo, Leigh and Pescatori (2010), shows how we implement the approach. In particular, it provides quotations and citations for each case to show where the estimated size of the measures, along with their motivation, can be found in the historical record. Appendix 2 provides two examples of how we implement the approach.

The sample includes the fiscal actions taken to reduce the deficit in 17 OECD countries during 1980–2009. Since our baseline econometric specification includes two years of lags, we also collect data on fiscal consolidations for 1978 and 1979. For the 17 countries

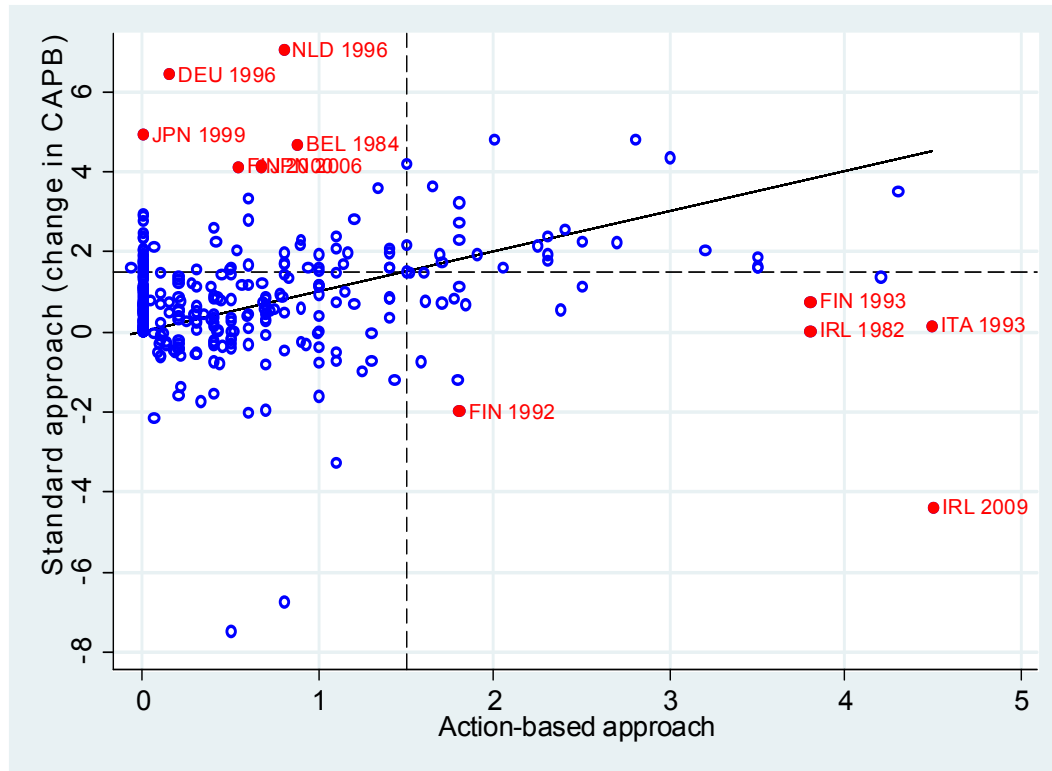
¹¹ Focusing on the United States, Romer and Romer (2010) use the narrative record, such as congressional reports, to identify the size and motivation for all post-World War II tax policy actions. They find that only a small share of observed changes in government revenue reflect actual changes in tax policy and use the changes in tax policy identified by means of their narrative approach to obtain estimates of the causal impact of tax changes on the economy.

covered—Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Portugal, Spain, Sweden, the United Kingdom, and the United States—we identified 215 years in which there were budgetary measures aimed at fiscal consolidation. Thus, across the sample countries, about 40 percent of years saw the introduction of budgetary measures aimed at reducing the deficit. The average size of fiscal consolidation was about 1 percent of GDP per year. Fiscal consolidations of more than 1.5 percent of GDP per year represent about 19 percent of all cases of consolidation. On average, countries implemented such large fiscal adjustments once every 14 years. As we show later on, the estimated effects of these large adjustments on output are similar, in proportional terms, to the effects of smaller adjustments.

D. Comparing the Two Approaches

In this subsection, we compare the size of fiscal consolidation identified using our action-based approach with the conventional definition of fiscal consolidation, an increase in the CAPB-to-GDP ratio. The CAPB-to-GDP data are from Alesina and Ardagna (2010). As reported in Figure 1, the two measures agree that there was fiscal consolidation in a number of cases, including Denmark (1983) and Ireland (1987)—the two cases highlighted by Giavazzi and Pagano (1990) in their work on expansionary fiscal consolidations. However, there are also numerous cases in which the standard approach and our approach come to different conclusions regarding the presence and size of fiscal consolidation. In particular, there are several cases for which we identify fiscal consolidation, but the CAPB-based approach identifies a large discretionary fiscal *stimulus*, as in the case of Ireland (2009). Similarly, there are several cases of large increases in the CAPB-to-GDP ratio for which we find little evidence of fiscal consolidation in the historical record, as in the case of Germany (1996).

Figure 1. Size of Fiscal Consolidation: Action-Based Approach vs. Standard Approach (Percent of GDP)



Note: Figure highlights cases of large adjustments (greater than 1.5 percent of GDP) for which the discrepancy between the action-based and standard approach exceeds 3 percent of GDP.

Which approach typically provides a more accurate identification of fiscal consolidation? To address this question, we focus on the largest discrepancies between the two approaches. In particular, we examine the 11 cases of large adjustments—greater than 1.5 percent of GDP—for which the discrepancy between the two approaches exceeded 3 percent of GDP. Figure 1 highlights these large discrepancies, and Appendix 3 describes each of the 11 cases in detail, and explains how we assess the relative accuracy of the two approaches.

Our analysis of the 11 largest disagreements between the two approaches provides strong evidence that our action-based approach more accurately identifies the size of fiscal consolidation. We find 8 cases where we are able to identify specific economic or budgetary developments, including one-off statistical operations, that cause the CAPB-based measures used by Alesina and Ardagna (2010) to inaccurately identify the size of the consolidation and that largely explain the gap between the two measures. In the remaining three cases (Italy in 1993, and Finland in 1992 and 1993), there were crises or large economic contractions that could plausibly have caused the CAPB-based approach to be highly inaccurate. We find no cases where there is evidence that our action-based measure was substantially inaccurate.

III. EFFECT OF FISCAL CONSOLIDATION ON ECONOMIC ACTIVITY

With periods of fiscal consolidation now identified, this section employs statistical techniques to assess the impact of the fiscal measures on economic activity. The statistical methodology follows that of Romer and Romer (2010), Cerra and Saxena (2008), and others. We focus on the impact of fiscal consolidation on GDP and unemployment in the short run—three years.

A. Estimated Effects of Fiscal Consolidation on Economic Activity

We examine the relationship between output and fiscal consolidation by estimating impulse response functions. In particular, we estimate the average impulse response of output to action-based fiscal consolidation using panel data analysis. The estimated equation makes use of an autoregressive model in growth rates estimated on annual data for 1980–2009 for the 17 countries in our sample. The growth rates are then cumulated to obtain the estimated impact of fiscal consolidation on the level of output.

The analysis accounts for the current and lagged impact of fiscal consolidation. Formally, the estimated equation is:

$$(1) \quad g_{it} = \alpha + \sum_{j=1}^2 \beta_j g_{i,t-j} + \sum_{s=0}^2 \beta_s FC_{i,t-s} + u_{it}$$

where the subscript i denotes the i th country and the subscript t denotes the t th year; g is the percentage change in real GDP; and FC is the estimated size of the action-based fiscal consolidation measures as a percent of GDP. The disturbance term, u_{it} is specified as a two-way error component model:

$$(2) \quad u_{it} = \mu_i + \lambda_t + v_{it}$$

where μ_i denotes a country-fixed effect, and λ_t denotes a year-fixed effect. The time effects capture shifts in global variables, such as the global business cycle. The country fixed effect captures differences in countries' steady-state growth rates. F -tests reject the absence of country and time fixed effects. The impulse response function for the effect of the fiscal actions on the *level* of output, along with one-standard-error bands, is obtained via the delta method. The impact on unemployment is obtained by re-estimating equation (1) while replacing the terms g with the change in the unemployment rate, and again cumulating the responses to obtain the impact on the level of the unemployment rate. To explore the impact on the unemployment rate, we replace all the GDP growth terms in the estimated equation with the change in the unemployment rate. In particular, the estimated equation is:

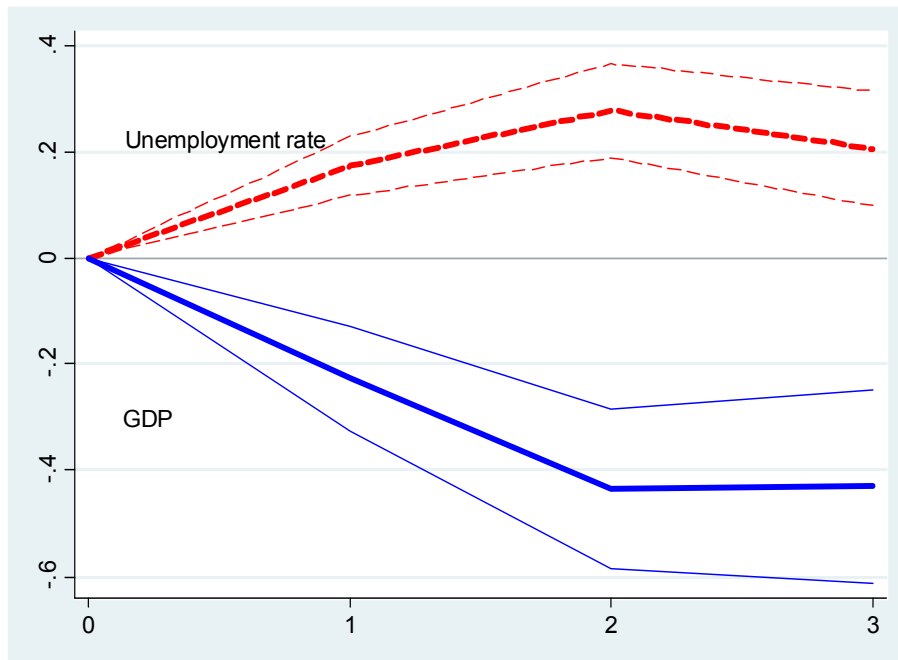
$$(3) \quad \Delta U_{it} = \alpha + \sum_{j=1}^2 \beta_j \Delta U_{i,t-j} + \sum_{s=0}^2 \beta_s FC_{i,t-s} + u_{it}$$

where ΔU is the first difference of the unemployment rate.¹² We then cumulate the impulse responses to obtain the impact of fiscal consolidation on the level of the unemployment rate.

Basic results

The key result that emerges from the analysis is that fiscal consolidations are typically contractionary (Figure 2). A fiscal consolidation equal to 1 percent of GDP typically reduces real GDP by an estimated 0.43 percent within two years. The effect is statistically significant at conventional levels with a t -statistic of -2.89 and a 90-percent confidence interval of $[-0.68, -0.19]$. The effect on the unemployment rate is an increase of about 0.28 percentage point within two years. The effect is statistically significant with a t -statistic of 3.13 and a 90-percent confidence interval of $[0.13, 0.42]$. Overall, the idea that fiscal consolidation stimulates economic activity in the short term finds little support in the data.

Figure 2. Effect of a 1 Percent of GDP Fiscal Consolidation on GDP and Unemployment Rate



Note: Figure reports point estimates and one standard error bands. The effect on GDP is in percent. The effect on the unemployment rate is in percentage points. $t=1$ denotes the year of fiscal consolidation.

¹² As in Equation (1), the estimation of Equation (3) includes both country- and time-fixed effects. Appendix 1 reports the sources of the data. Similarly, all subsequent equations mentioned in this paper include both country- and time-fixed effects.

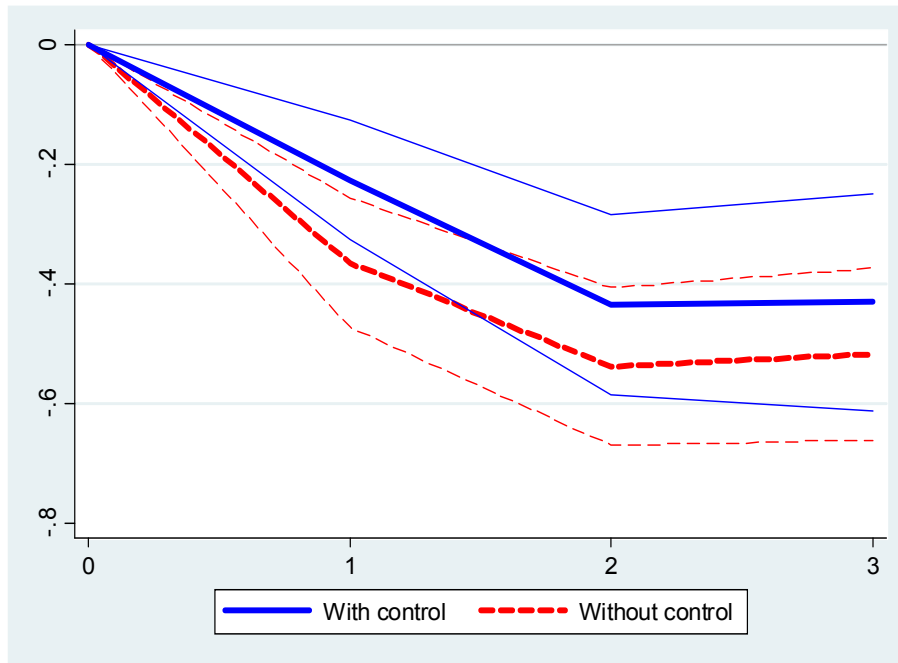
Robustness

The above results suggest that fiscal consolidation tends to have a contractionary effect on economic activity. In this sub-section, we perform a number of tests to assess the robustness of this result.

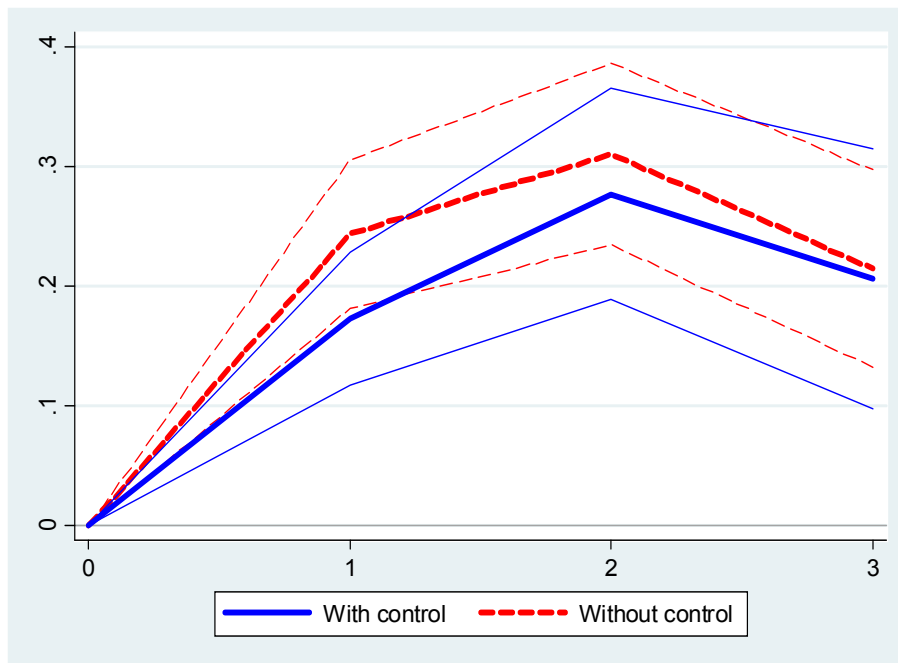
First, we consider the robustness of the results to excluding lags of the dependent variable. If consolidation were more likely in a strong economy, one would expect to see a correlation between lagged output growth and consolidation, and controlling for lagged output would have an appreciable impact on the estimates. We thus exclude the terms $\sum_{j=1}^2 \beta_j g_{i,t-j}$ in from the estimated equation. As Figure 3 reports, excluding lags of growth had only a small effect on the results, which is reassuring as it suggests that this source of bias is small in our sample. The effect on GDP changes from the baseline estimate of -0.43 ($t = -2.89$) to -0.54 ($t = -4.1$). Similarly, regarding the estimated impact of fiscal consolidation on unemployment, excluding lags of unemployment had a small impact on the results. The effect changes from 0.28 ($t = 3.13$) to 0.31 ($t = 4.10$).

Figure 3. Robustness: With and Without Controlling for Lags of Dependent Variable
(Effect of a 1 Percent of GDP Fiscal Consolidation)

a. GDP (percent)



b. Unemployment Rate (percentage points)



Note: Figure reports point estimates and one standard error bands. $t=1$ denotes the year of fiscal consolidation.

Second, we address the possibility that the baseline estimated equation omits variables that affect output and may be correlated with fiscal consolidation. Not controlling

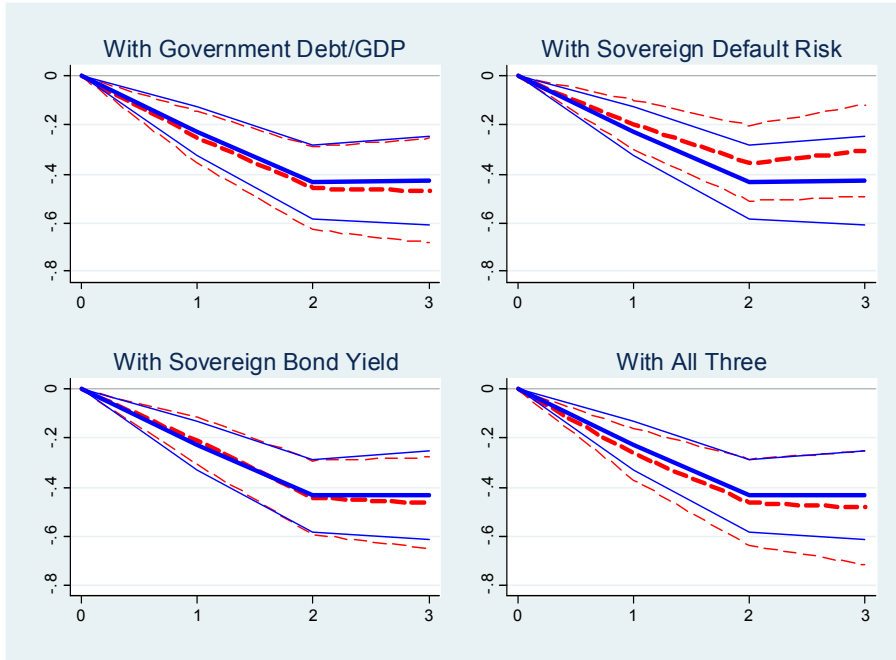
for such factors could influence the estimated effect of consolidation. Here, we consider the most obvious omitted variables that could plausibly bias the analysis towards overstating the negative effects of fiscal consolidation on economic activity.¹³ In particular, we consider the initial government debt-to-GDP ratio, the perceived level of sovereign default risk, and the sovereign (10-year) bond yield. These variables could plausibly raise borrowing costs and reduce growth, but also prompt governments to conduct fiscal consolidation. Our measure of perceived default risk is the Institutional Investor Ratings index (IIR), following Reinhart, Rogoff, and Savastano (2003) and Eichengreen and Mody (2004). The ratings are based on assessments of sovereign risk by private sector analysts. Each country is rated on a scale of zero to 100, with a rating of 100 assigned to the lowest perceived sovereign default probability. In each case, we include three lags of the additional variable in the estimated equation.

Overall, we find that the inclusion of these additional variables has negligible effects on the results. Regarding the effect on output, Figure 4 reports that, in each case, the effect in the second year is similar to the baseline estimate of -0.43 percent ($t = -2.89$). In particular, including the government debt-to-GDP ratio yields an estimate of -0.46 ($t = -2.69$); including the IIR changes the estimate to -0.36 ($t = -2.31$); and including the 10-year bond yield an estimate of -0.44 ($t = -2.90$). Including all three additional variables at the same time yields an estimate of -0.46 ($t = -2.60$). In the case of the unemployment rate, Figure 4 shows that the estimated impact is also similar to the baseline estimate of 0.28 percent ($t = 3.13$). In particular, including the government debt-to-GDP ratio yields an estimate of 0.28 ($t = 2.88$); including the IIR changes the estimate to 0.25 ($t = 2.78$); and including the sovereign bond yield changes the estimate to 0.26 ($t = 2.82$). Including all three additional variables at the same time yields an estimate of 0.25 ($t = 2.47$). The finding that the results are robust to the inclusion of these additional variables is reassuring, as it suggests that the level of bias due to the omission of these variables is small in this sample.

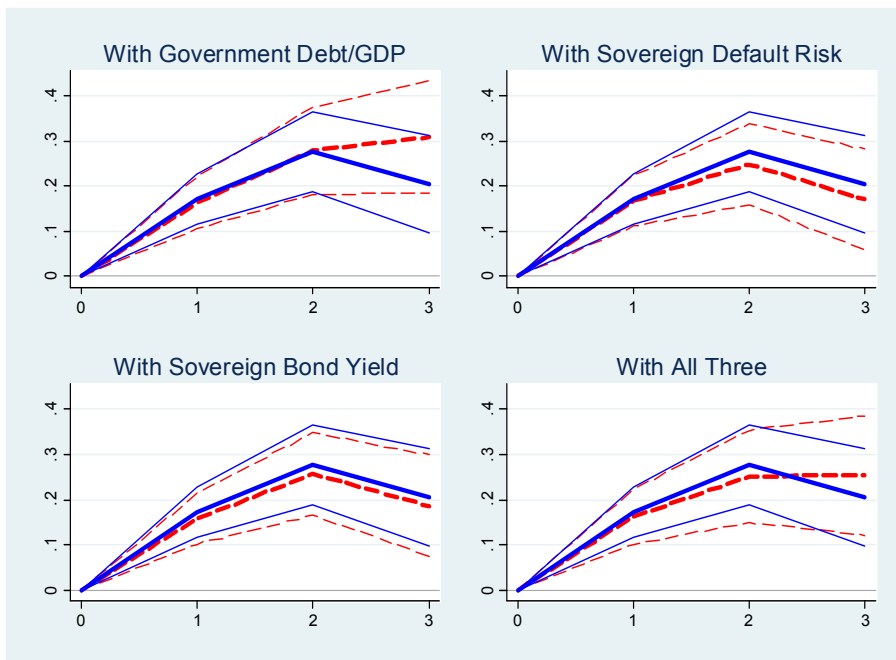
¹³ Other omitted variables could go in the opposite direction. For example, countries are more likely to be willing to consolidate when other factors are not acting to reduce output. Overall, it is not clear which way the omission of variables would go.

Figure 4. Robustness: Effect of Including Additional Variables
(Effect of a 1 Percent of GDP Fiscal Consolidation)

a. Effect on GDP (percent)



b. Effect on Unemployment Rate (percentage points)



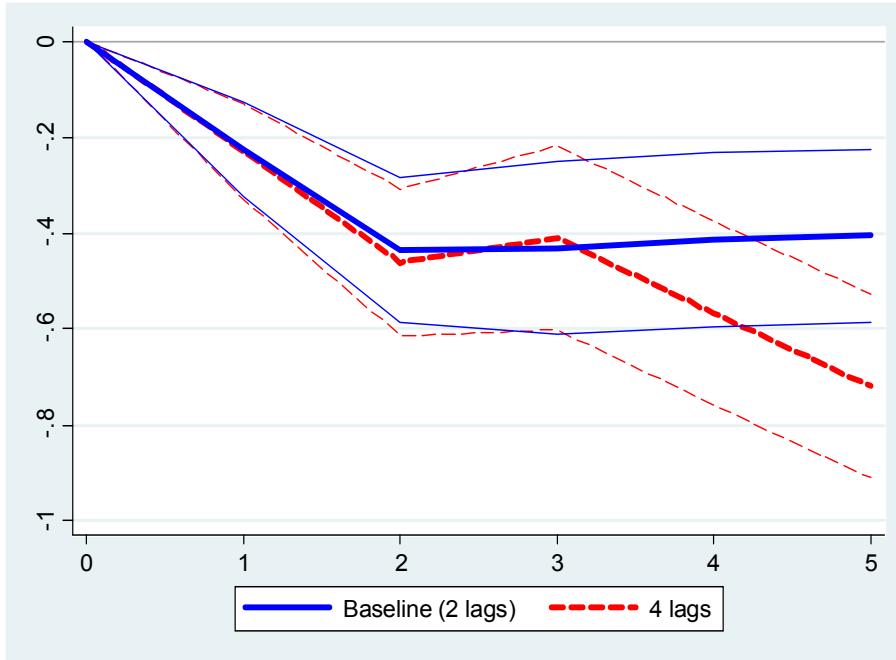
Note: Figure reports point estimates and one standard error bands. $t=1$ denotes the year of fiscal consolidation. Solid line indicates baseline estimate. Dashes indicate results when additional variables are included in the estimated equation.

Third, we consider the robustness of the results to including a longer lag structure. While our baseline estimates focus on the short-run effect of fiscal consolidation—the first three years—it is possible that the effects are sustained beyond three years. To explore this possibility, we re-estimate Equation (1) to include four years of lags. Figure 5 reports the results, and compares them with those from the baseline approach with two lags. For GDP, the impact after two years, -0.44 percent ($t = -2.77$) is similar to the baseline estimate of -0.43 percent ($t = -2.89$). For the unemployment rate, the impact after two years, 0.30 ($t = 3.22$) is comparable with the baseline of 0.28 percentage point ($t = 3.13$). In addition, both the baseline specification and the alternative specification with more lags suggest that the effects of fiscal consolidation have sustained negative effects on real GDP that last beyond three years. Allowing for four lags even suggests that the effect reaches -0.72 percent ($t = -3.75$) by the fifth year. For the unemployment rate, both specifications indicate a hump-shaped response, with a peak in the second year. However, the specification with four lags suggests that the effect on the unemployment rate remains significant after five years, at 0.23 percentage point ($t = 2.00$), while the baseline specification yields an effect of 0.13 percentage point ($t = 1.24$), which is not statistically significant at conventional levels.

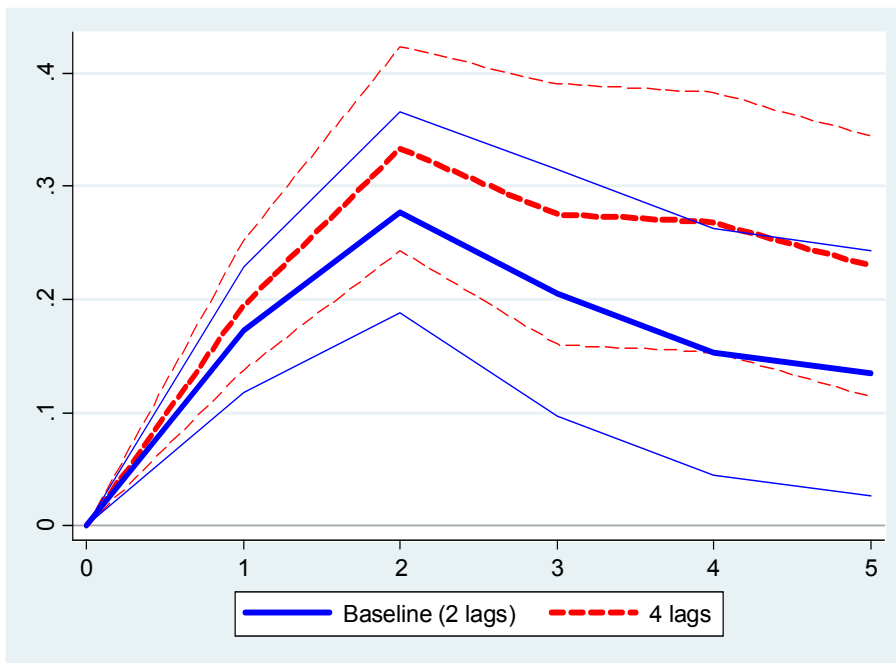
Finally, we re-estimate the effect using the Arellano-Bond (1991) procedure. This procedure addresses the possibility of bias due to the fact that country fixed effects are correlated with the lagged dependent variables in the autoregressive equation. Here, the bias is likely to be small here given the large number of observations per country relative to the number of countries (30 years for each of our 17 countries). As expected, when the estimation is conducted using the Arellano-Bond estimator that corrects for this possible bias, the results are very similar, both for output and unemployment (Figure 6). For output, the effect is -0.40 ($t = 2.57$) in the second year, compared with the baseline estimate of -0.43 ($t = 2.89$). For the unemployment rate, the effect is 0.29 ($t = 3.17$) in the second year, compared with the baseline estimate of 0.28 ($t = 3.13$).

Figure 5. Robustness: Additional Lags of Dependent Variable
(Effect of a 1 Percent of GDP Fiscal Consolidation)

a. GDP (percent)



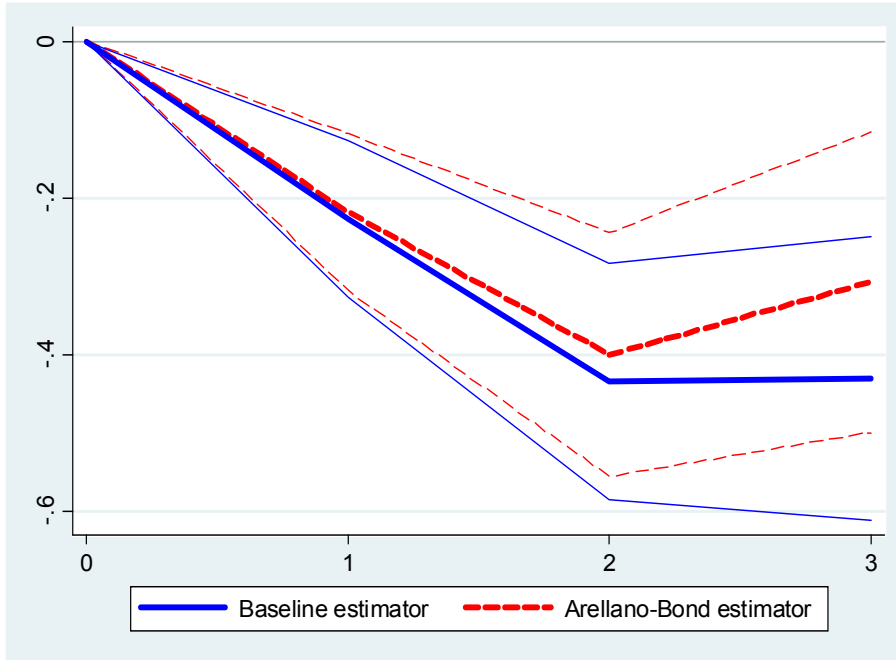
b. Unemployment Rate (percentage points)



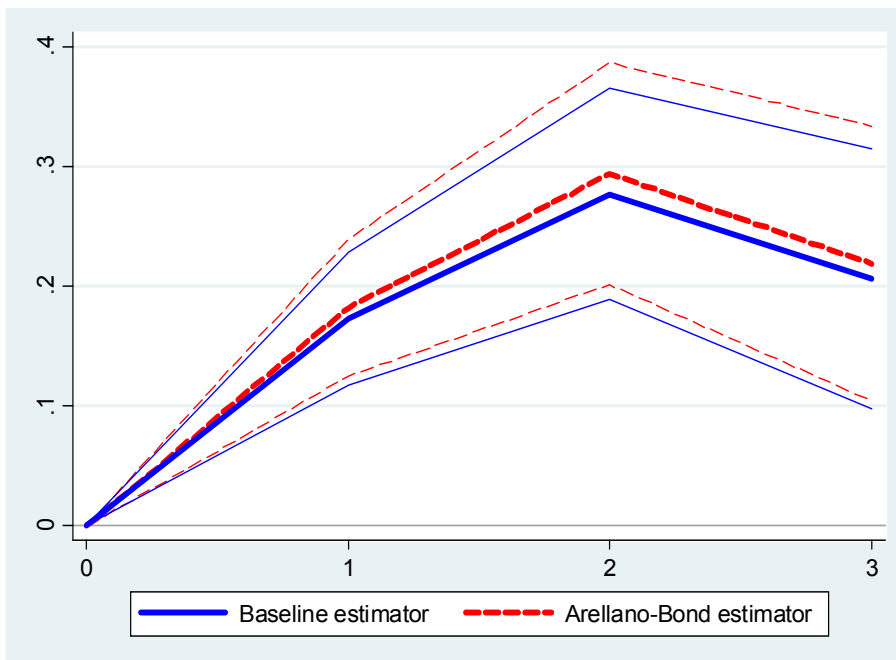
Note: Figure reports point estimates and one standard error bands. $t=1$ denotes the year of fiscal consolidation.

Figure 6. Robustness: Arellano-Bond Estimator
(Effect of a 1 Percent of GDP Fiscal Consolidation)

a. GDP (percent)



b. Unemployment Rate (percentage points)



Note: Figure reports point estimates and one standard error bands. $t=1$ denotes the year of fiscal consolidation.

Overall, this section suggests that our baseline results hold up to a number of robustness tests. In all cases, the effect of fiscal consolidation on output is negative,

significant, and close to the baseline estimate of -0.43 within two years. Similarly, in each case, fiscal consolidation raises the unemployment rate by an amount that is close to the baseline estimate of 0.28 percentage point, and the effect is statistically significant.

IV. EXTENSIONS

The above analysis found that fiscal consolidations have a contractionary effect on economic activity, and no evidence of expansionary effects. This section turns to three key factors that could have shaped the outcomes: the response of interest rates and exchange rates to fiscal consolidation; the composition of the fiscal package; and the role of perceived sovereign risk of the country undertaking the consolidation.

A. The Mitigating Role of Interest Rates and Exchange Rates

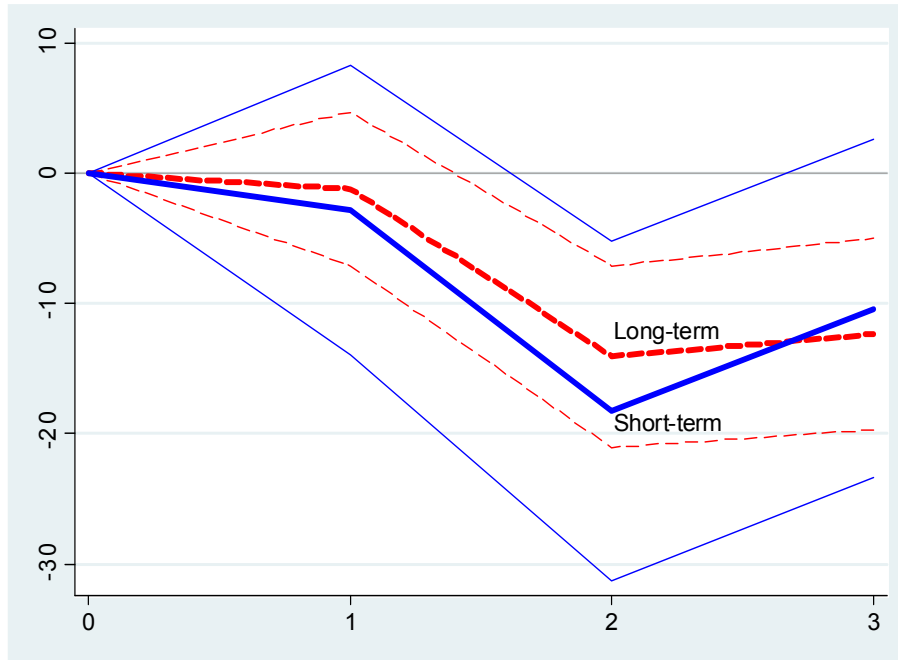
We now turn to the role of interest rate cuts and declines in the value of the currency in mitigating the impact of fiscal consolidation. In addition, to clarify how interest rates and exchange rates shaped the outcome, we examine the behavior of the components of GDP, including exports and imports. To explore these channels, we use the same statistical approach as described above (Equation 1), but apply it to studying the impact of fiscal consolidation on exchange rates and interest rates instead of on output. For example, to examine the response of the interest rate to fiscal consolidation, we repeat the estimation of the equation described above, while replacing all the GDP growth terms (g) with the change in the interest rate. We then cumulated the impulse responses to obtain the impact of fiscal consolidation on the level of the interest rate.

Interest rates

The short-term policy interest rate typically falls by 18 basis points ($t = -1.40$) in response to a fiscal consolidation of 1 percent of GDP (Figure 7). Since the rate of inflation usually does not change much following fiscal consolidation, the fall in real interest rates is similar. At the same time, the long-term nominal interest rate on government bonds falls broadly in line with short-term rates. In particular, the yield on government bonds with a maturity of 10 years declines by about 14 basis points ($t = -2.02$) after two years in response to a fiscal consolidation of 1 percent of GDP. The response of long-term rates suggests that fiscal consolidation may reduce risk premiums.¹⁴ While the fall in the long-term rate is statistically significant, the fall in the policy rate is not.

¹⁴The effect of fiscal consolidation on longer-term interest rates may be influenced by two factors: the decline in the current and future short-term interest rate, and a reduction in the risk premium related to the perceived improvement in the fiscal outlook.

Figure 7. Response of Interest Rates to a 1 Percent of GDP Fiscal Consolidation (basis points)



Note: Figure reports point estimates and one standard error bands. $t=1$ denotes the year of fiscal consolidation.

Exchange rates

In response to a fiscal consolidation of 1 percent of GDP, the real effective exchange rate depreciates by 1.12 percent in the first year ($t = -3.17$). Interestingly, this real depreciation is fully explained by nominal exchange rate depreciation or currency devaluation (see Figure 8). Examples of large devaluations during fiscal consolidation include, among others, Finland (1992), Ireland (1987), and Italy (1992).

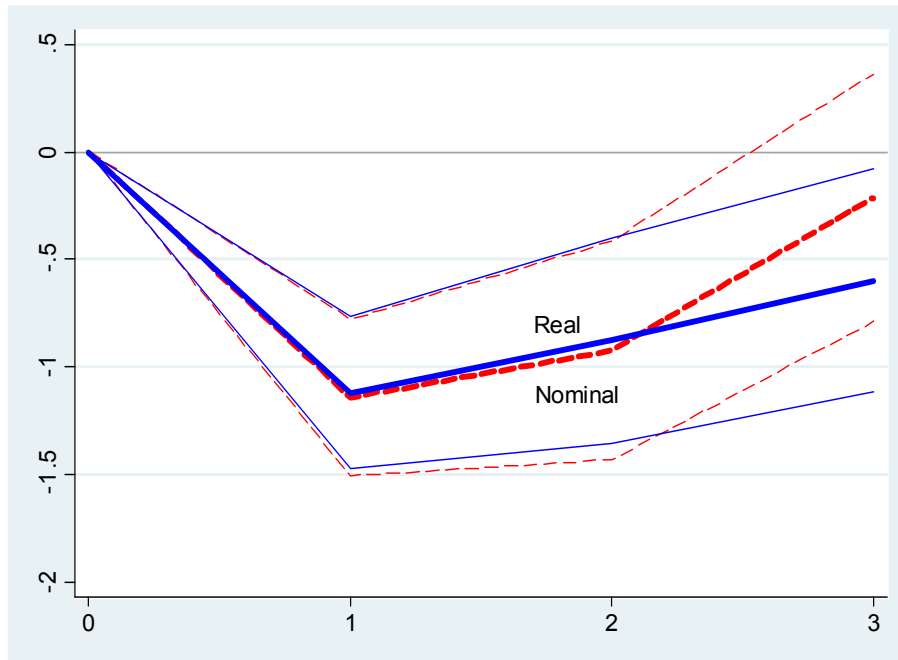
This result suggests that the exchange rate plays an important role in mitigating the impact of fiscal consolidation. To further investigate the role of the exchange rate, we split the sample according to the flexibility of the exchange rate regime. In particular, we repeat the estimation approach used above for two sub-samples: fiscal consolidations occurring in a pegged exchange rate regime, and in floating regimes. The source of the exchange rate regime classification is the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions*.¹⁵ In particular for the pegged regimes, we estimate the following equation:

¹⁵ Following Bubula and Otker-Robe (2002), pegged regimes include both hard pegs (currency unions and currency boards) and soft pegs (pegs vis-à-vis a single currency or a basket, horizontal bands, and crawling pegs and bands). Floating regimes include both independently floating regimes and managed floating regimes with no predetermined path for the exchange rate.

$$(4) \quad g_{it} = \alpha + \sum_{j=1}^2 \beta_j g_{i,t-j} + \sum_{s=0}^2 \gamma_s Pegged_{i,t-s} + \sum_{s=0}^2 \beta_s FC_{i,t-s} + u_{it}$$

where *Pegged* equals fiscal consolidation (*FC*) when the exchange rate regime is pegged. The sum of the responses to *Pegged* and *FC* show the effects of a consolidation occurring in a pegged exchange rate regime. We then estimate an analogous equation for the set of consolidations occurring in a floating exchange rate regimes. We report results based on the *de jure* classification of exchange rate regimes provided by the IMF. The results are similar based on the *de facto* classification.

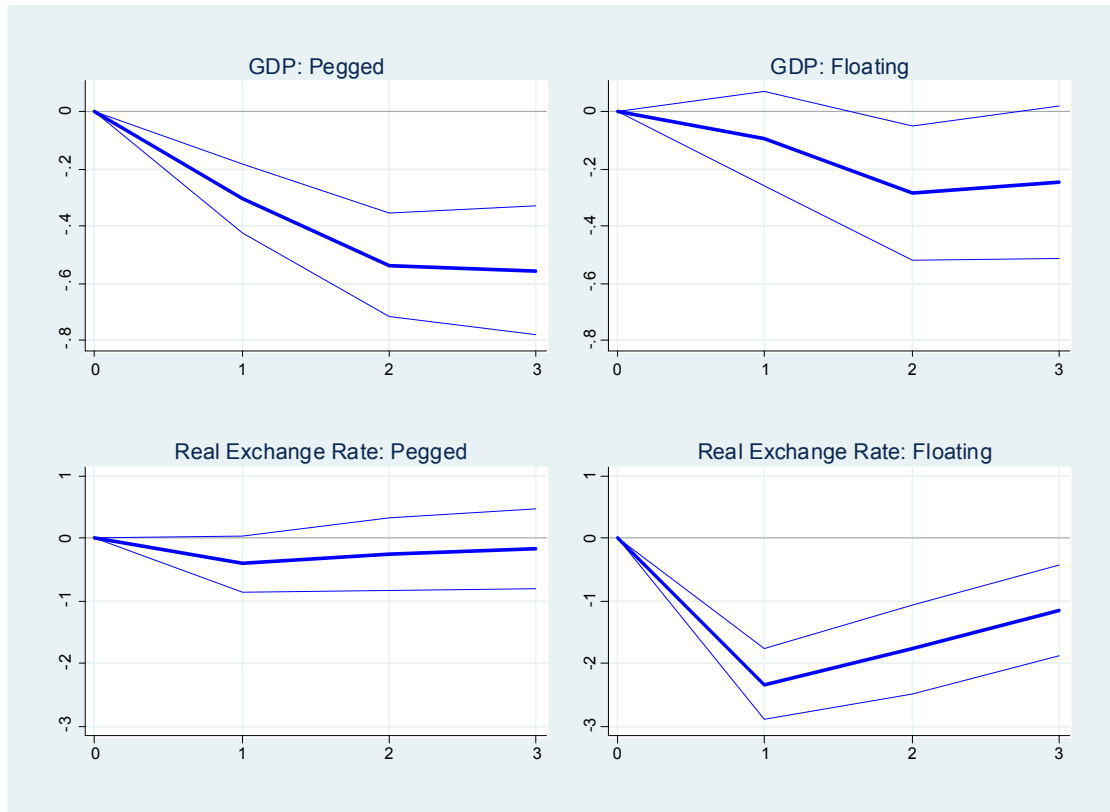
Figure 8. Response of Exchange Rates to a 1 Percent of GDP Fiscal Consolidation (percent)



Note: Figure reports point estimates and one standard error bands. $t=1$ denotes the year of fiscal consolidation.

The results suggest that, as expected, the impact of fiscal consolidation on output is more contractionary and the exchange rate changes less in pegged exchange rate regimes. A 1 percent of GDP fiscal consolidation has an impact on output of -0.54 percent ($t = -2.94$) when the exchange rate is pegged, but only -0.29 percent ($t = -1.23$) in floating regimes (see Figure 9). The response of the real effective exchange rate is -0.41 ($t = -0.93$) in pegged regimes, and -2.33 ($t = -4.18$) in floating regimes. These findings are consistent with Mundell-Fleming theory. They are also consistent with a number of recent studies, such as Ilzetzki, Mendoza, and Vegh (2010), who find that fiscal multipliers are larger in economies operating fixed exchange rate regimes.

Figure 9. Response of GDP to a 1 Percent of GDP Fiscal Consolidation: Pegged vs. Floating Exchange Rate Regimes



Note: Figure reports point estimates and one standard error bands. $t=1$ denotes the year of fiscal consolidation.

Transmission channel: the role of net exports

How do these changes in interest rates and exchange rates affect the economy? The fall in interest rates is likely to support consumption and investment. And the real depreciation should support economic activity by boosting net exports.

Decomposing the response of GDP into its demand components confirms that net exports expand in response to fiscal consolidation, providing a key cushioning role (Figure 10). In particular, the contribution of net exports to GDP rises by 0.51 percentage points ($t = 4.49$).¹⁶ The increase in net exports reflects both an increase in real exports in response to the real exchange rate depreciation, and a decline in real imports reflecting both the real appreciation and the fall in income. Real exports rise by 1.07 percent ($t = 2.96$), and real

¹⁶ The contribution of net exports to GDP is defined as $\frac{X_{t-1}}{Y_{t-1}} g_{X,t} - \frac{M_{t-1}}{Y_{t-1}} g_{M,t}$, where X and M denote real exports and imports, respectively, Y denotes real GDP, and g_X and g_M denote the percentage change in real exports and imports, respectively. The contribution of domestic demand to GDP is defined as $\frac{C_{t-1}}{Y_{t-1}} g_{C,t} + \frac{I_{t-1}}{Y_{t-1}} g_{I,t}$, where C and I denote real consumption and real investment, respectively.

imports fall 0.92 percent ($t = -2.33$). Since the analysis controls for shifts in global demand (time dummies), the estimated increase in exports does not reflect an upswing in external demand.¹⁷ Finally, in line with these findings, fiscal consolidation has a positive effect on the external current account-to-GDP ratio, with the each 1 percent of GDP of fiscal consolidation raising the current account-to-GDP ratio by about 0.62 percentage point ($t = 4.68$) within two years (Figure 11). This finding is in line with a strong “twin-deficit” link between fiscal and external current account balances.¹⁸

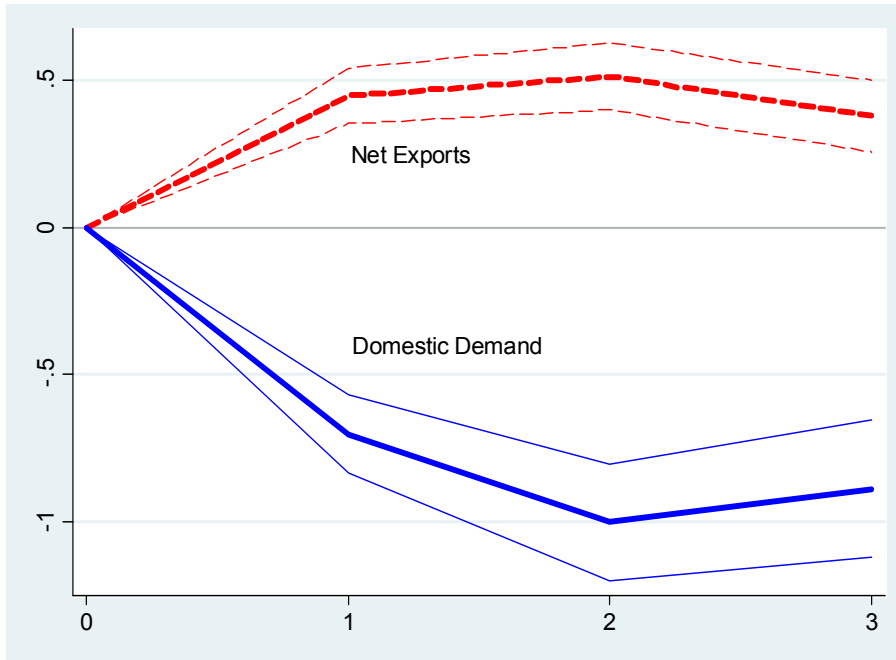
Meanwhile, the contribution of domestic demand—consumption and investment—to GDP declines substantially in response to fiscal retrenchment. In particular, a consolidation of 1 percent of GDP reduces the contribution of domestic demand to GDP by 1.00 percentage point ($t = -5.07$) within two years. This result is broadly consistent with textbook (Keynesian) effects on demand of spending cuts and tax hikes.

Overall, this section confirms that a fall in the value of the currency plays a key role in softening the impact of fiscal consolidation on output through the impact on net exports. Without this increase in net exports, the output cost of fiscal consolidation would be more than twice as large.

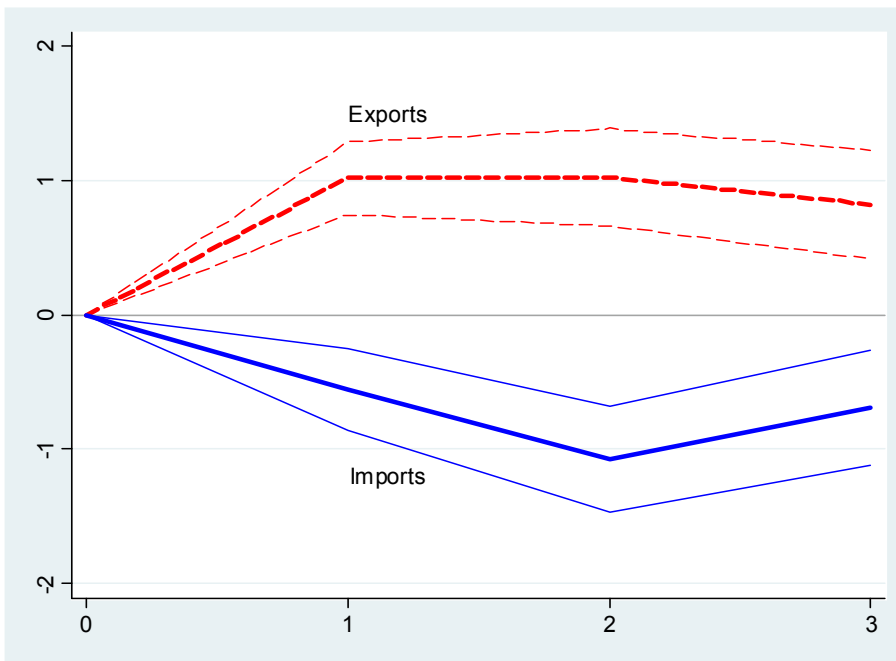
¹⁷ The estimated response of real exports and imports are broadly consistent with that implied by conventional estimates of elasticities with respect to the real exchange rate. For example Bayoumi and Faruqee (1998, p. 32) report that, within two years, a 1 percent real depreciation should raise exports by 0.6 percent and reduce imports by 0.78 percent, other things equal. In our sample, the estimated impact of fiscal consolidation is a real depreciation of about 1.1 percent. The conventional elasticities would thus imply an impact on exports and imports of 0.66 percent and 0.86 percent, respectively, while our estimated impact is 1.03 percent and 0.99 percent, respectively.

¹⁸ Note that this estimate of the size of the link between fiscal consolidation and the current account-to-GDP (0.62) is larger than in a number of existing studies that use an outcome-based measure of fiscal policy (such as the overall budget surplus). For example, Chinn and Ito (2008), estimate that a 1 percent of GDP rise in the fiscal surplus raises the U.S. current account-to-GDP ratio by 0.10-0.49 percentage points, while Abbas et al. (2010) estimate the size of the effect at 0.2-0.3 percentage points.

Figure 10. Effect of a 1 Percent of GDP Fiscal Consolidation on Components of GDP
 a. Domestic Demand and Net Exports

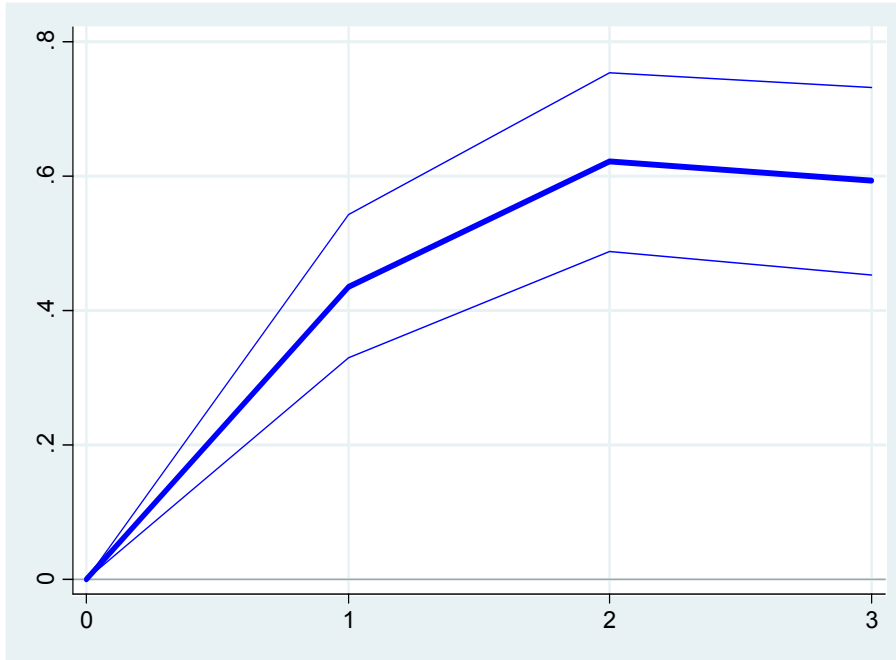


b. Exports and Imports



Note: Figure reports point estimates and one standard error bands. $t=1$ denotes the year of fiscal consolidation.

Figure 11. Effect of a 1 Percent of GDP Fiscal Consolidation on External Current Account-to-GDP Ratio (percent)



Note: Figure reports point estimates and one standard error bands. $t=1$ denotes the year of fiscal consolidation.

B. Taxes versus Spending

Does the composition of fiscal consolidation across taxes and spending matter? A number of studies suggest that fiscal consolidation associated primarily with declines in spending is accompanied by an expansion of the economy in the short term, whereas adjustments based primarily on revenue increases feature output contractions.¹⁹ In this section, using our data set of periods of action-based fiscal consolidation, we revisit these stylized facts to test whether the composition of consolidation measures makes a difference in terms of their impact on growth. We also investigate the role of interest rates and exchange rates in explaining the effects of different types of fiscal consolidation measures.

¹⁹See, for example, Alesina and Perotti (1995, 1997), Alesina and Ardagna (2010), Broadbent and Daly (2010), and others.

Basic results

To address the issue, we repeat the estimation approach used above for two types of fiscal consolidation. The first type, denoted as “tax-based,” corresponds to years in which the contribution of tax hikes to fiscal consolidation is greater than the contribution of spending cuts. The second type, denoted as “spending-based,” corresponds to years in which the contribution of spending cuts to fiscal consolidation is greater than that of tax hikes.²⁰

$$(5) \quad g_{it} = \alpha + \sum_{j=1}^2 \beta_j g_{i,t-j} + \sum_{s=0}^2 \gamma_s TB_{i,t-s} + \sum_{s=0}^2 \beta_s FC_{i,t-s} + u_{it}$$

where TB equals fiscal consolidation (FC) when the consolidation is tax-based. The sum of the responses to TB and FC show the effects of a tax-based consolidation. The response to FC shows the impact of a spending-based consolidation, and the response to TB shows the *difference* in the effects of a tax-based and a spending-based consolidation, which we also discuss below.

Spending-based adjustments are less contractionary than tax-based adjustments. In the case of tax-based programs, the effect of a fiscal consolidation of 1 percent of GDP on GDP is -1.13 percent ($t = -4.19$) within two years (Figure 12). In the case of spending-based programs, the effect on output is -0.24 percent ($t = -1.52$), and is not statistically significant. The difference between the tax-based and spending-based responses is strongly statistically significant at -0.86 percent ($t = -2.97$). Both tax-based and spending-based consolidations have a significant effect on unemployment, but the increase is about half as large for spending-based consolidations. Tax-based consolidation raises the unemployment rate by 0.49 percentage point within two years ($t = 3.03$), and spending-based deficit cuts raise the unemployment rate by 0.21 percentage point ($t = 2.23$). However, as will be shown below, a key reason the costs of spending-based deficit cuts are relatively small is that they typically benefit from a large dose of monetary stimulus, as well as an expansion in net exports.

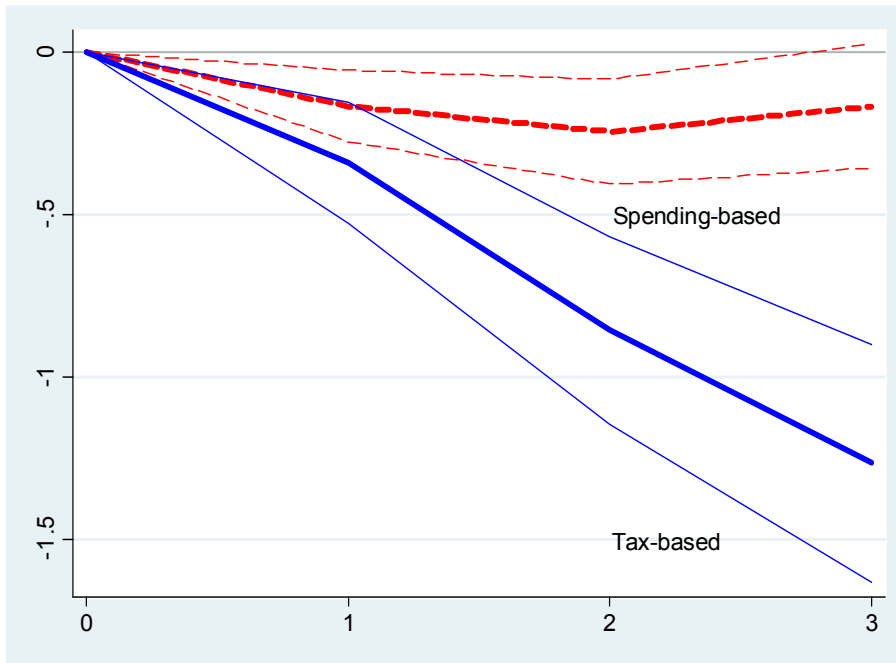
Domestic demand contracts significantly for both types of fiscal consolidation, but by more in the case of tax-based packages. In particular, in the case of spending-based measures, domestic demand falls by about 0.69 percent ($t = -3.14$) after two years, whereas the decline is 1.91 percent ($t = -5.38$) in the case of tax-based packages (Figure 13).

A rise in net exports mitigates the impact of the consolidation on GDP to a similar extent for the two types of consolidations. The contribution of net exports rises by about 0.54 and 0.49 percentage points, for tax-based and spending-based consolidations, respectively. However, in the case of spending-based consolidations, exports drive the rise in net exports, while the rise is due mainly to a fall in imports in the case of tax-based consolidations (Figure 14).

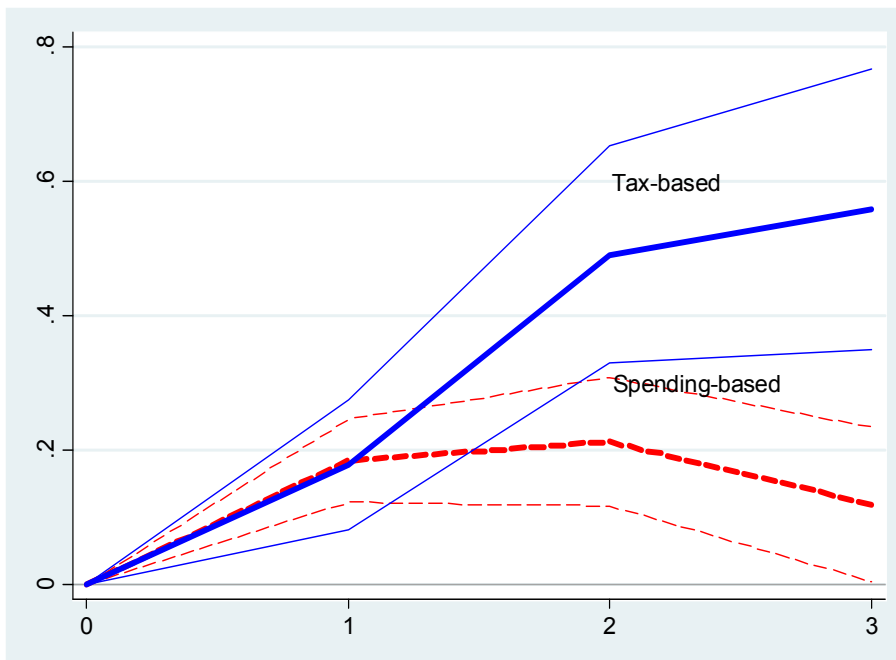
²⁰Similar results are obtained if the tax-based type corresponds to years in which the contribution of tax hikes to fiscal consolidation was more than 60 percent of the total; and the same holds true for the spending-based type.

Figure 12. Effect of a 1 Percent of GDP Fiscal Consolidation:
Spending-based vs. Tax-based Contraction

a. GDP (percent)



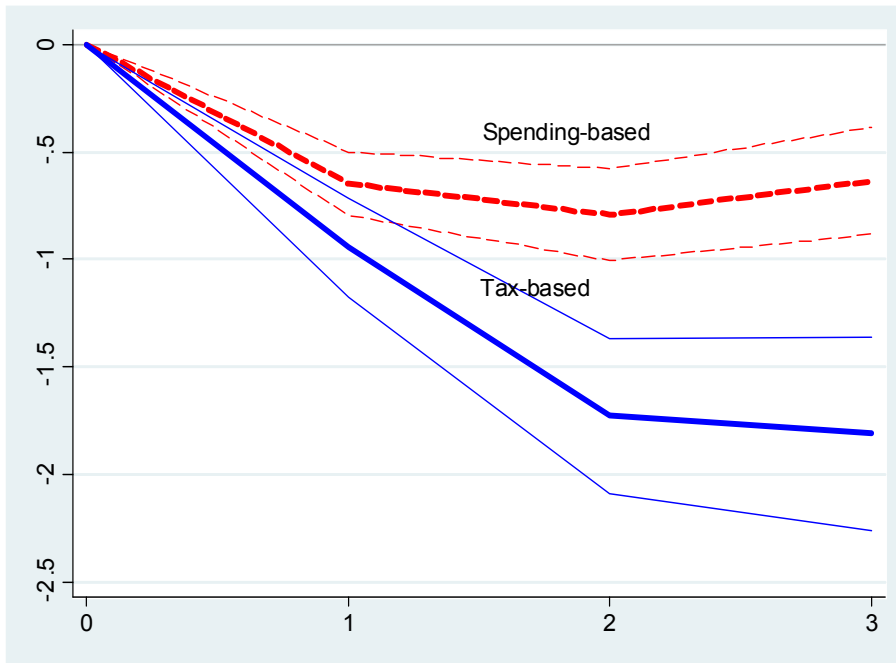
b. Unemployment Rate (percentage points)



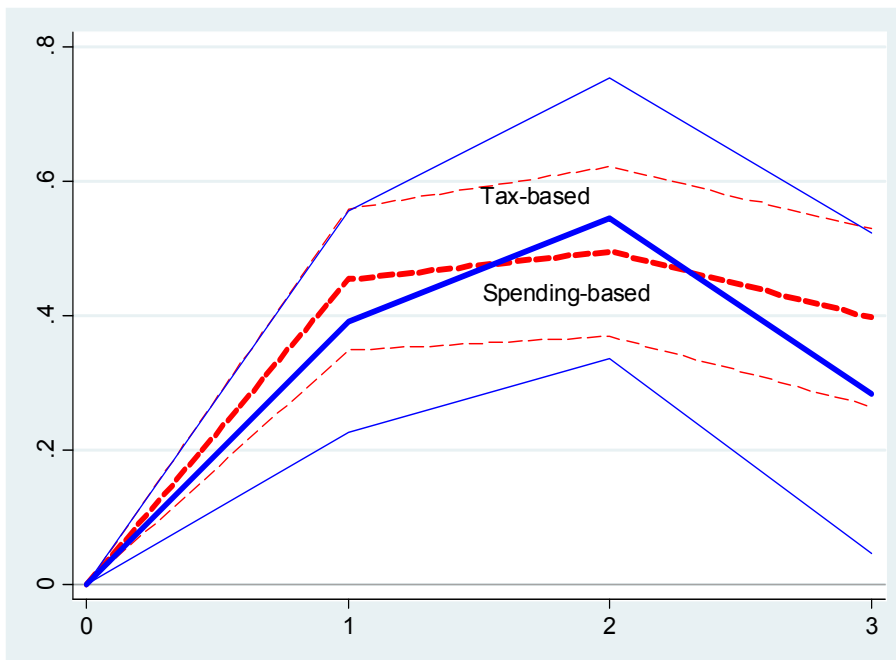
Note: Figure reports point estimates and one standard error bands. $t=1$ denotes the year of fiscal consolidation.

Figure 13. Effect of a 1 Percent of GDP Fiscal Consolidation on Domestic Demand and Net Exports: Spending-based vs. Tax-based Contraction (percentage points)

a. Domestic Demand



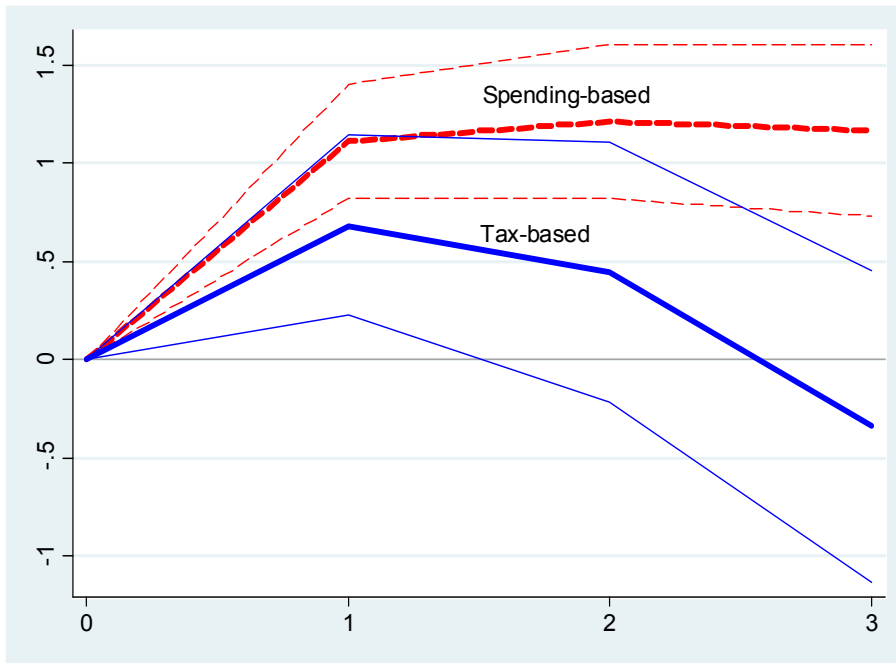
b. Net Exports



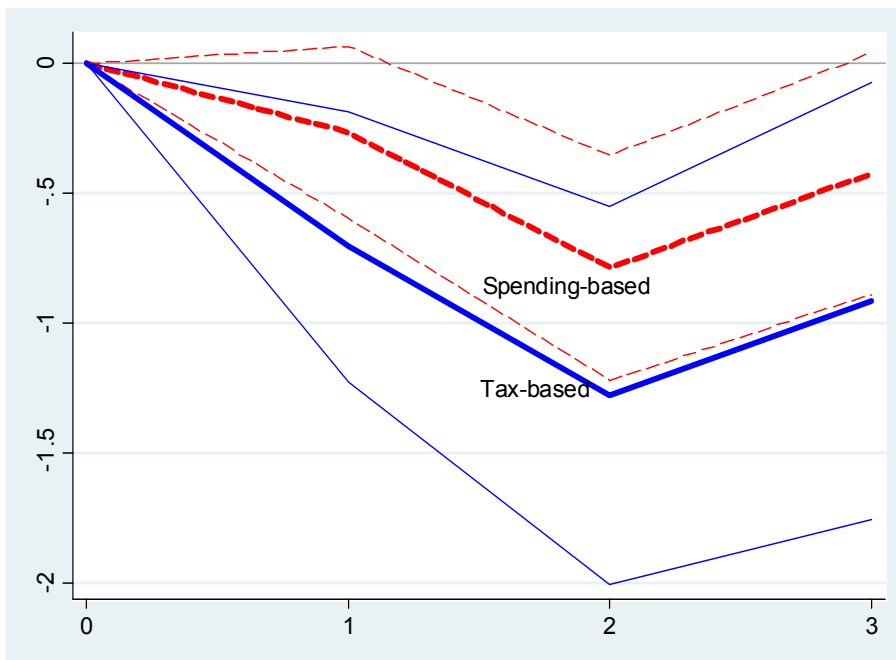
Note: Figure reports point estimates and one standard error bands. $t=1$ denotes the year of fiscal consolidation.

Figure 14. Effect of a 1 Percent of GDP Fiscal Consolidation on Exports and Imports: Spending-based vs. Tax-based Contraction (percent)

a. Exports



b. Imports



Note: Figure reports point estimates and one standard error bands. $t=1$ denotes the year of fiscal consolidation.

Why are spending-based adjustments less contractionary?

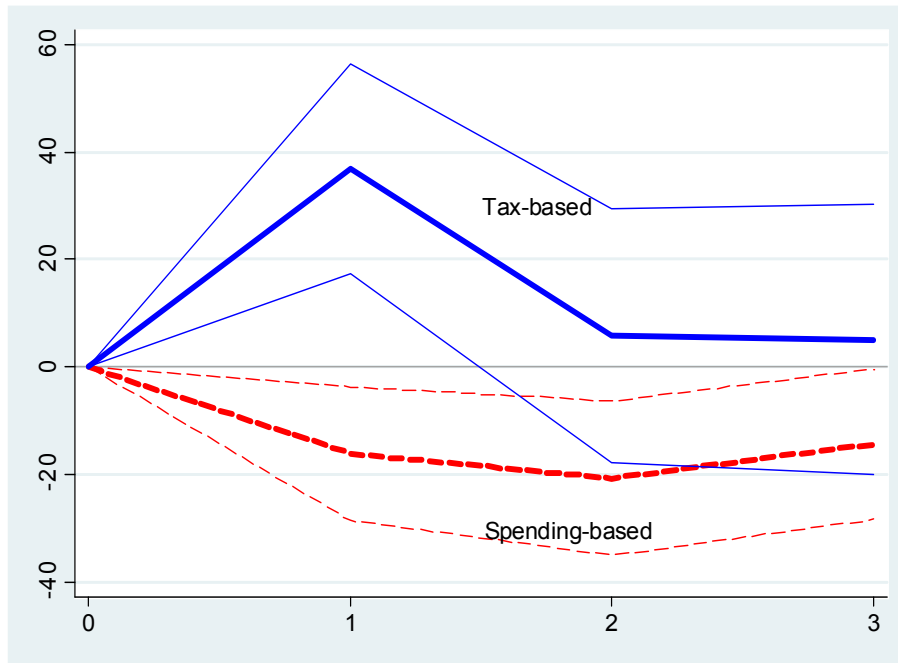
Part of the difference is due to the response of monetary conditions to fiscal consolidation: interest rates and the value of the currency tend to fall more following spending-based consolidation (Figure 15). Existing estimates in the literature can provide a rough sense of how much of the difference in output performance stems from the difference in monetary conditions. As Figure 16 reports, the difference in interest-rate responses between tax-based and spending-based fiscal consolidation is 53 basis points in the first year ($t = 2.51$).²¹ Meanwhile, the output cost for tax-based consolidation exceeds that for spending-based consolidation by 0.34 percentage point ($t = 1.84$) in the first year and by about 0.86 percentage points ($t = 2.97$) in the second year. Therefore, for the difference in output outcomes to be attributable entirely to the different monetary policy responses, a 100 basis point rise in interest rates would need to reduce output by 0.64 percent in the first year and 1.6 percent in the second. Such an impact is inside the range of estimates found in the empirical literature.²² Thus, it appears that the difference in monetary policy responses accounts for much of the difference in output performance. The response of the exchange rate is also not consistent with a confidence-based explanation for the difference in outcomes. If spending cuts enhance confidence more than tax hikes do, the exchange rate could be expected to *appreciate* on impact for spending-based consolidations. Instead, the exchange rate *depreciates*, and even more so than for tax-based consolidations.

²¹ Note that part of the effect of interest rates on output works through the exchange rate. Therefore, to avoid double counting, the difference in output costs due to the difference in exchange rate behavior is not considered separately here.

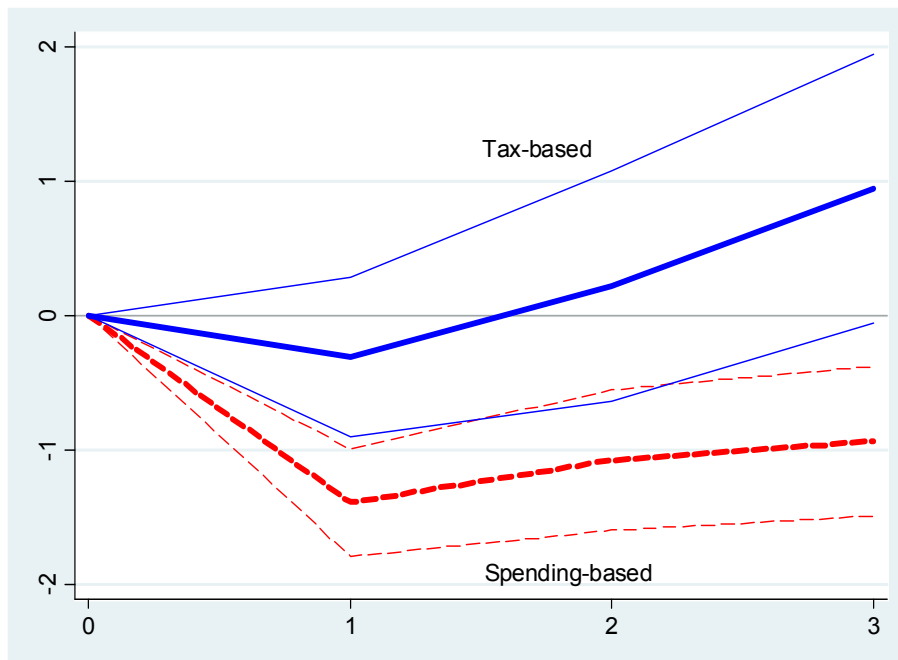
²²Romer and Romer (2004) find that an unexpected 100 basis point increase in interest rates reduces output (measured by industrial production) by 4.3 percent after two years. Sims (1992) estimates the maximum impact on industrial production at about -1.5 percent, while Bernanke and Mihov (1998) and Christiano and others (1996) find a maximum effect on real GDP close to -1 percent.

Figure 15. Effect of a 1 Percent of GDP Fiscal Consolidation on Monetary Conditions:
Spending-based vs. Tax-based Contraction

a. Policy Rate (basis points)

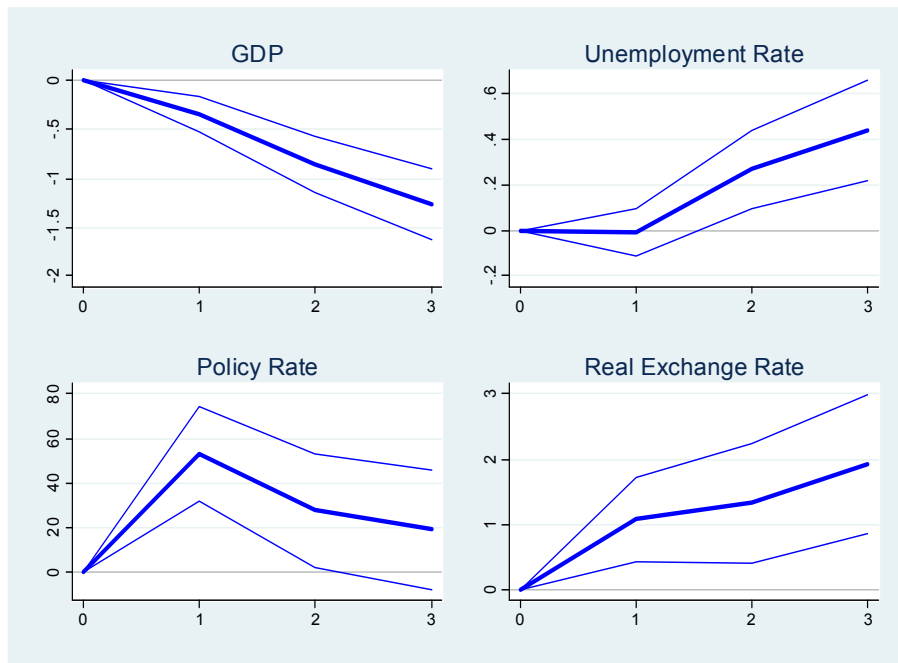


b. Real Exchange Rate (percent)



Note: Figure reports point estimates and one standard error bands. $t=1$ denotes the year of fiscal consolidation.

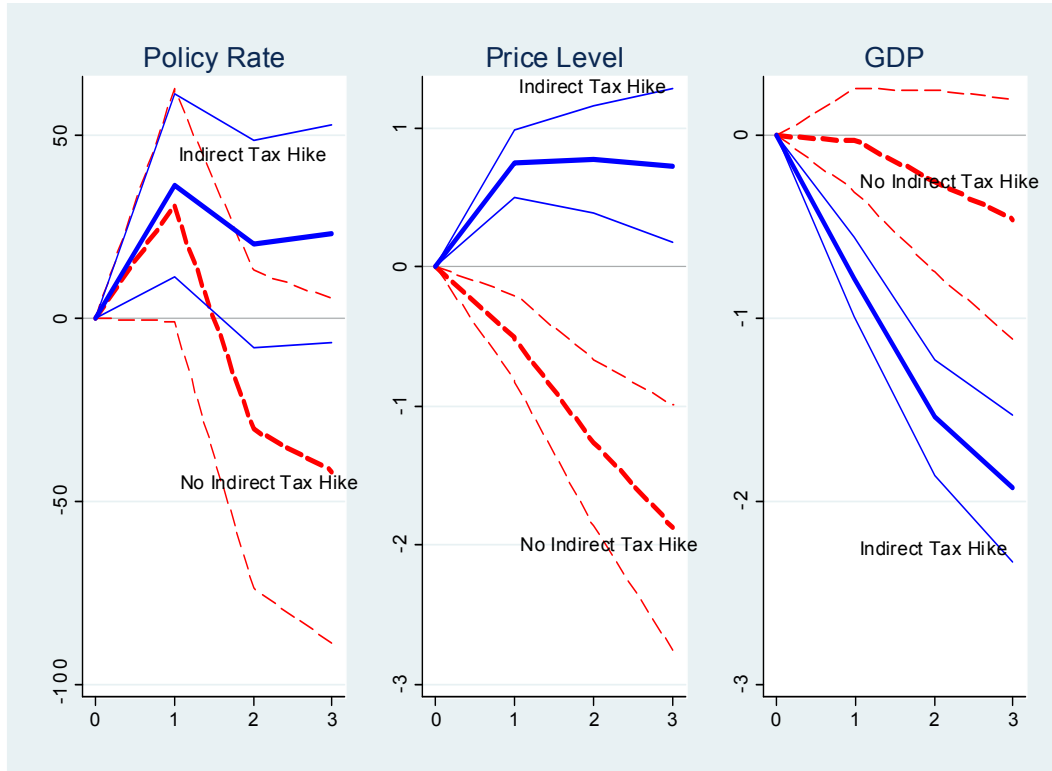
Figure 16. Difference Between Tax-based and Spending-based Consolidation of 1 Percent of GDP: Monetary Conditions, GDP, and Unemployment Rate



Note: Figure reports point estimates of difference between responses, along with one standard error bands. $t=1$ denotes the year of Fiscal Consolidation.

These findings are in line with the notion that central banks view spending-based deficit cuts more favorably and are therefore more willing to provide monetary stimulus following spending-based adjustments. It is also plausible that an increase in taxes, if it involves indirect tax hikes (sales and excise taxes, VAT), raises prices on impact, making interest rate cuts by an inflation-averse central bank less likely. In line with this interpretation, Figure 17 provides some evidence that tax-based packages that include indirect tax hikes raise the price level on impact. At the same time, the policy rate rises more for tax-based adjustments that include indirect tax hikes—though this evidence is no more than suggestive—and the output costs are particularly large.

Figure 17. Tax-based Consolidation of 1 Percent of GDP: With and Without Indirect Tax Hikes



Note: Figure reports point estimates of difference between responses, along with one standard error bands. $t=1$ denotes the year of fiscal consolidation. Price level measured by GDP deflator. Policy rate is measured in basis points, other variables are in percent.

C. The Role of Perceived Sovereign Risk

One would expect that expansionary fiscal consolidations would be more likely in situations where doubts about solvency raise borrowing costs, and where the consolidation could reduce those costs sharply. In line with this notion, Giavazzi and Pagano (1990) found evidence of “expansionary fiscal consolidations” in Denmark in 1983 and Ireland in 1987—two countries that had experienced a rapid deterioration in their sovereign debt rating.²³ In this subsection, we examine the role of sovereign risk perceptions.

To explore this issue, we split the sample into two groups. The first group includes fiscal adjustments preceded by high (above-median) levels of perceived sovereign credit risk in the three years before fiscal consolidation. The second group includes adjustments preceded by low (below-median) perceived sovereign credit risk. In particular, we estimate the following equation:

²³ Based on our identification strategy, Denmark (1983) and Ireland (1987) undertook spending-based fiscal consolidation measures amounting to about 3 percent of GDP each.

$$(6) \quad g_{it} = \alpha + \sum_{j=1}^2 \beta_j g_{i,t-j} + \sum_{s=0}^2 \gamma_s HiRisk_{i,t-s} + \sum_{s=0}^2 \beta_s FC_{i,t-s} + u_{it}$$

where *HiRisk* equals fiscal consolidation (*FC*) when the consolidation is preceded by a high level of perceived sovereign default risk. The sum of the responses to *HiRisk* and *FC* show the effects of consolidation in a high-risk economy, and the response to *FC* shows the impact of consolidation in a low-risk economy.

As discussed above, our measure of perceived solvency risk is the Institutional Investor Ratings index. Each country is rated on a scale of zero to 100, with a rating of 100 assigned to the lowest perceived sovereign default probability. The median level of this index, 80, is close to that of Portugal in 2007. Denmark (1983) and Ireland (1987)—the two cases studied by Giavazzi and Pagano (1990)—fall into this high-perceived-risk category.

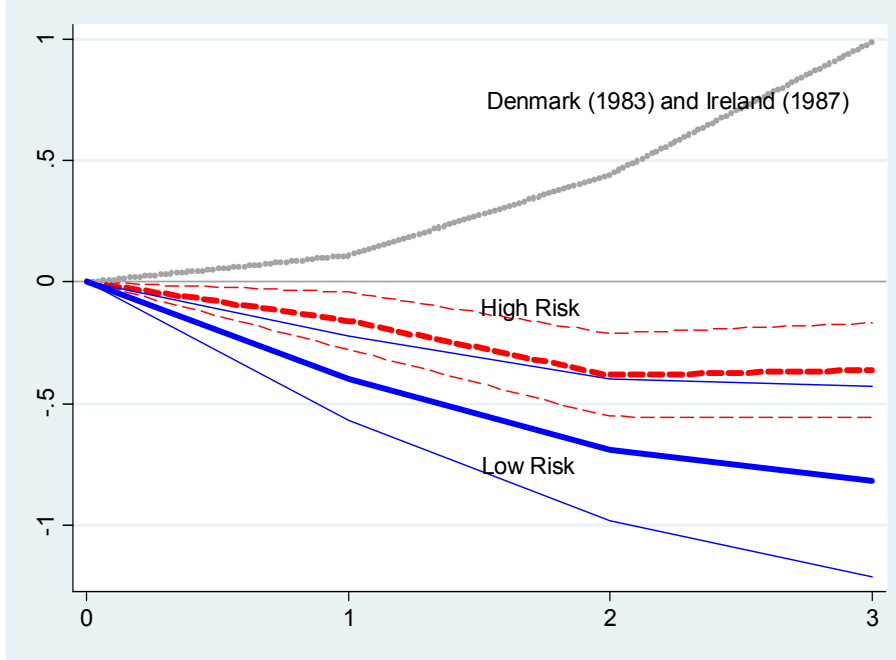
The estimation results suggest that deficit cuts preceded by high perceived sovereign risk are indeed less contractionary than those preceded by low perceived sovereign default risk (Figure 18). For the group of low-risk countries, the effect of a 1 percent of GDP fiscal consolidation on GDP is -0.69 percent ($t = -2.35$) after two years, whereas for the group of high-risk countries, the impact on GDP is about half as large, at -0.38 percent ($t = -2.24$). This finding is consistent with the notion that confidence or credibility effects help mitigate the impact of fiscal consolidation on high-risk countries and that low perceived sovereign default risk is associated with a sharper contraction.

At the same time, however, even for the group of high-risk countries, the results are not usually expansionary. The estimates imply that output on average still falls following fiscal consolidation in these countries by a statistically significant 0.38 percent. However, when the only two episodes of fiscal consolidation considered are those of Denmark (1983) and Ireland (1987), the estimated effect on output is positive at 0.44 percent ($t = 0.73$) after two years and 0.99 percent ($t = 1.19$) after three years but not statistically significant.²⁴ These findings are broadly consistent with the finding of Giavazzi and Pagano (1990) that Denmark and Ireland experienced “expansionary fiscal consolidations.” However, the results also suggest that these two cases are not representative of the normal output response, even among countries with a relatively poor initial credit rating.²⁵

²⁴ To focus on the two episodes, the equation estimated is as in Equation (6), but with the term *HiRisk* replaced with a variable that equals *FC* in the case of Denmark (1983) and Ireland (1987).

²⁵ Jayadev and Konczal (2010) suggest that key factors that explain the strong performance of Ireland’s economy following the 1987 fiscal consolidation included a large devaluation of the Irish pound within the European Exchange Rate Mechanism in 1986, and an expansion in exports driven by the “Lawson Boom” in the United Kingdom.

Figure 18. Effect of a 1 Percent of GDP Fiscal Consolidation on GDP: By Sovereign Default Risk (percent)



Note: Figure reports point estimates and one standard error bands. $t=1$ denotes the year of fiscal consolidation.

V. COMPARISON WITH THE LITERATURE

How do our results compare with those obtained using the standard set of fiscal consolidation episodes? To answer this question, we consider the sample of large fiscal adjustments identified by Alesina and Ardagna (2010) for our same sample of 17 countries—years in which the CAPB-to-GDP ratio increases by at least 1.5 percentage points.²⁶ The estimated equation for the large action-based fiscal consolidation is

$$(7) \quad g_{it} = \alpha + \sum_{j=1}^2 \beta_j g_{i,t-j} + \sum_{s=0}^2 \gamma_s Large_{i,t-s} + \sum_{s=0}^2 \beta_s FC_{i,t-s} + u_{it}$$

where *Large* equals fiscal consolidation (*FC*) when it exceeds 1.5 percent of GDP. The sum of the responses to *Large* and *FC* show the effects of large consolidation. The estimated equation for the large CAPB-based fiscal consolidation is

$$(8) \quad g_{it} = \alpha + \sum_{j=1}^2 \beta_j g_{i,t-j} + \sum_{s=0}^2 \gamma_s Large_{i,t-s} + \sum_{s=0}^2 \beta_s \Delta CAPB_{i,t-s} + u_{it}$$

where *Large* equals the change in the CAPB-to-GDP ratio when it exceeds 1.5 percentage points. The sum of the responses to *Large* and $\Delta CAPB$ show the effects of large CAPB-

²⁶These episodes are listed in Alesina and Ardagna (2010, Table 1).

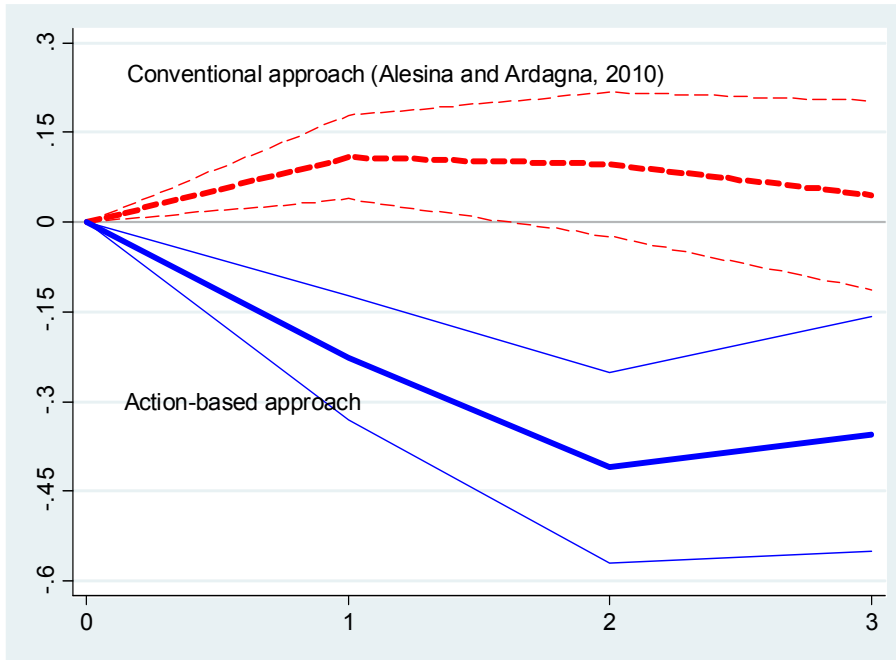
based consolidation.

For our sample of 17 OECD economies, the estimation results suggest that fiscal consolidation measured by the CAPB usually stimulates GDP and reduces the rate of unemployment in the short term (Figure 19). GDP rises by 0.10 percent ($t = 0.80$) and unemployment falls by 0.11 percentage point ($t = -1.58$) within two years.²⁷ In contrast, for a comparable set of large consolidation episodes identified according to our action-based approach (those greater than 1.5 percent of GDP), the impact on GDP is negative and unemployment rises. GDP falls by 0.41 percent ($t = -2.56$), and the unemployment rate rises by 0.30 percentage point ($t = 3.24$) within two years. Also, importantly, studies based on the standard approach usually find that consolidations based on spending cuts tend to have an expansionary effect in the short run. For example, Alesina and Ardagna (2010, Table 9) report that a cut in the cyclically-adjusted current spending-to-GDP ratio of 1 percentage point raises GDP by 0.43 percent ($t = 2.55$) within one year. In contrast, as discussed above, we find that spending-based consolidations are on average contractionary, with lower GDP and higher unemployment (Figure 10). Regarding the effects of tax hikes, Alesina and Ardagna (2010, Table 9) find that a rise in the cyclically-adjusted tax-to-GDP ratio of 1 percentage point reduces GDP by 0.22 percent ($t = 1.07$). This contractionary effect of tax increases is thus several-fold smaller than in our results reported above (Figure 10).

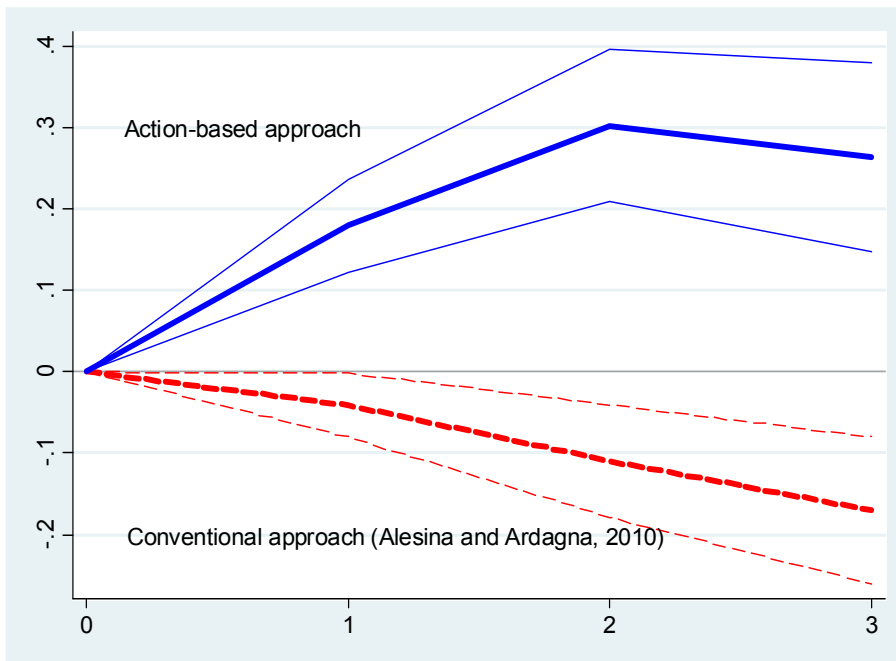
What explains this stark contrast? Why does fiscal consolidation have an insignificant or expansionary effect based on the standard set of episodes but a contractionary effect based on our sample of action-based episodes? As described above, the standard approach to identification of consolidation based on the behavior of the CAPB may be imperfect and create bias in the estimated effects of consolidation. Appendix 3 demonstrates that these problems are substantial. It shows that there are large differences between the episodes identified by the two approaches. It then examines the 11 cases in which the difference between the size of the consolidation identified by the two approaches is largest and establishes two results. First, the action-based measure appears to be substantially more accurate. In the majority of the 11 episodes, there were specific economic or budgetary developments that cause the CAPB-based approach to inaccurately measure the size of the consolidation; in the remainder, there were economic developments that very likely had a large effect on the CAPB-based measure. Second, the errors are correlated with economic developments. Most notably, the CAPB-based approach often fails to identify consolidation when governments took substantial actions to reduce the deficit but the actions were associated with severe economic downturns. It is therefore not surprising that the estimates based on the CAPB do not find that consolidations are on average contractionary.

²⁷ This effects is broadly consistent with the estimates reported by Alesina and Ardagna (2010) in their regression analysis (Tables 9-11), where rise in the CAPB (fiscal consolidation) is associated with either no change in GDP or a small increase. In Table 11, Alesina and Ardagna (2010) report that an increase in the CAPB-to-GDP of one percentage point raises GDP by about 0.15 percent in the first year ($t = 3.98$).

Figure 19. Effect of a Large Fiscal Consolidation: Conventional vs. Action-based Approach
 a. GDP (percent)



b. Unemployment Rate (percentage points)



Note: Figure reports point estimates of marginal effect of each additional 1 percent of GDP of fiscal consolidation, along with one standard error bands. $t=1$ denotes the year of fiscal consolidation. Large consolidation defined as consolidation greater than 1.5 percent of GDP.

Figure 19 also illustrates another interesting finding: based on our set of fiscal adjustments, the incremental impact of fiscal consolidation on economic activity appears to

be unrelated to the size of the package. In particular, the estimated responses of output and unemployment to these large deficit cuts (greater than 1.5 percent of GDP) are similar to those reported before for our full sample of fiscal consolidation. For each additional 1 percent of GDP of fiscal consolidation, the impact on output is and unemployment is similar to the baseline results for all adjustments, large and small, reported earlier.

VI. CONCLUSIONS

A number of studies suggest that fiscal consolidation can have expansionary effects in the short term. Prominent voices have endorsed this finding. For example, European Central Bank President Jean-Claude Trichet (2010) recently said “It is an error to think that fiscal consolidation poses a risk to growth and job creation.” Given the large fiscal adjustment currently planned by many countries, reassessing the evidence seems timely.

This paper questions this view. In particular, our examination of data for 17 OECD countries over the past 30 years suggests that the way that the literature usually measures fiscal consolidation biases the analysis towards downplaying contractionary effects and overstating expansionary ones. To obtain more accurate estimates of the effects of fiscal consolidation, we focus on historical accounts and records of tax hikes and spending cuts motivated by deficit reduction.

Our analysis suggests that fiscal consolidation usually dampens economic activity in the short term. In particular, a budget deficit cut of 1 percent of GDP reduces domestic demand—consumption and investment—by about 1 percent, and raises the unemployment rate by 0.28 percent. At the same time, an expansion in net exports usually occurs, and this limits the impact on GDP to a decline of 0.43 percent. The results are highly statistically significant and robust.

We also find that a number of factors can soften or exacerbate the impact of fiscal consolidation on economic activity. In particular, central banks usually offset some of the contractionary pressure by reducing policy rates, and longer-term interest rates typically decline, cushioning the impact on domestic demand. A decline in the real value of the domestic currency typically plays an important cushioning role by spurring net exports and is usually the result of nominal depreciation or currency devaluation. In line with this finding, we find that fiscal retrenchment tends to reduce output more in economies operating a pegged exchange rate regime. In addition, both spending-based and tax-based adjustments reduce domestic demand and raise unemployment, but the effects are more contractionary for tax-based adjustments. A key reason for this difference is that central banks typically provide less monetary stimulus during tax-based adjustments, particularly when they involve hikes in indirect taxes that put upward pressure on inflation. Finally, fiscal retrenchment in countries that face a high perceived sovereign default risk tends to be less contractionary. But *expansionary* effects of consolidation are unusual even for this group.

Overall, the main conclusion from our analysis is, in the words of Kuttner and Posen (2001, p. 96), “trust what you learned in intermediate macroeconomics class.” Raising taxes and government cutting spending reduces output and raises unemployment in the short term.

In our sample of advanced economies, this basic lesson holds up even where one would most expect to find expansionary effects, as in the case of countries with a high sovereign default risk.

Appendix 1. Data Sources

The two main sources of our data are the World Bank World Development Indicators (WDI) database and the IMF's World Economic Outlook (WEO) database. Real GDP, real consumption, real investment, real exports, real imports, and the unemployment rate come from these two databases. In particular, data are taken from the WDI until the latest available year (usually) 2007, and are extended to 2009 based on WEO. The nominal effective exchange rate and real effective exchange rate series come from the IMF's International Financial Statistics (IFS) database. The monetary policy (short-term) interest rate and the 10-year government bond yield data come from the Bloomberg Financial Markets database, from national sources, and from Thomson Datastream. The Institutional Investor Rating comes from *Institutional Investor*. Data on the cyclically-adjusted primary budget surplus come from Alesina and Ardagna (2010), and from the Organization for Economic Cooperation and Development (OECD) Economic Outlook database.

Appendix 2. Historical Analysis of Fiscal Consolidation

Fiscal Consolidation in Ireland in 2009

Fiscal consolidation totaled 4.5 percent of GDP, with spending cuts of 2.6 percent of GDP and tax hikes of 1.9 percent of GDP. Fiscal consolidation measures were introduced at different times between July 2008 and April 2009. On the spending side, the 2009 *OECD Economic Surveys*, p. 50, and October 2008 *Ireland – Stability Programme Update*, p. D15, report spending cuts for 2009 of € 1 billion (0.6 percent of GDP) announced in July 2008. Furthermore, the 2009 *OECD Economic Surveys*, pp. 50-51, and 2009 *IMF Staff Report*, p. 23, mention two additional packages of spending cuts of 1 percent of GDP each. The first one, introduced in February 2009, centered on reducing the wage bill through a pension levy for public sector workers, and the second one, introduced in the 2009 Supplementary Budget in April 2009, consisted of both, current and capital spending cuts. On the revenue side, the sources report two packages of tax hikes. The first one of 1 percent of GDP, announced in the 2009 Budget in October 2008, consisted a levy on personal incomes, while the second one of 0.9 percent of GDP, introduced in the 2009 Supplementary Budget in April 2009, included further hikes to personal income taxes, an increase in capital gains and capital acquisitions taxes, a rise in stamp and excise duties, and a hike in social contributions.

Fiscal Consolidation in Japan in 1997

Fiscal consolidation totaled 1.8 percent of GDP, with tax hikes of 1.2 percent of GDP and spending cuts of 0.6 percent of GDP. The tightening in fiscal policy was part of a

medium-term strategy of fiscal consolidation (Fiscal Structural Reform Act) in response to a large structural fiscal deficit and future demographic pressures, as discussed in the 1997 *IMF Staff Report* (1997 *IMF Staff Report*, p.24). The revenue measures included an increase in the consumption tax rate from 3 to 5 percent (yielding fiscal savings of about 0.8 percent of GDP), and the ending of an income tax cut introduced three years earlier (0.4 percent of GDP). Government investment was also cut in 1997 (0.6 percent of GDP), reflecting the completion of projects introduced earlier (1997 *IMF Staff Report*, table on p. 22). As noted by Takahashi and Tokuoka (2010), “The targets included aiming to reduce the fiscal deficit of the general government (excluding the social security fund) below 3 percent of GDP by FY2005” (p. 3).

Appendix 3. Identifying Periods of Fiscal Consolidation: Critique of Standard Approach

Figure 1 provides a scatter plot of increases in the cyclically-adjusted primary budget balance (CAPB)—the standard measure of fiscal consolidation—on the vertical axis versus the size of fiscal consolidation based on the policy record on the horizontal axis. The figure reports years for which either the CAPB-to-GDP ratio increased or the policy record indicated fiscal consolidation.²⁸ The CAPB-to-GDP data are from Alesina and Ardagna (2010).²⁹ The top-right corner of the scatter plot shows cases in which the two measures agree that there was a large fiscal consolidation (greater than 1.5 percent of GDP). It includes cases such as Denmark (1983) and Ireland (1987)—the two cases highlighted by Giavazzi and Pagano (1990) in their work on expansionary fiscal consolidations. However, Figure 1 also reports numerous cases in which the standard approach and our approach come to different conclusions regarding the presence and size of fiscal consolidation.

Which approach typically provides a more accurate identification of fiscal consolidation? To address this question, we focus on the largest discrepancies between the two approaches. In particular, we examine the 11 cases of large adjustments—greater than 1.5 percent of GDP—for which the discrepancy between the two approaches exceeded 3 percent of GDP. These 11 cases are highlighted in Figure 1. We now describe each of these 11 cases, and explain how we assess the relative accuracy of the two approaches.

²⁸ Cases in which there was no evidence of fiscal consolidation in the historical record correspond to the observations along the zero line on the horizontal axis with positive values on the vertical axis.

²⁹ The cases of increases in the CAPB-to-GDP ratio greater than 1.5 percentage points in Figure 20 are also those reported as large fiscal adjustments in Table A1 in Alesina and Ardagna (2010).

Large contractions based on the standard approach, but not according to our action-based approach

We start with the cases in the top-left corner of Figure 1, which contains six periods identified as large consolidations based on the standard approach, but for which the policy record shows either only a small consolidation or no consolidation at all.

Germany (1996): The CAPB-to-GDP ratio increased by 6.4 percentage points, but the policy record indicates fiscal consolidation measures amounting to only 0.2 percent of GDP. The large increase in the CAPB-to-GDP ratio in 1996 reflected a large one-time capital transfer in 1995, which implied a change in the CAPB-to-GDP ratio of about -7 percentage points in 1995, and 6.4 percentage points in 1996. In particular, the 1996 *IMF Recent Economic Developments* (p. 18), reports a one-time transfer of Treuhand (Trust Agency) and East German housing debt to the general government amounting to 6.8 percent of GDP in 1995. This operation was recorded in the OECD Economic Outlook database as a one-time increase in capital transfers that raised the general government deficit from 2.3 percent of GDP in 1994 to 9.7 percent of GDP in 1995. The deficit returned to a more normal level in 1996, at 3.3 percent of GDP. Therefore, the sharp increase in the CAPB in 1996 bears no relation to fiscal consolidation measures, but instead reflects the end of a one-time large capital transfer.

Netherlands (1996): The CAPB-to-GDP ratio increased by 7.0 percentage points, but the policy record indicates fiscal consolidation measures amounting to only 0.8 percent of GDP, implying a discrepancy of 6.2 percent of GDP. This discrepancy is almost fully explained by the end of a large one-time capital transfer made in the previous year, 1995, which induced a negative *change* in the CAPB-to-GDP ratio in 1995 followed by a positive change in 1996. In particular, as reported in the 1995 *IMF Recent Economic Developments* report (p. 12): “In 1995, the approximate present value of all social housing subsidies from 1995 onward was to be paid in a one-time lump sum.” The *1995/1996 OECD Economic Surveys: Netherlands* (p. 29) estimates this lump-sum payment at 5.8 percent of GDP in 1995. So, this one-time transaction—which was unrelated to tax hikes or spending cuts—explains almost all of the 6.2 percent of GDP discrepancy between our policy record and the CAPB-to-GDP ratio.

Japan (1999): The CAPB-to-GDP ratio rose by about 4.9 percentage points, but the policy record shows no evidence of fiscal consolidation measures. Indeed, Japan’s fiscal consolidation program, initiated in 1997, was suspended in 1998 following the onset of a severe recession, and there is no evidence of measures designed to cut the budget deficit until 2002, when the authorities announced a new multi-year program of fiscal consolidation (*2003 OECD Economic Survey: Japan*, p. 15). Instead, as the *1998 OECD Economic Survey: Japan* reports (p. 84), the government made a one-time capital transfer in 1998 to the Japan National Railway, amounting to about ¥24.3 trillion (4.8 percent of GDP). The one-time nature of this capital transfer implies a change in the (general government) CAPB of about 4.8 percentage points of GDP in the following year, 1999. This increase is similar to the 4.9 percentage point change in the CAPB-to-GDP ratio computed by Alesina and Ardagna

(2010). Therefore, the sharp increase in the CAPB in 1999 bears no relation to fiscal consolidation measures, but instead reflects the end of a one-time capital transfer.

Finland (2000): The CAPB-to-GDP ratio increased by 4.1 percentage points, but the policy record shows fiscal consolidation measures amounting to only 0.9 percent of GDP. This episode corresponds to an asset price boom: real stock prices in Finland rose by 70 percent in 1999, and by 86 percent in 2000 (Haver Analytics). Of the 4.1 percentage point increase in the CAPB-to-GDP ratio, 2 percentage points reflect a rise in revenue from one-time factors unrelated to policy actions.³⁰ These one-time factors included a rise in tax revenue associated with stock-option and capital gains, and an increase in non-tax (property income) revenue partly due to an extraordinary dividend issued by the fully state-owned bank Leonia on the eve of its merger with the private insurance company Sampo. Regarding the remaining 1.2 percentage point discrepancy relative to the historical record (2.1 versus 0.9), the OECD Economic Outlook database indicates a fall in cyclically-adjusted social security outlays of about 1 percentage point. However, we can find no mention of social security cuts in the historical record, such as the *OECD Economic Survey*.³¹ Overall, therefore, we conclude that the increase in the CAPB-to-GDP ratio of 4.1 percentage points overstates the amount of consolidation in 2000 by at least 2 percentage points and probably closer to 3.

Japan (2006): The CAPB-to-GDP ratio increased by 4.1 percentage points, but the policy record indicates fiscal consolidation measures amounting to only 0.67 percent of GDP, implying a discrepancy of about 3.4 percent of GDP. At the same time, the CAPB-to-GDP ratio reported in the 2008 *OECD Economic Surveys: Japan* rose by 3.2 percentage points in 2006 (Table 3.1, p. 65, line 4). Thus, some (0.9 percentage point) of the discrepancy is due to differences between the *OECD Economic Survey* and Alesina and Ardagna (2010) in the method used to compute the CAPB. In addition, the *OECD Economic Survey* indicates that a large part of the CAPB increase resulted from one-time asset operations that improved the fiscal balance in 2006 but were unrelated to tax hikes or spending cuts.³² Without these one-time asset operations, the 2008 *OECD Economic Survey: Japan* estimates that the CAPB-to-GDP ratio increased by only 0.4 percentage point in 2006 (OECD Table 3.1, p. 65, line 8). Therefore, once the change in the CAPB-to-GDP ratio is adjusted to remove the influence of asset operations unrelated to tax hikes and spending cuts, the increase in the CAPB-to-GDP ratio is close to our estimate of policy measures of 0.67 percent of GDP.

³⁰The 2001-2002 issue of the *OECD Economic Surveys: Finland* reports the 2000 budget outcome as “a very high surplus mainly due to one-off factors” (p.37).

³¹Note that cuts to social security spending are not part of the measures amounting to 0.9 percent of GDP that we identify in the policy record.

³² The 2008 *OECD Economic Survey: Japan* reports that the one-time factors include receipts of funds by the government from corporate pension funds, receipts associated with the privatization of highway corporations, and receipts from the “transfer of the reserve fund from the Fiscal Loan Fund Special Account to the central government” (p. 65).

Belgium (1984): The CAPB-to-GDP ratio increased by 4.7 percentage points, but the policy record indicates fiscal consolidation measures amounting to 0.88 percent of GDP, implying a discrepancy of about 3.8 percent of GDP. At the same time, the CAPB-to-GDP ratio reported in the OECD Economic Outlook database rises by 4.1 percentage points in 1984. Thus, some of the discrepancy (0.6 percentage point) is due to differences in the method used to compute the CAPB. Of the remaining discrepancy (3.2 percentage points), most is explained by the end of a one-time capital transfer made in 1983. In particular, the OECD Economic Outlook database indicates a one-time increase in capital transfers in 1983 that reduced the CAPB-to-GDP ratio by 2.1 percentage points in 1983. When this one-time transfer came to an end in 1984, it caused the CAPB-to-GDP ratio to rise by 2.1 percentage points (OECD Economic Outlook database). Therefore, excluding the influence of this one-time capital transfer, the discrepancy between the standard approach and our action-based approach shrinks from 3.2 percent of GDP to 1.1 percent of GDP (3.2–2.1).³³

Large contractions based on our action-based approach, but not according to the standard approach

Next, we turn to the five cases in the bottom-right corner of Figure 20—periods identified as large consolidations based on the narrative approach, but that feature either a fall in the CAPB or a small increase.

Ireland (2009): Here, the CAPB-to-GDP ratio *fell* by about 4.4 percentage points, but the historical record reports fiscal consolidation measures of about 4.5 percent of GDP, implying a discrepancy of 8.9 percentage points. The fall in the CAPB despite a substantial fiscal consolidation reflects the impact of the financial crisis during which stock and house prices fell sharply.³⁴ For reasons discussed above, such sharp contractions tend to have a negative impact on the CAPB, causing the CAPB-based approach to inaccurately identify the size of consolidation measures. Indeed, while the CAPB-to-GDP ratio computed by Alesina and Ardagna (2010) falls by 4.4 percentage points, the CAPB-to-GDP ratio reported in the OECD Economic Outlook falls only by 1.1 percentage points, suggesting that 3.3 percentage points of the discrepancy is due to the differences in the method used to compute the CAPB. Of the remaining 5.6 percent of GDP discrepancy, a 2.6 percent of GDP is driven by a sharp decline in cyclically-adjusted tax revenue in 2009 according to the OECD’s calculations. Tax revenue directly related to asset prices—capital gains taxes and stamp duties—fell by 1

³³The policy record suggests that the increase in capital transfers in 1983 reflected “direct aid to industry” (1985/1986 *OECD Economic Survey: Belgium*, pp. 25–26).

³⁴Real stock and house prices fell by 44 percent and 20 percent in 2009, respectively (Haver Analytics database).

percent of GDP in 2009.³⁵ Finally, another 0.8 percentage point decline in the CAPB-to-GDP ratio is driven by an increase in cyclically adjusted social security benefit payments that have no counterpart in the policy record. Excluding these cyclically adjusted items, the CAPB-to-GDP ratio rises by 2.3 percentage points ($-1.1 + 2.6 + 0.8$), which represents a large fiscal consolidation and is substantially closer to our estimated size of fiscal consolidation than the Alesina and Ardagna (2010) estimate of -4.4 percentage points.

Italy (1993): The CAPB-to-GDP ratio increased by only 0.2 percentage points in 1993, but the policy record reports a large consolidation of 4.3 percent of GDP. A plausible reason for this large discrepancy is that there was a sharp economic contraction in 1993 associated with the European exchange rate mechanism crisis, which, for the reasons explained above, causes the CAPB-based approach to be inaccurate. Indeed, while the CAPB-to-GDP ratio computed by Alesina and Ardagna (2010) increases by 0.2 percentage points, the CAPB-to-GDP ratio computed by the OECD increases by 1.9 percentage points (OECD Economic Outlook database). The OECD's calculation of the change in the CAPB-to-GDP ratio is therefore consistent with a large fiscal consolidation in 1993 (greater than 1.5 percent of GDP). However, even this estimate of fiscal consolidation is substantially smaller than what is in the policy record. In particular, the 1994 *OECD Economic Surveys* (pp. 44-47), 1993 *IMF Recent Economic Developments* (pp. 7-8), and the 1993 Banca d'Italia's annual report (p. 145) all report that fiscal consolidation measures in 1993 amounted to more than 4 percent of GDP. The source of the remaining discrepancy vis-à-vis the change in the CAPB-to-GDP ratio could plausibly reflect the fact that, during sharp recessions, cyclical adjustment techniques tend to allocate part of the fiscal worsening due to automatic stabilizers to a fall in the CAPB. This problem causes the increase in the CAPB to understate the size of fiscal consolidation measures.

Finland (1992) and (1993): The CAPB-to-GDP ratio *fell* by 2.0 percentage points in 1992 and *rose* by 0.8 percentage point in 1993, but the policy record indicates consolidation measures amounting to 1.8 and 3.8 percent of GDP in 1992 and 1993, respectively. The fall in the CAPB in 1992 despite evidence of fiscal consolidation measures during those years was probably due to the depth of the recession after the outbreak of the Finnish banking crisis at the end of 1991.³⁶ For reasons explained above, these developments probably depressed tax revenue and increased social security transfers beyond what could have been predicted based on standard cyclical-adjustment techniques. In line with this notion, the *cyclically-adjusted* tax-revenue-to-GDP ratio fell in 1992 by 1.2 percentage points, and the cyclically-adjusted social-security spending-to-GDP rose by 2.3 percentage points (OECD Economic

³⁵Revenue from capital gains taxes and stamp duties fell by 73 and 45 percent in 2009 (Ministry of Finance, white paper on receipts and expenditures 2009 and 2010). There was also a sharp fall in the cyclically-adjusted indirect-tax-to-GDP ratio, which fell by 1.4 percentage points (OECD Economic Outlook database).

³⁶Real GDP fell by 6.4 percent in 1991 and 3.8 percent in 1992, and the unemployment rate increased by 5.1 percentage points in 1992. In 1993, real GDP fell by another 0.9 percent and the unemployment rate increased by 4.6 percentage points

Outlook database). Excluding these two cyclically-adjusted items, the CAPB-to-GDP ratio rose by 1.5 percentage points in 1992, close to the size of consolidation based on the policy record (1.8 percent of GDP). Similarly, in 1993, as the sharp recession continued, the cyclically-adjusted tax revenue-to-GDP ratio fell by 1.1 percentage points, and the cyclically-adjusted social-security spending-to-GDP ratio rose by 1.9 percentage points. Excluding these two cyclically-adjusted items, the CAPB-to-GDP ratio rose by 3.8 percentage points in 1992, in line with the size of consolidation based on the policy record (3.8 percent of GDP).

Ireland (1982): The CAPB-to-GDP ratio increased by 0.05 percentage point, but the narrative record indicates fiscal consolidation measures totaling 3.8 percent of GDP. The small increase in the CAPB reflects the problems of cyclical-adjustment techniques during episodes in which consolidation consists mainly of consumption tax hikes, and in which there is a large decline in private consumption. In particular, Ireland's 1982 fiscal consolidation package included substantial increases in value-added tax (VAT) rates (from 10 to 18 percent in the lower rate, and from 25 to 30 percent in the standard rate) and in excise duties. At the same time, real private consumption fell by 7.1 percent, although real GDP grew by 2.3 percent, supported by external demand. This is the only year since 1970 in which private consumption fell while GDP grew. The result was a small increase in VAT receipts for a given level of GDP. The change in tax rates is not taken into account by the CAPB-based approach, as fiscal variables are cyclically adjusted with respect to overall GDP, and the elasticity is assumed to be constant over time. Therefore, the CAPB-to-GDP ratio fails to pick up the large tax hikes that occurred that year. The OECD's CAPB-to-GDP ratio increases by more than that of Alesina and Ardagna (2010)—0.8 percentage point—leaving a discrepancy of 3 percent of GDP relative to our action-based fiscal consolidation measure. The following simple calculation illustrates how more than half of this remaining discrepancy could be due to the unusual behavior of consumption during this episode. If the consumption-to-GDP ratio in 1982 had remained at the 1981 level of 65 percent, instead of falling to 59 percent, the VAT hike would have added 1.6 percentage points to the cyclically-adjusted tax-to-GDP ratio.³⁷ This increase in cyclically-adjusted tax revenue would have raised the CAPB-to-GDP ratio from the OECD's 0.8 percentage point to 2.4 percentage points, far closer to our action-based measure of fiscal consolidation (3.8 percent of GDP). Overall, this is a case in which the standard approach seems to miss a large part of the fiscal consolidation measures.

This examination of the 11 largest disagreements between the two approaches provides strong evidence that our action-based approach more accurately identifies the size of fiscal consolidation. We find 8 cases where we are able to identify specific economic or budgetary developments that cause the CAPB-based measures used by Alesina and Ardagna

³⁷In particular, the indirect tax-to-GDP ratio in 1982 was 15.3 percent, implying—given the consumption-to-GDP ratio of 59 percent—an average indirect tax rate of about 26 percent. Therefore, keeping the consumption-to-GDP ratio at the 1981 level of 65 percent could have yielded an indirect-tax-to-GDP ratio of 16.9 percent (26 percent \times 65 percent)—, that is, 1.6 percentage points higher than the actual 15.3 percent.

(2010) to inaccurately identify the size of the consolidation and that largely explain the gap between the two measures. In the remaining three cases (Italy in 1993, and Finland in 1992 and 1993), there were crises or large economic contractions that could plausibly have caused the CAPB-based approach to be highly inaccurate. We find no cases where there is evidence that our action-based measure was substantially inaccurate.

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