

# FISCAL POLICY AND MACROECONOMIC PERFORMANCE: AN OVERVIEW

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After two decades of relative neglect, fiscal policy is back at the center of the economics research agenda. The fiscal developments around the global financial crisis of 2007–09 are undoubtedly a major factor behind that comeback. The large fiscal stimulus packages adopted by many countries in the face of large adverse shocks have triggered an unusually heated debate among academics, policymakers, and commentators alike. At the center of the controversy lie some important questions:

- How effective is fiscal policy at stimulating the economy?
- What is the best design for a fiscal stimulus package? Should most of the weight be on government spending increases or tax reductions?
- Are automatic stabilizers enough, or is a discretionary stimulus needed?
- How does fiscal policy interact with monetary policy? Is there room for coordination?
- What are the possible consequences for the economy of a large rise in the debt-to-GDP ratio? And those of the fiscal consolidations aimed at stabilizing that ratio?
- Should countries adopt explicit fiscal rules?

The papers included in this volume, written by economists with a recognized expertise in the field, shed light on some of the issues above.

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The purpose of this introduction is twofold. First, we provide a quick overview of the modern macroeconomic literature on fiscal policy, focusing on the most significant papers and their main findings. Second, we provide a brief summary of the contributions contained in the volume and describe how they relate to each other and to the existing literature.

## **1. A QUICK (AND PARTIAL) OVERVIEW OF SOME OF THE ISSUES AND THE RELATED LITERATURE**

Virtually all theoretical models of the economy predict that changes in fiscal policy, whether in the form of changes in government purchases or tax rates, will have some effect on the level of economic activity. The transmission channel differs dramatically among paradigms, however. We start by reviewing some benchmark results regarding the effects of tax changes and then turn our attention to government purchases. Next we describe the literature on large fiscal consolidations and their macroeconomic effects, followed by a discussion of fiscal rules. We conclude by briefly reviewing the literature on automatic stabilizers. Throughout, we do not attempt to provide an exhaustive survey of the literature, which is clearly beyond the scope of this introduction, but aim instead at identifying some of the issues that have been the subject of research in recent years and some of the key related references.

### **1.1 The Macroeconomic Effects of Tax Changes**

A key theoretical benchmark in the literature on the effects of taxes is given by the so-called Ricardian equivalence result (Barro, 1974), which can be simply stated as follows: the timing of the taxation required to finance a given exogenous path of government spending has no aggregate real effects on output, employment, or capital accumulation. Thus, a tax cut today (financed by issuing debt) will not affect the path of consumption or the labor supply: households will simply save the additional disposable income and use the (capitalized) proceeds to pay the higher future taxes required to repay the debt. Several (unrealistic) assumptions must be satisfied in order for Ricardian equivalence to hold in its starkest form: (a) taxes must be lump sum; (b) households must have an infinite horizon; and (c) households must have unconstrained access

to perfect capital markets (and be able to borrow and lend at the same rate as the government).

If taxes are instead distortionary (for example, they are levied on capital or labor income), the timing of taxes matters, for it affects the current incentives to save and supply labor relative to the future. In that context, we would expect a tax cut to increase the labor supply by increasing the after-tax real wage and real interest rate, thus leading to an increase in employment and output (for example, Braun, 1994; McGrattan, 1994). The quantitative importance of such effects, however, hinges critically on the wage elasticity of labor supply, as well as agents' willingness to substitute intertemporally.<sup>1</sup>

If current households have a finite horizon, they will anticipate that part of the future tax burden will fall on future generations, which will lead them to increase consumption and reduce the resources devoted to capital accumulation (Diamond, 1965; Blanchard, 1985).<sup>2</sup>

Finally, if households (or a significant fraction thereof) are subject to binding borrowing constraints due to capital market imperfections, their consumption will be more sensitive to current disposable income than implied by the permanent-income hypothesis.<sup>3</sup> As a result, a tax cut will generally imply an increase in consumption, in response to the immediate rise in disposable income. In an economy where output is determined by aggregate demand, the increase in consumption will lead to an expansion in output and employment, *ceteris paribus*. The expansion in output will further raise disposable income and consumption, generating a multiplier effect. Over time, however, other effects may arise through the supply side (even if taxes are lump sum), which may mitigate or even fully neutralize the initial expansionary impact (see, for example, Elmendorf and Mankiw, 1999, for a discussion).

In the presence of nominal rigidities (and the consequent monetary nonneutralities), the impact of an exogenous tax change on the aggregate economy will be mediated by the induced response

1. Prescott (2004) argues that differences in distortionary taxation are the main explanation for the differences in hours worked per person across countries. His simulations rely on higher labor supply elasticities than typically uncovered by the empirical evidence.

2. Even if households have an infinite horizon, the same will be true if they expect higher future tax liabilities to fall partly on future taxpayers (as in the case of population growth). See, for example, Weil (1989).

3. The same is true if capital markets are perfect but a fraction of consumers are myopic or just follow a simple rule of thumb that makes them consume their current income.

of the monetary authority and, specifically, by the implied path of real interest rates. To the extent that a tax cut leads to an expansion in output and a rise in inflationary pressures, a monetary authority following a conventional Taylor rule will respond by raising nominal and real rates, which will lower the investment and consumption of Ricardian households (and possibly net exports as well, through the likely real appreciation), thus dampening the initial expansionary effects of the tax cut.

A vast literature seeks to provide evidence on the Ricardian equivalence hypothesis by assessing the relevance of either its assumptions or its predictions. The nature of the phenomenon being studied, where (unobservable) expectations potentially play a central role, implies important challenges for that empirical work. Thus, the observation of an increase in consumption in response to a tax reduction should not necessarily point to the failure of Ricardian equivalence, for it may have been caused by another factor correlated with the tax cut (for example, a contemporaneous or anticipated reduction in government spending). Despite these difficulties and the lack of clear evidence for or against Ricardian equivalence, most economists tend to view it as a theoretical benchmark, with limited relevance in the real world. As argued by Elmendorf and Mankiw (1999), “most economists are incredulous about the assumptions that are needed to support the Ricardian view.”

Finally, two key papers seek to identify exogenous tax changes and estimate their quantitative effects. Blanchard and Perotti (2002) use a structural VAR approach that relies on U.S. tax code information to control for the endogenous tax response to GDP changes. An unexpected exogenous tax increase is shown to cause a significant output decline that builds over time, with a maximum multiplier ranging from 0.78 to 1.33 depending on the specification. That decline in output is associated with a decline in both private consumption and investment. Blanchard and Perotti find that anticipated tax changes have negligible effects before they are implemented.

Romer and Romer (2010) use an alternative empirical approach to learn about the effects of tax changes. In particular, they address some of the hurdles facing traditional econometric analysis by focusing exclusively on legislated tax changes that can be defined as exogenous on the basis of the narrative evidence (that is, the record in public documents on the motivation underlying the adopted tax legislation). Their estimates of the effects of a tax change on output

are large and highly significant: a tax increase of one percent of GDP reduces output over the next three years by nearly three percent, a tax multiplier substantially larger than that uncovered by Blanchard and Perotti.<sup>4</sup> That estimated effect is robust to a variety of alternative specifications and (as in Blanchard and Perotti, 2002) is shown to be associated with declines in both consumption and investment. The decline in the latter is particularly strong.

## **1.2 The Macroeconomic Effects of Changes in Government Spending**

The impact of changes in government spending on aggregate output has been the subject of much research in recent years, partly spurred by the controversy regarding the fiscal stimulus packages put together in response to the crisis.<sup>5</sup> Much of that research has focused on the size of the multiplier, that is, the change in GDP resulting from a \$1 increase in government spending. Both in theory and in practice, the size of the multiplier will generally depend on a number of factors, including whether the change in government spending is more or less persistent, whether it is tax or deficit financed, and whether it takes the form of a change in transfers or direct government purchases of goods and services; in the latter case, it also depends on whether those purchases affect the marginal utility of private consumption or the marginal product of labor or some other input employed by private firms.

In traditional Keynesian theory—as reflected in undergraduate textbooks—a change in government spending affects output and employment through its impact on aggregate demand. An increase in government purchases directly affects one of the components of aggregate demand and leads to an immediate one-for-one increase in output. The resulting rise in disposable income brings about an increase in consumption and, accordingly, a further rise in output, which triggers further rounds of consumption and income rises. As a result, the multiplier is well above one. In the case of a rise in transfers, the effect is predicted to be smaller, since transfers do

4. Favero and Giavazzi (2012) shed some light on the reasons for the differences in the two papers' estimates of the size of the tax multiplier. Their proposed estimation approach combining the VAR and narrative methods yields results closer to the VAR literature. Romer and Romer (2010) provide an alternative interpretation of those differences.

5. See Ramey (2011a) for a recent survey of the literature.

not have a direct impact on aggregate demand but rather only work through their impact on disposable income and consumption (which will rise less than transfers if part of the latter is saved). Since this framework does not account for supply constraints, spending multipliers can be quite large, rendering fiscal policy a highly effective stabilization tool.

The neoclassical approach to fiscal policy, as exemplified by the relevant applications of the real business cycle (RBC) model (for example, Baxter and King, 1993), emphasizes several channels through which government purchases influence output that are ignored by the textbook Keynesian framework.<sup>6</sup> First, an exogenous rise in government purchases shifts the aggregate labor supply schedule outward, while leaving aggregate labor demand unchanged in the short run. The expansion in labor supply results from the higher marginal utility of consumption due to the decline in the latter variable as a result of both wealth and substitution effects. The extent of that effect will be influenced by the degree of substitutability between private and public spending in households' preferences. The labor demand schedule will shift over time as a result of the increase or decrease in the capital stock. Whether the capital stock increases or decreases depends on a number of factors, including the persistence of fiscal shocks. Finally, aggregate labor demand may also expand if government purchases are productive, that is, if they raise the private marginal product of labor. This may be the case for public investment and the resulting accumulation of public capital.

As emphasized by Baxter and King (1993), the size of the government purchases multiplier is very sensitive to the assumptions on the nature of the intervention (see above). If the rise in government purchases is financed by distortionary taxes, the multiplier can easily turn negative. On the other hand, persistent increases in public investment financed through lump-sum (or deficit-financed) taxes can have very large long-run multipliers if public capital is highly productive. For regular (that is, nonproductive) government purchases financed through lump-sum taxes, the short-run multiplier is generally below one, with consumption typically falling. The multiplier at longer horizons can

6. In the neoclassical framework, transfers are generally modeled as negative lump-sum taxes, and hence they have no impact if Ricardian equivalence holds. See the discussion above.

attain values above unity if the capital stock rises sufficiently, which in turn requires a sufficiently persistent—or even permanent—increase in government purchases.

The introduction of nominal rigidities, as found in the New Keynesian model, has two important implications for the size of the government purchases multiplier. First, labor demand is no longer constrained to correspond to the marginal product of labor, since output and thus employment are now demand determined.<sup>7</sup> Second, the extent of the increase in aggregate demand resulting from a rise in government purchases will not be independent of how monetary policy is conducted and, in particular, how the latter responds to that fiscal intervention. Yet, as discussed in Galí, López-Salido, and Vallés (2007), if the central bank follows a conventional Taylor-type rule, the outcome of a change in government purchases is hardly different from that found in the real business cycle model, with relatively small multipliers. Only in the case of a weak nominal interest rate response (with a consequent decline in the real rate) can the multiplier attain values significantly above one (Woodford, 2011). That scenario will clearly be relevant when monetary policy hits the zero lower bound on the nominal interest rate, as discussed in Eggertsson (2011) and Christiano, Eichenbaum, and Rebelo (2011).

An alternative approach that opens the door to potentially large government spending multipliers consists in assuming that a fraction of households behave in a non-Ricardian fashion, consuming all their current labor income every period. Galí, López-Salido, and Vallés (2007) show, in the context of an otherwise standard New Keynesian model, that the spending multiplier is increasing in the relative weight of those non-Ricardian households. If the latter are sufficiently important in the economy, and if prices are sufficiently sticky, aggregate consumption will rise in response to an increase in government purchases, and the multiplier will be well above unity.

The empirical studies on the aggregate effects of government spending fail to reach a consensus on the size of the multiplier and the impact on other variables like consumption. As in the case of tax changes, the main challenge lies in being able to identify an exogenous change in government purchases. Most of the existing evidence relies on structural vector autoregressive (VAR) models, with different papers using alternative identification schemes. Blanchard and

7. Formally, price markups may adjust, driving a wedge between real wages and the marginal product of labor.

Perotti (2002) identify exogenous shocks to government spending by assuming that the latter variable is predetermined relative to the other variables included in the VAR.<sup>8</sup> They find that a positive shock to government purchases leads to a persistent rise in that variable and generates a large positive response of output, with the associated multiplier being larger than (but close to) one. The fiscal expansion is associated with large (and significant) increases in consumption, but negative (and significant) decreases in investment.<sup>9</sup>

Perotti (2005) applies the methodology of Blanchard and Perotti (2002) to several OECD countries. He emphasizes the evidence of subsample instability in the effects of government spending shocks, with the responses in the 1980s and 1990s being more muted than in previous decades. Mountford and Uhlig (2009), who use a VAR with sign restrictions, uncover a multiplier for (deficit-financed) government purchases well below unity, with evidence of a strong crowding out of both residential and nonresidential investment.

Ramey (2011b) criticizes the above VAR approaches to identifying government purchases shocks, on the grounds that most changes in government spending are anticipated, but they are not captured as such by the VAR (given the restricted information set). That shortcoming, she argues, invalidates many of the inferences drawn from those methods.

Ramey and Shapiro (1998) use a narrative approach to identify shocks that raise military spending, which they codify by means of a dummy variable (widely known as the Ramey-Shapiro dummy). They find that nondurable goods consumption displays a very small, though slightly significant decline, while durables consumption falls persistently after a brief, quantitatively large rise on impact. They also find that the product wage decreases, even though the real wage remains essentially unchanged. Following a similar approach, Edelberg, Eichenbaum, and Fisher (1999) point to a fall in real wages, an increase in nonresidential investment, and a mild and delayed fall in the consumption of nondurables and services, though durables consumption increases on impact in response to a Ramey-Shapiro episode. Overall, empirical work using that approach has uncovered relative small multipliers, which very seldom rise above unity.

8. Fatás and Mihov (2001) and Galí, López-Salido, and Vallés (2007) follow a similar approach and obtain similar results.

9. Estimated multipliers in Fatás and Mihov (2001) and Galí, López-Salido, and Vallés (2007) are larger, with smaller or insignificant effects on investment.

After a systematic analysis and comparison of the size of the multipliers uncovered by much of the recent literature, Ramey (2011a) concludes that “despite significant differences in samples, experiments and identification methods, most aggregate studies estimate a range of multipliers from around 0.6 to 1.8” with “the range within studies... [being] almost as wide as the range across studies.”

### **1.3 Fiscal Consolidations**

Fiscal consolidations can be defined as episodes of large, discretionary government spending cuts or tax hikes (or both) aimed at ending an unsustainable debt path. The recent literature on fiscal consolidations was initiated by Giavazzi and Pagano (1990), who describe two episodes in which such fiscal consolidations appeared to have had expansionary effects on economic activity: Denmark in the early 1980s and Ireland in the late 1980s. Such outcomes were at odds with the predictions of the theory and the bulk of the evidence on the effects of fiscal policy in normal times. Alesina and Perotti (1997) analyze the success and macroeconomic consequences of a large number of fiscal consolidations undertaken by OECD countries over the period 1960–94. After defining the success of a fiscal consolidation in terms of its ability to lead to a protracted period with smaller structural primary deficits or debt-to-GDP ratios, they show that fiscal adjustments that rely on expenditure cuts (in particular, cuts in transfer programs and the public wage bill) are more successful, on average, than those based on tax increases. They also find that successful consolidations tend to be expansionary, while unsuccessful ones generally have contractionary effects. In the former case, the expansionary effects are generally associated with an investment boom and an improvement in relative labor unit costs, due to significant real wage containment, as well as an expansion of net exports and profitability.<sup>10</sup>

In subsequent work, Perotti (1999) finds evidence of a negative correlation between consumption and government spending during episodes of fiscal consolidation (and hence large spending cuts), but only in circumstances of fiscal stress (defined by unusually high debt-to-GDP ratios). In normal times, the estimated effects have the opposite sign, that is, consumption increases in response to a rise in government purchases.

10. See also Alesina and Ardagna (1998).

Ardagna (2004) revisits the evidence in Alesina and Perotti (1997), using formal econometric tools (as opposed to simple descriptive statistics) to control for a number of factors. She concludes that the likelihood that a fiscal adjustment will succeed in reducing the debt-to-GDP ratio is increasing (nonlinearly) in the size of the adjustment and GDP growth, but it does not depend on the relative weight of tax hikes and spending cuts in the adjustment (contrary to Alesina and Perotti, 1997). She confirms that, other things equal, GDP growth is higher the larger the decrease in primary spending (especially when the cuts are focused on public employment and the wage bill). That expansionary effect is enhanced if accompanied by an increase in money growth or a decline in short-term interest rates, but it is not affected significantly by exchange rate movements. In a follow-up paper using a longer sample period and more countries, Alesina and Ardagna (2009) obtain similar qualitative results. However, as in the original paper (Alesina and Perotti, 1997), they find stronger evidence that composition effects play a role in determining whether a fiscal adjustment succeeds in reducing the debt-to-GDP ratio, which is more likely in expenditure-based adjustments.

The above papers all use variations in cyclically adjusted budgets (or its components) to identify fiscal consolidations. In IMF (2010), fiscal consolidation episodes are selected on the basis of policy actions, independently of their *ex post* impact on the cyclically adjusted budget balance, and on the basis of narrative evidence pointing to tax hikes or spending cuts that are implemented with the deliberate goal of reducing the budget deficit. This alternative approach to identifying fiscal consolidations yields several results that differ significantly from the earlier literature. In particular, both governing spending cuts and tax hikes are estimated to have a contractionary effect on output. The contraction is dampened by reductions in interest rates and in the value of the domestic currency. The contractionary effects are larger for tax-based adjustments and smaller for those based on spending cuts. The latter are estimated to be slightly expansionary when the consolidation relies on reductions in transfers. Finally, the contractionary impact appears to be smaller for higher levels of perceived sovereign risk.

## **1.4 Fiscal Policy Design**

The previous sections have summarized recent research aimed at understanding the macroeconomic effects of exogenous changes

in government spending or taxes, both in theory and in practice. That avenue is useful for analyzing the effectiveness of different fiscal instruments and the channels through which their effects are transmitted, but it is not the only perspective through which fiscal policy can be assessed. One alternative is to consider the endogenous component of fiscal policy, that is, on fiscal policy as a function of the state of the economy. The focus on the endogenous component of fiscal policy naturally brings a normative perspective to the analysis, since it raises the question of how fiscal policy should be conducted. This tradition encompasses two approaches. The first explores the derivation and characterization of the optimal fiscal policy, while the second analyzes simple fiscal policy rules and their macroeconomic and welfare consequences. Next we briefly overview some key papers and results from the two approaches.

#### **1.4.1 Optimal tax and debt policy**

The literature on optimal fiscal policy generally focuses on the problem of optimal taxation given an exogenous path of government purchases and no availability of lump-sum taxes. Judd (1985) and Chamley (1986) derived a classic result in the context of a deterministic neoclassical growth model: under the optimal fiscal policy, the capital income tax rate converges toward zero (and for a suitable utility function, it will attain that value after one period).

Lucas and Stokey (1983) analyze optimal taxation policy in a stochastic model featuring exogenous government expenditures, with both taxes and government debt payoffs contingent on the state of nature (given by the realization of government spending in their model) and no capital accumulation. They show that optimal tax rates and debt display serial correlation properties similar to those of government expenditures. In contrast, Barro (1979) finds, in the context of a partial equilibrium model with one-period risk-free debt as the only asset, that tax rates and debt would follow random walk processes under the optimal policy, independently of the properties of government expenditures. Aiyagari and others (2002) use a general equilibrium setup identical to Lucas and Stokey (1983) but with noncontingent government debt only. Under some restrictions on preferences and the amount of assets the government can accumulate, they show that tax rates and debt follow near unit root processes, independently of the serial correlation properties of government expenditure. While this result is reminiscent of Barro

(1979), the authors find strong contemporaneous responses of taxes and debt to spending shocks (as in Lucas and Stokey, 1983).

Chari, Christiano, and Kehoe (1994) quantitatively explore the properties of optimal taxes in a calibrated real business cycle model, with capital accumulation, shocks to technology and government spending, and state-contingent debt. They show that the optimal policy implies a positive but nearly constant tax rate on labor income (with its limited variation inheriting the serial correlation of government spending), while the *ex ante* tax rate on capital income is also very stable and has a mean close to zero (being equal to zero in the case of separable preferences). State-contingent returns on government debt—or, alternatively, state-contingent capital income tax rates—are the main shock absorbers.

Chari, Christiano, and Kehoe (1991) analyze a monetary version of the same framework under the assumption of noncontingent nominal debt. Unexpected changes in the price level provide the appropriate *ex post* real payments on debt, making the latter effectively contingent in real terms, as in Lucas and Stokey (1983). Schmitt-Grohé and Uribe (2004) point to the fragility of the previous result when nominal rigidities are introduced. They show that the gains from using unexpected inflation or deflation to make debt effectively state contingent are largely offset by the costs associated with price instability, even if the degree of nominal rigidities is relatively small. The optimal policy mix in their environment implies a stable near-zero inflation rate and near random walk behavior in government debt and taxes (as in Aiyagari and others, 2002).

A number of recent papers endogenize government spending when deriving optimal fiscal policy, usually under the assumption that government services yield some utility. Thus, Adam (2011) introduces an endogenous government spending decision in an environment similar to that in Schmitt-Grohé and Uribe (2004), focusing on the optimal fiscal policy response to technology shocks as a function of the initial level of (nominal, noncontingent) government debt. When the latter is zero, the optimal policy requires that government spending adjusts one to one with any change in tax revenues, while keeping the debt level and distortionary tax rates unchanged. When the initial debt level is positive, only part of the increase in tax revenues is matched by an increase in government spending, with both the tax rate and the debt level declining permanently, as in Barro (1979). A second-order approximation to the equilibrium dynamics under the optimal policy, results in the optimal level of debt gradually converging to zero.

Finally, Galí and Monacelli (2010) analyze optimal monetary and fiscal policy analysis with endogenous government spending in the context of a New Keynesian model of a currency union in which member countries are subject to idiosyncratic technology shocks. They show that government spending will optimally deviate, in a countercyclical fashion, from a policy of efficient provision of utility-yielding public services in order to compensate for the lack of an autonomous monetary policy.

### **1.4.2 Simple rules**

Although much of the recent research centers on monetary policy, some papers examine the macroeconomic consequences of alternative rules and empirically characterize the fiscal rules followed by governments in practice. We briefly summarize some of that research next.

Leeper (1991) analyzes the importance for macroeconomic outcomes of the policy mix, as defined by some key properties of the monetary and fiscal rules in place. Conventional macroeconomic models assume that the fiscal authority follows a passive rule, that is, one that guarantees that the intertemporal budget constraint of the government is satisfied given any path of interest rates, output, and other variables. In that case, an active monetary policy (that is, one that reacts with sufficient strength to inflation) will be ultimately responsible for controlling the price level. On the other hand, under a regime characterized by active fiscal policy (that is, one that does not in itself guarantee the sustainability of debt dynamics) and a passive monetary policy, inflation control falls fully under the responsibility of the fiscal authority, giving rise to the so-called fiscal theory of the price level. Woodford (1998) provides a related analysis in the context of a model with nominal rigidities. In subsequent work, Davig and Leeper (2007) show how an economy's equilibrium properties are affected by stochastic switches in the nature of monetary and fiscal policy. In such an environment, the economy's response to a given shock depends not only on the fiscal and monetary policy regimes in place at the time of the shock, but also on the expected duration of those regimes and the nature of the regimes that may replace them in the future.

The extent to which simple fiscal policy rules can approximate the optimal monetary and fiscal policies has been the subject of some analysis in the literature. For example, Schmitt-Grohé and Uribe (2006) show that the economy's responses to technology

shocks under the optimal policy can be closely approximated by a simple rule that makes the income tax rate respond to its own lagged value and to the deviations of government liabilities and output from their respective steady state values under the optimal policy, combined with a Taylor-type rule for monetary policy. The implied welfare losses are very small, provided that the coefficients on both government liabilities and output are optimally chosen. That approximation is particularly good when technology shocks are the main source of fluctuations, but not so much when fiscal shocks are dominant. In addition to the theoretical literature on simple fiscal policy rules, a small empirical literature has also emerged aimed at estimating those rules for different countries and historical periods. A frequent objective is to assess the sustainability of fiscal policy. Bohn (1998) constitutes an early example in this tradition: he estimates a fiscal policy rule for the United States and shows that the surplus responds positively to the debt-to-GDP ratio with sufficient strength to guarantee that the latter variable displays some mean reversion.

Another purpose of estimating fiscal policy rules is to establish the degree of countercyclicality of fiscal policy, by measuring the sensitivity of deficits (or the revenue and spending components) to output gap fluctuations. Countercyclicality is partly related to the presence of so-called automatic stabilizers, rather than to deliberate discretionary policy decisions to stabilize the cycle. Isolating that discretionary component poses an important challenge, as does the need to control for the biases that may result from reverse causality (that is, the effect of exogenous fiscal shocks on output). Examples of papers seeking to characterize empirically the response of fiscal policy to cyclical developments include Gavin and Perotti (1997) for Latin America, Lane (2003) for a sample of 22 OECD countries, and Galí and Perotti (2003) for euro area countries.

Finally, the residual from estimated fiscal policy rules can provide a measure of nonsystematic fiscal policy. Fatás and Mihov (2003) show that countries with less volatility in the residual (which they interpret as signaling a smaller role for discretionary policy) also display less macroeconomic instability and higher average growth. Related evidence using data for U.S. states can be found in Fatás and Mihov (2006).

Finally, another branch of the literature on fiscal policy explores the impact of government size on macroeconomic volatility. Galí (1994) shows that several measures of government size, including

tax revenues and government spending as a fraction of GDP, are strongly negatively correlated with measures of output volatility across OECD countries. That observation is shown to be at odds with the predictions of a standard RBC model. Fatás and Mihov (2001) find that such a relationship is robust to the inclusion of a variety of controls and alternative detrending and estimation approaches. They also show that an even stronger negative relationship between government size and output volatility obtains across U.S. states.

## **2. OVERVIEW OF THE BOOK**

Ten contributions were presented during the 14th Annual Conference of the Central Bank of Chile, on Fiscal Policy and Macroeconomic Performance. They were organized into three sections. The first assessed the effects of fiscal policy on macroeconomic outcomes. Tommaso Monacelli, Roberto Perotti, and Antonella Trigari focused on the effects of tax cuts on the labor market. Joachim Voth analyzed the extent to which fiscal retrenchment can take place before civil unrest is triggered. Rodrigo Caputo and Miguel Fuentes examined the long-run effects of fiscal transfers and investment on the real exchange rate in a broad panel of countries. Finally, Mauricio Villafuerte, Pablo López-Murphy, and Rolando Ossowski presented an examination of fiscal policies among resource exporters in Latin America and the Caribbean.

The second section included research on the interactions of fiscal and monetary policy. Gauti Eggertsson analyzed how the fiscal multiplier is affected by the degree of coordination between the fiscal and monetary authorities. Giancarlo Corsetti questioned the conventional wisdom that fiscal policy is more expansionary under a fixed exchange rate than under a floating regime. Finally, Luis Felipe Céspedes, Jorge Fornero, and Jordi Galí explored the effects of Chilean fiscal policy on consumption and income using a DSGE framework that relaxes the assumption of Ricardian equivalence.

The final section focused on fiscal policy in emerging market economies. Jeffrey Frankel discussed the structural spending rule adopted by Chile in 2001. Eduardo Engel, Christopher Neilson, and Rodrigo Valdés presented a welfare analysis of the effects of Chile's fiscal rule. Michel Strawczynski and Joseph Zeira examined the cyclicity of fiscal policy in a broad set of emerging market economies and assessed whether the observed dynamics can be characterized using Aguiar and Gopinath's distinction of permanent

and temporary shocks. We now proceed to briefly summarize each of the contributions.

Which is more effective at reducing unemployment—increasing government spending or reducing taxes? Does it make a difference if policymakers change income taxes or business taxes? Monacelli, Perotti, and Trigari (in this volume) address these relevant questions by estimating the effect of exogenous changes in taxes on the U.S. unemployment rate along the lines of the narrative approach of Romer and Romer (2010). Following Perotti (2010), they argue that the discretionary and the automatic components of changes in tax revenues are likely to have different effects on output, which must be taken into account when estimating the effects of tax changes on the economy. They estimate an instrumental variable version of the Mertens and Ravn (2009) equation that accounts for the dynamic response of the macroeconomic variables of interest (such as output, unemployment, government spending, and interest rates) to changes in the discretionary part of tax revenues. They argue that this methodology provides a better estimation of the effects of tax changes on the economy than Romer and Romer's (2010) approach. More specifically, Monacelli, Perotti, and Trigari (in this volume) base their estimation on the data set from Perotti (2010), which disaggregates the aggregate tax shocks into four main categories (personal, corporate, social security, and indirect taxes) and also distinguishes between receipts and liabilities. They show that an increase in tax receipts of one percent of GDP has a sizeable positive impact on the unemployment rate and a negative impact on hours worked, labor market tightness, and the probability of finding a job. The negative effect on GDP lies in the mid-range of other values found in the literature. They indicate that this depends on a series of methodological details, involving both the econometric specification and the estimation method. Finally, they also show that the unemployment multiplier is larger for business taxes than for personal income taxes.

The austerity measures implemented by the Greek government in 2010 were followed by strikes and riots. This situation does not seem completely new, at least from a South American perspective. Voth (in this volume) studies the extent to which budget cuts are directly related to surging social unrest in a group of 11 South American countries for the period 1937–95. He uses data collected by Banks (1994) on the number of political assassinations, general strikes, riots, and anti-government demonstrations. Using these variables, he

constructs an aggregate measure called chaos to capture social unrest that corresponds to the first principal component of the four variables. Voth finds strong evidence that fiscal austerity (cuts in government expenditure) is associated with periods of violent protest: the larger the fiscal adjustment, the greater the risk of riots, demonstrations, assassinations, and revolutions. Surprisingly, he finds that increases in fiscal revenues have a similar effect to expenditure changes. This may be explained by episodes of simultaneous tax and spending increases that reduce the level of unrest. One possible explanation is that budget cuts and social unrest may be explained by a common factor, such as hard times. When he controls for economic growth, the results mostly remain unchanged, suggesting that the omitted variable problem may not be that severe.

Theoretical models tend to indicate that government consumption is negatively correlated with the real exchange rate, that is, higher government consumption tends to appreciate the real exchange rate. This is usually the result of a higher share of nontradables in government consumption than in private consumption. Empirical evidence tends to support this claim. Caputo and Fuentes (in this volume) test the effects of government expenditures on the real exchange rate for a group of 55 developing and developed economies for the period 1980–2007. In addition to considering the impact of government consumption on the real exchange rate, they assess the effect of the other two components of fiscal expenses—namely, government transfers and investment—on the real exchange rate. Their results suggest that changes in both government consumption and public investment appreciate the real exchange rate significantly, with the long-run elasticity being close to one. They also find that government transfers appear to have no impact on the real exchange rate.

The implementation of fiscal policy is particularly challenging in countries where commodity-related fiscal revenues are significant, since commodity prices are subject to great fluctuations. The recent behavior of commodity prices, which recorded a significant increase in 2004–08 followed by a drastic fall in 2009, is a good example of such volatility. Villafuerte, Lopez-Murphy, and Ossowski (in this volume) examine the cyclical properties of fiscal policy for a group of nonrenewable-resource-exporting countries (NRECs) in Latin America and the Caribbean during the economic and resource price cycle of the last decade. The countries included in the study are Bolivia, Chile, Ecuador, Mexico, Peru, Trinidad and Tobago, and

Venezuela. For these countries, fiscal revenues from nonrenewable sources represented between 20 and 57 percent of total fiscal revenues in 2005–09. Based on their estimations, the authors argue that fiscal policy was predominantly procyclical in these countries during the boom. They also indicate that in the 2009 downturn, some countries implemented a countercyclical fiscal policy, while others experienced a procyclical stance. Finally, countries that displayed a more conservative fiscal policy in 2003–08 implemented more expansionary fiscal policies, on average, during the 2009 crisis.

The global financial crisis of 2008 generated an aggressive response from central banks around the world. In some cases, monetary policy rates were reduced to their effective lower bounds. Rapid output contraction gave rise to the fear of a liquidity trap within the policy horizon. As discussed by Krugman (1998), to avoid a liquidity trap, the government should just commit to a higher future money supply. If this commitment lacks credibility, fiscal policy may provide as a powerful stabilization tool, as argued by Christiano, Eichenbaum, and Rebelo (2011). In his contribution to this volume, Eggertsson studies the role of coordination between an (independent) central bank and the government in avoiding a liquidity trap scenario. Using a standard New Keynesian economy subject to the zero lower bound on the nominal interest rate and with costly taxation, he shows that the coordination of fiscal and monetary policy is key for increasing the credibility of future inflation announcements. If raising taxes is costly, inflation may be a good alternative for reducing public debt. The announcement of future inflation supported with increases in government spending can be highly credible if the central bank shares, to some extent, the government's objective function (coordination). In this case, the deficit spending multiplier (that is, the effect of increasing nominal debt on output) is high, which adds to the classical real government spending multiplier. Eggertsson claims that it was precisely Roosevelt's commitment to inflate the price level to its pre-Depression level, with the backing of fiscal expansion, that explains the relatively quick recovery of the U.S. economy after 1933 compared with the protracted stagnation of the Japanese economy in 1992–2006.

A conventional view in international economics is that fiscal policy is more effective under fixed exchange rates than under flexible exchange rates. Under flexible exchange rates, an increase in government spending (or a reduction in taxes) will generally lead to a rise in the interest rate, which will tend to appreciate the domestic

currency. Overall, exports fall, as do investment and consumption. Under a credible fixed exchange rate regime, the interest rate cannot respond (since it must match the foreign interest rate, which does not change), so there is no crowding out of government spending. Corsetti, Kuester and Muller (in this volume) argue that this conventional wisdom depends crucially on the medium-term fiscal regime under consideration. They consider a fiscal regime in which, after an initial fiscal stimulus, both spending and taxes are adjusted so as to stabilize debt. In this case, the long-term real interest rate tends to fall if agents anticipate a contraction in government spending in the near future. As this is expected to cause a slowdown of inflation, under floating rates private agents also expect the central bank to cut policy rates. In this scenario, long-term real interest rates may actually fall at the time of the fiscal expansion, instead of increasing. Thus, the conventional wisdom does not hold.

As we discussed in the previous section, the existence of non-Ricardian households is a key element for explaining potentially large government spending multipliers. If non-Ricardian households play a crucial role in explaining the transmission of government spending shocks, they should have a relatively higher importance in economies where the fraction of non-Ricardian households is potentially larger, that is, developing countries. Céspedes, Fornero, and Galí (in this volume) study the effects of government spending shocks in Chile, an emerging market economy that follows a structural balance fiscal rule. The empirical evidence indicates that the fiscal multiplier is positive and large in the Chilean economy. The positive consumption multiplier that emerges from their empirical analysis suggests the presence of non-Ricardian effects. The authors develop a small open economy model to study the channels through which these shocks are transmitted to the economy, along the lines of Galí, López-Salido, and Vallés (2007) and Coenen, McAdam, and Straub (2008). They show that the specification of a fiscal policy rule that approximates the Chilean rule leads to consumption and output fiscal multipliers that are positive in the short run, in a way consistent with the evidence.

Between 2005 and 2008, Chile accumulated fiscal surpluses equivalent to nearly 25 percent of GDP. The fiscal surpluses have their origin in an increase in the price of copper: the average copper price for that period was close to 300 percent higher than at the beginning of the decade. However, while the higher copper price may explain the higher fiscal revenues received by the Chilean government, it clearly does not explain why those additional

revenues were saved. Fiscal policy in Latin American countries tends to be clearly procyclical, as documented by Gavin and Perotti (1997). Frankel (in this volume) studies the fiscal policy framework in Chile in order to explain its distinctive behavior compared to other Latin American commodity exporters. Fiscal policy in Chile is implemented using a structural balance rule. Under this rule, if effective copper prices are above the long-run trend or if the economy is in a boom (where effective output is above potential output), the government must save the difference generated in fiscal revenues. Frankel provides evidence that official forecasts will generally be overly optimistic if not insulated from politics, and the problem can be worse when the government is formally subject to budget rules. He argues that the key innovation that has allowed Chile to achieve countercyclical fiscal policy and to run surpluses in booms is not the structural budget rule itself, but the creation of a regime that transfers the responsibility for estimating long-run trends in copper prices and GDP to independent expert panels.

While the structural balance rule implemented in Chile has been useful for improving the management of copper windfall revenues, it is not necessarily the optimal rule. Engel, Neilson, and Valdes (in this volume) study the optimal design of the spending rule for a government that has volatile revenues from an exogenous source, such as a flow from a natural resource. They analyze policies for a government with a precautionary saving motive, which has to decide how much to transfer from volatile copper revenues to impatient agents who differ in their private incomes and who consume all available income. Crucially, the government has limited space for borrowing against future revenue and has access to an imperfect technology for targeting transfers, such that a fraction of the transfers go to richer households. The authors concentrate on the implementation of social insurance, assuming that output is exogenous. For their purpose, countercyclical actions reflect the government's interest in increasing transfers at times when household consumption is low and government spending has a higher marginal utility. Engel, Neilson, and Valdes show that in this setup, the gains from moving from a balanced budget rule to an optimal rule are significant. Optimal spending is countercyclical, and this countercyclicality is higher when government expenditures are less targeted because the inefficiencies of poor targeting are less costly. Simpler rules, such as the structural balance rule, also provide welfare gains.

Finally, institutions may play a significant role explaining the procyclicality of fiscal policy in Latin America. Strawczynski and Zeira (in this volume) study a different channel that may explain this behavior: the characteristics of business cycles in these economies. Following the work of Aguiar and Gopinath (2007), they test whether developed and emerging economies react differently to persistent shocks to output. Their results indicate that while government expenditure in developed economies is not affected by permanent shocks, emerging countries tend to implement a procyclical fiscal policy when facing permanent shocks to per capita GDP.

## REFERENCES

- Adam, K. 2011. "Government Debt and Optimal Monetary and Fiscal Policy." *European Economic Review* 55(1): 57–74.
- Aguiar, M. and G. Gopinath. 2007. "Emerging Market Business Cycles: The Cycle is the Trend." *Journal of Political Economy* 115(1): 11–69.
- Aiyagari, S. R., A. Marcet, T. J. Sargent, and J. Seppälä. 2002. "Optimal Taxation without State-Contingent Debt." *Journal of Political Economy* 110(6): 1220–54.
- Alesina, A. and S. Ardagna. 1998. "Tales of Fiscal Adjustment." *Economic Policy* 13(27): 489–545.
- . 2009. "Large Changes in Fiscal Policy: Taxes versus Spending." In *Tax Policy and the Economy*, vol. 24, edited by J. Brown. Cambridge, Mass.: National Bureau of Economic Research.
- Alesina, A. and R. Perotti. 1997. "Fiscal Adjustment in OECD Countries: Composition and Macroeconomic Effects." *IMF Staff Papers* 44(2): 210–48.
- Ardagna, S. 2004. "Fiscal Stabilizations: When Do They Work and Why?" *European Economic Review* 48(5): 1047–74.
- Barro, R. J. 1974. "Are Government Bonds Net Wealth?" *Journal of Political Economy* 82(6): 1095–117.
- Baxter, M. and R. King. 1993. "Fiscal Policy in General Equilibrium." *American Economic Review* 83(3): 315–34.
- Banks, A. S. 1994. *Cross-National Time-Series Data Archive*. Binghamton, N.Y.: Databanks International.
- Blanchard, O. J. 1985. "Debt, Deficits, and Finite Horizons." *Journal of Political Economy* 93(2): 223–47.
- Blanchard, O. J., and R. Perotti. 2002. "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output." *Quarterly Journal of Economics* 117(4): 1329–68.
- Bohn, H. 1998. "The Behavior of U.S. Public Debt and Deficits." *Quarterly Journal of Economics* 113(3): 949–63.
- Braun, R. A. 1994. "Tax Disturbances and Real Economic Activity in the Postwar United States." *Journal of Monetary Economics* 33(3): 441–62.
- Chamley, C. 1986. "Optimal Taxation of Capital Income in General Equilibrium with Infinite Lives." *Econometrica* 54(3): 607–22
- Chari, V. V., L. J. Christiano, and P. J. Kehoe. 1991. "Optimal Fiscal and Monetary Policy: Some Recent Results." *Journal of Money, Credit, and Banking* 23(3): 519–39.

- . 1994. “Optimal Business Cycle Policy in a Business Cycle Model.” *Journal of Political Economy* 102(4): 617–52.
- Christiano, L. J., M. Eichenbaum, and S. Rebelo. 2011. “When Is the Government Spending Multiplier Large?” *Journal of Political Economy* 119(1): 78–121.
- Coenen, G., P. McAdam, and R. Straub. 2008. “Tax Reform and Labour-Market Performance in the Euro Area: A Simulation-Based Analysis Using the New Area-Wide Model.” *Journal of Economic Dynamics and Control* 32(8): 2543–83.
- Davig, T. and E. Leeper. 2007. “Fluctuating Macro Policies and the Fiscal Theory.” *NBER Macroeconomics Annual 2006*, edited by D. Acemoglu, K. Rogoff, and M. Woodford, pp. 247–98. MIT Press.
- Diamond, P. A. 1965. “National Debt in a Neoclassical Growth Model.” *American Economic Review* 55(5): 1126–50.
- Edelberg, W., M. Eichenbaum, and J. D. Fisher 1999. “Understanding the Effects of a Shock to Government Purchases.” *Review of Economic Dynamics* 2(1): 166–206.
- Eggertsson, G. B. 2011. “What Fiscal Policy Is Effective at Zero Interest Rates?” *NBER Macroeconomics Annual 2010*, edited by D. Acemoglu and M. Woodford, pp. 59–112. University of Chicago Press.
- Elmendorf, D. W. and N. G. Mankiw. 1999. “Government Debt.” In *Handbook of Macroeconomics*, vol 1C, edited by J. Taylor and M. Woodford, pp. 1616–63. Amsterdam: North Holland.
- Fatás, A. and I. Mihov. 2001. “Government Size and Automatic Stabilizers: International and Intranational Evidence.” *Journal of International Economics* 55(1): 3–28.
- . 2003. “The Case for Restricting Fiscal Policy Discretion.” *Quarterly Journal of Economics* 118(4): 1419–47.
- . 2006. “The Macroeconomic Effects of Fiscal Rules in the U.S. States.” *Journal of Public Economics* 90(1–2): 101–17.
- Favero, C. and F. Giavazzi. 2012. “Measuring Tax Multipliers: The Narrative Method in Fiscal VARs.” *American Economic Journal* (forthcoming).
- Galí, J. 1994. “Government Size and Macroeconomic Stability.” *European Economic Review* 38(1): 117–32.
- Galí, J., J. D. López-Salido, and J. Vallés. 2007. “Understanding the Effects of Government Spending on Consumption.” *Journal of the European Economic Association* 5(1): 227–70.
- Galí, J. and T. Monacelli. 2010. “Optimal Monetary and Fiscal Policy in a Currency Union.” *Journal of International Economics* 76(1): 116–32.

- Galí, J. and R. Perotti. 2003. "Fiscal Policy and Monetary Integration in Europe." *Economic Policy* 18(37): 535–72.
- Gavin, M. and R. Perotti. 1997. "Fiscal Policy in Latin America." *NBER Macroeconomics Annual 1997*, edited by Ben S. Bernanke and Julio Rotemberg, pp. 11–60. MIT Press
- Giavazzi, F. and M. Pagano. 1990. "Can Severe Fiscal Contractions be Expansionary? Tales of Two Small European Countries." *NBER Macroeconomics Annual*, edited by Olivier Jean Blanchard and Stanley Fischer, pp. 75–122. MIT Press.
- IMF (International Monetary Fund). 2010. *World Economic Outlook*. October issue. Washington.
- Krugman, P. 1998. "It's Baaack! Japan's Slump and the Return of the Liquidity Trap." *Brookings Papers on Economic Activity* 29(2): 137–206.
- Judd, K. 1985. "Redistributive Taxation in a Simple Perfect Foresight Model." *Journal of Public Economics* 28(1): 59–83.
- Lane, P. 2003. "The Cyclical Behaviour of Fiscal Policy: Evidence from the OECD." *Journal of Public Economics* 87(12): 2661–75.
- Leeper, E. M. 1991. "Equilibria under 'active' and 'passive' monetary and fiscal policies." *Journal of Monetary Economics* 27(1): 129–47.
- Lucas, R. E. and N. L. Stokey. 1983. "Optimal Fiscal and Monetary Policy in an Economy without Capital." *Journal of Monetary Economics* 12(1): 55–93.
- Mertens, K. and M. O. Ravn. 2009. "Empirical Evidence on The Aggregate Effects of Anticipated and Unanticipated U.S. Tax Policy Shocks." Discussion Paper 7370. London: Centre for Economic Policy Research.
- McGrattan, E. 1994. "The Macroeconomic Effects of Distortionary Taxation." *Journal of Monetary Economics* 33(3): 573–601.
- Mountford, A. and H. Uhlig. 2009. "What Are the Effects of Fiscal Policy Shocks?" *Journal of Applied Econometrics* 24(6): 960–92.
- Perotti, R. 1999. "Fiscal Policy in Good Times and Bad." *Quarterly Journal of Economics* 114(4): 1399–436.
- . 2005. "Estimating the Effects of Fiscal Policy in OECD Countries," CEPR Discussion Paper 4842.
- . 2010. "The Effects of Tax Shocks on Output: Not So Large, But Not Small Either." Working Paper 16786. Cambridge, Mass.: National Bureau of Economic Research.
- Prescott, E. C. 2004. "Why Do Americans Work So Much More than Europeans?" *Federal Reserve Bank of Minneapolis Quarterly Review* 28(1): 2–13.

- Ramey, V. 2011a. "Can Government Purchases Stimulate the Economy?" *Journal of Economic Literature* 49(3): 673–85.
- . 2011b. "Identifying Government Spending Shocks: It's All in the Timing." *Quarterly Journal of Economics* 126(1): 1–50.
- Ramey, V. and M. Shapiro. 1998. "Costly Capital Reallocation and the Effects of Government Spending." *Carnegie-Rochester Conference Series on Public Policy* 48(1): 145–94.
- Romer, C. D. and D. H. Romer. 2010. "The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks." *American Economic Review* 100(3): 763–801.
- Schmitt-Grohé, S. and M. Uribe. 2004. "Optimal Fiscal and Monetary Policy under Sticky Prices." *Journal of Economic Theory* 114(2): 198–230.
- . 2006. "Optimal Fiscal and Monetary Policy in a Medium-Scale Macroeconomic Model." *NBER Macroeconomics Annual 2005*, edited by Mark Gertler and Kenneth S. Rogoff, pp. 383–426. MIT Press.
- Weil, P. 1989. "Overlapping Families of Infinitely-Lived Agents." *Journal of Public Economics* 38(2): 183–98.
- Woodford, M. 1998. "Control of the Public Debt: A Requirement for Price Stability?" In *The Debt Burden and its Consequences for Monetary Policy*, edited by G. Calvo and M. King, pp. 117–54. New York: St. Martin's Press.
- . 2011. "Simple Analytics of the Government Expenditure Multiplier." *American Economic Journal: Macroeconomics* 3(1): 1–35.