

POLICY RESEARCH WORKING PAPER

4365

# Fiscal Policy in Developing Countries: A Framework and Some Questions

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September 2007



## Abstract

This paper surveys fiscal policy in developing countries from the point of view of long-run growth. The first section reviews existing methodologies to estimate the effects of fiscal policy shocks and of systematic fiscal policy, with time series or with cross-sectional methods, and their applicability to developing countries. The second section surveys optimal fiscal policy in developing countries, by considering the role of the intertemporal government budget, and sustainability and solvency. It also reviews the fuzzy debate on “fiscal space” and “macroeconomic space” — and the usefulness (or lack thereof) of these terms for policy analysis. The third section asks what theory tells us about the optimal cyclical behavior of fiscal policy in developing countries. It shows that it very much depends on the assumptions about the interactions between

credit market imperfections at the individual, firms, or government level, and on the supply of external funds to the country. Different sets of assumptions lead to different implications about optimal cyclical behavior. The available evidence on the cyclical behavior of fiscal policy, and possible reasons for the observed prevalence of a procyclical behavior in developing countries, is also reviewed. If one agrees that fiscal policy is indeed less countercyclical than we think is optimal, the issue is how to correct the problem. One obvious question is why government do not self-insure, i.e. why they do not accumulate assets in upturns and decumulate them in downturns. This leads to the analysis of fiscal rules and stabilization funds, in the fourth section. The last section concludes with what the author considers important research and policy questions in each part.

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# Fiscal policy in developing countries: a framework and some questions

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# 1 Introduction

A recurrent theme in the policy debate about developing countries is that in the past there has been an excessive focus on the objective of short-run stabilization as opposed to the objective of long-run growth. Although it is not obvious that a trade-off between the two objectives should exist, it is nonetheless useful to start by taking it as given because it is so central to the current debate.

Assessing this statement requires a knowledge of the effects of different types of fiscal policy. In the first part of this paper, I therefore review existing methodologies to estimate the effects of fiscal policy shocks and of systematic fiscal policy, with time series or with cross-sectional methods; I also review their applicability to developing countries, and what we can plausibly hope to learn from them.

Based on this analysis, I then consider the issue of optimal fiscal policy in developing countries. I start by considering the role of the first obvious constraint, the intertemporal government budget. This introduces the notions of sustainability and solvency. But these well defined notions have been obfuscated, in recent years, by the more fuzzy debate on "fiscal space" and "macroeconomic space"; I then review the usefulness (or lack thereof) of these terms for policy analysis.

The debate on short-run vs. long-run aspects of fiscal policy is often also cast in terms of the procyclical (destabilizing) behavior of fiscal policy in developing countries. In the third part, I first ask what theory tells us about the optimal cyclical behavior of fiscal policy in developing countries. I show that it very much depends on the assumptions about the interactions between credit market imperfections at the individual, firm, or government level, and on the supply of external funds to the country. Different sets of assumptions lead to different implications about the optimal cyclical behavior of fiscal policy. I then proceed to consider the available evidence on the cyclical behavior of fiscal policy, and possible reasons for the observed prevalence of procyclical (destabilizing) behavior in developing countries.

If one agrees that fiscal policy is indeed more procyclical (less countercyclical) than we think is optimal, the question is how to correct the problem. One obvious question is why governments do not self-insure, i.e. why they do not accumulate assets in upturns and decumulate them in downturns. This leads to the analysis of fiscal rules and stabilization funds, in the fourth part.

The last part concludes with what I consider important research and policy questions in each part.

Although this is a survey, in a topic as vast as fiscal policy it necessarily must leave out several important topics. I deal only indirectly with the issue of the optimal size of government, and not at all with Ricardian equivalence, partly because there is not much new in these areas in recent years, and partly because in my opinion these topics have been over-researched in the past relative to other important topics. I also leave out entirely

issues of fiscal federalism and of taxation, both because they would require a different survey each and because I do not have specific expertise in these fields.

## 2 Estimating the effects of fiscal policy

For both a positive and a normative assessment of the trade-off between the short-run and the long-run objectives of fiscal policy, one first needs to be able to estimate the effects of fiscal policy on the macroeconomy.

Roughly speaking, there are two types of questions we are interested in:

- 1) What are the stabilization or cyclical properties of fiscal policy?
- 2) What are the long-run effects of fiscal policy?

In principle, both issues can be studied through two approaches:

1) The first approach relies on time-series methodologies to study the effects of a shock (i.e., an unexpected change) in a given type of government spending on a given variable.

2) The second approach relies on time-series, cross-sectional or panel regressions to study the long-run effects of fiscal policy or of alternative systematic fiscal policies. For instance, what are the effects of a given automatic stabilizer on the variability of output? Or, what are the long-run effects of a marginal change in a given type of public infrastructure stock on the average growth rate?

In order to assess the stabilization properties of fiscal policy, both approaches are relevant. If there is a negative shock to GDP, the policymaker would like to know how the economy would respond, whether the policymaker should make a discretionary change in, say, government consumption. But the policymaker would also like to know how much stabilization can be expected ex ante from a given type of automatic stabilizer.

Both approaches are in principle relevant also to assess the long-run growth aspects of fiscal policy. The second approach is probably the more natural one in this case: should the stock of paved roads increase exogenously, how much would average long-run growth increase? The first approach can still be used, by tracing the effects of a shock to investment in paved roads into the distant future.

### 2.1 A methodological premise

The tools of empirical fiscal policy analysis have been mostly developed for and applied to data for industrialized countries. Developing countries are different from industrialized countries in many respects, one important of which, for our purposes, is the structure of the government budget. Typically, government budgets in industrialized countries are bigger (as shares of GDP); and on the spending side they are more skewed towards transfers; on the revenue side, towards personal and social security taxes. In developing countries transfers are typically small, and the biggest share of government spending is

represented by consumption of goods and services, and within this, by government wages;<sup>1</sup> on the revenue side, indirect taxes often are the biggest component.

This is certainly true, but there is no reason to believe that the methodologies applied to OECD countries should not apply to other countries: in essence, these methodologies all deal, in different ways, with the problem of reverse causality in estimating the effects of fiscal policy; though certainly not uncontroversial, they are currently the frontier of our empirical exploration. Conceptually, there is no reason why radically different methodologies (which have not been put forward anyway), or even ignoring the problem of reverse causation altogether, should be better suited for developing countries.

The real issue, however, is data availability. Developing countries have drastically worse fiscal data than industrialized countries, and this, as we will see, could be the binding constraint.

### **3 Estimating the stabilization effects of fiscal policy in the short- to medium-run via time series methodologies**

In this section I will review time series methodologies to study the effects of fiscal policy shocks in the short- to medium-run, relevant for stabilization policies. Compared with cross-country regressions, these methodologies are much less common for developing countries; and although their use is spreading in recent years, their implications are not always well understood. Because of the focus on the short- to medium-run, it is useful to think of government spending here as current purchases of goods and services, or government consumption.<sup>2</sup>

#### **3.1 Theory**

Virtually all reasonable economists agree that an increase in the interest rate controlled by the monetary authorities will lead to some fall in the output gap and a slowdown in inflation (although undoubtedly the magnitude and timing of these effects is subject to some debate). Things are different for fiscal policy: neoclassical and neokeynesian theories

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<sup>1</sup>Government consumption can be divided into the purchase of goods (and some services) on the market (such as a car for the police or a computer for a school) and of non-market services (such as those of public sector teachers and of policemen); this latter component is government wages.

<sup>2</sup>Theoretically, the government wage component of government consumption has very different effects from the purchase of market goods component (see e.g. Finn (1998)). Empirically too these two components have different effects (see Perotti 1997a)). For lack of space, I do not pursue these differences here.

have opposite implications for the effects of a shock to government spending on goods and services on such key variables as private consumption, and the real wage.

Assume first that taxation is lump-sum, to eliminate the intertemporal and intratemporal substitution effects of taxation. Essentially, in neoclassical models (such as Baxter and King (1993)), a shock to government consumption generates a negative wealth effect on the infinitely lived representative household (higher government spending means higher taxation in present discounted value terms); as the household feels poorer, its labor supply increases and its consumption declines (leisure and consumption are both normal goods); as labor supply increases along a given labor demand, the real wage falls.

The story is very different in neoknesian models, where government spending causes an outshift in the demand for goods for instance because of the presence of nominal rigidities, or because of countercyclical markups (as in Ravn, Schmitt-Grohé and Uribe (2006)) or else because of increasing returns to scale (as in Devereux, Head and Lapham (1996)). As the derived demand for labor also shifts out, the real wage can increase; and as a consequence, private consumption too can increase, for instance because there are liquidity constrained individuals who are forced to consume all their labor income each period, as in Galí, López-Salido, and Vallés (2007), or via simple substitution from leisure into consumption, as in Ravn, Schmitt-Grohé and Uribe (2006) and Devereux, Head and Lapham (1996).

Things are even more complicated for private investment: even within each strand of theory, the effects of government spending on private investment is depends on features such as the persistence of the government spending shock in the neoclassical model, and the relative strength of the accelerator effect vs. the crowding out effect in neoknesian models.

As we will see in the following sections, different theories of the optimal behavior of fiscal policy over the cycle- and by implication different evaluations of the operation of fiscal policy during financial crises - are based on different views about the effects of fiscal policy on consumption, investment and the real wage.

Hence, estimating the response of these variables to a government spending shock is therefore important both because it is of fundamental importance in assessing the countercyclical and stabilization properties of fiscal policy, and because it is important in discriminating between two fundamentally different models of the economy, which is in turn important in assessing the room for stabilizing policy. And yet, we will see that there is no agreement at all on such a simple but basic question as the response of private consumption to a shock to government consumption in the US: probably one half of the profession would argue that the data show a positive response, the other half would argue for a negative response. Similarly, alternative approaches to the estimation of the effects of fiscal shocks typically lead to different estimates of the crowding out (or crowding in) effect of government spending on investment and on the current accounts in the US.

I now review these alternative empirical approaches, and derive implications for the

study of the effects of fiscal policy in developing countries.

### 3.2 Identifying fiscal shocks

Identifying shocks to government spending and taxation is a difficult and controversial exercise, which is nowhere near a consensus even in a much studied case like that of the US. I will first discuss a Structural Vector Autoregression Approach (SVAR) based on Blanchard and Perotti (2002), which will also introduce a discussion of the many possible problems in identifying fiscal policy shocks. Later I will discuss alternative approaches.

The natural context for time series methods is that of a Vector Autoregression. Start from the reduced form specification:

$$X_t = A(L)X_{t-1} + U_t \quad (1)$$

in which each variable in the vector  $X_t$  is regressed on, say, 4 lags of all variables in the same vector. For simplicity, think of the vector  $X_t$  as including the log of output  $y_t$ , the log of government spending  $g_t$ , and the log of taxes  $t_t$ , all in real, per capita terms. The reduced form residuals of the  $g_t$  and  $t_t$  equations,  $u_t^g$  and  $u_t^t$ , can be thought of as linear combinations of three components. First, the *automatic response* of government spending and taxes to innovations in output, i.e. the response to the reduced form output residual  $u_t^y$ ; for instance, the automatic increase in tax revenues when output increases. Second, the *systematic discretionary response* of peacemakers to innovations in the other endogenous variables; for instance, reductions in tax rates implemented systematically in response to recessions. Third, *random discretionary shocks* to fiscal policies; these are the “structural” fiscal shocks, which unlike the reduced form residuals are uncorrelated with all other structural shocks. This is the only component that is not correlated with output shocks, hence this is the component we would like to isolate, so that we can then trace the dynamic response of the economy to a shock to this component. Formally, we can write:

$$u_t^t = \alpha_{ty}u_t^y + \beta_{tg}e_t^g + e_t^t \quad (2)$$

$$u_t^g = \alpha_{gy}u_t^y + \beta_{gt}e_t^t + e_t^g \quad (3)$$

where the coefficients  $\alpha_{ty}$  and  $\alpha_{gy}$  capture the first two components and  $e_t^g$  and  $e_t^t$  are the “structural” fiscal shocks, with  $cov(e_t^g, e_t^t) = 0$ . Clearly,  $e_t^g$  and  $e_t^t$  are correlated with the reduced form residuals, hence they cannot be obtained by an OLS estimation of (2) and (3), nor are there any instruments available.

The key to identification is the observation that it typically takes longer than a quarter for discretionary fiscal policy to respond to, say, an output shock, hence if one uses quarterly data the second component, the *systematic discretionary response*, is absent. As a consequence, the coefficients  $\alpha_{ty}$  and  $\alpha_{gy}$  in (2) and (3) capture only the *automatic response* of fiscal variables to economic activity. For OECD countries, one can use avail-



able external information on the elasticity of taxes and spending to GDP, inflation and interest rates to *compute* the appropriate values of these elasticities;<sup>3</sup> with these, one can then construct the cyclically adjusted fiscal shocks:

$$u_t^{t,CA} \equiv u_t^t - \alpha_{ty}u_t^y = \beta_{tg}e_t^g + e_t^t \quad (4)$$

$$u_t^{g,CA} \equiv u_t^g - \alpha_{gy}u_t^y = \beta_{gt}e_t^t + e_t^g \quad (5)$$

which are linear combinations of the two structural fiscal policy shocks. The estimate of  $e_t^t$  and  $e_t^g$  can be obtained by orthogonalization, i.e. by assuming  $\beta_{gt} = 0$  or  $\beta_{tg} = 0$ ; since the correlation between  $u_t^{t,CA}$  and  $u_t^{g,CA}$  is typically very low, the actual ordering does not matter; as a benchmark, I will use the first orthogonalization.

The two structural shocks thus estimated are orthogonal to the other structural shocks of the economy, hence they can be used as instruments in the remaining equations: thus, one can estimate the GDP equation  $u_t^y = \gamma_{yt}u_t^t + \gamma_{yg}u_t^g + e_t^y$ , using  $e_t^g$  and  $e_t^t$  as instruments for  $u_t^t$  and  $u_t^g$ .

Once the structural shocks are identified, one can estimate the impulse response to, say, a government spending shock by feeding the latter into the estimated dynamic system.

### 3.3 Applications

Thus, there are two key elements in this approach: the availability of external estimates of the automatic responses of fiscal policy variables to other endogenous variables, like output, inflation and the interest rate (and, in developing countries, probably to other variables like commodity prices); and the availability of quarterly data, to ensure that the second component (the systematic discretionary component) is absent from the estimated reduced form residuals. Note also that the fiscal policy data ideally should cover the general government, and perhaps even the non-financial public sector, especially in developing countries where the employment and investment policies of public enterprises are often close substitutes of the same policies by the general government. All these elements are typically absent in developing countries, and this is a fundamental obstacle to applying this method soundly to these countries. In addition, in these countries often quarterly data are in reality interpolated from annual data, making them virtually unusable for this purpose.

These features are often not well understood in attempts to apply this methodology to developing countries. In their application to Argentina, Rezk et al. (2006) derive the government spending and tax shocks from a Choleski decomposition in which government spending is ordered first and taxation second. Formally, this methodology is equivalent

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<sup>3</sup>Importantly, these values of the elasticities of government revenues and transfers are not estimated, but computed from institutional information on statutory tax brackets, the distribution of taxpayers by income classes, the statutory unemployment benefit, etc.

to assuming that both government spending and, more seriously, tax revenues do not respond contemporaneously to *any* innovation in the economy - clearly a counterfactual assumption.

Many studies resort to the use of Granger causality as a substitute for a careful identification. It is instead well known that Granger causality is a purely statistical definition, that has little to do with our notion of causality in an economically meaningful sense.

Virtually all of these studies use annual data; this is a problem because with annual data one cannot exclude that the estimated innovation in government spending is contaminated by a discretionary response of policymakers to other innovations in the economy (the second component above). For instance, a finding that a shock to a government spending component has a negative effect on output might simply capture the fact that, when there is a negative output shock, the policymaker increases government spending as a countercyclical measure.

Others (like M' Amanja, Lloyd and Morrissey (2007) on Kenya) do not make any attempt to identify the structural shocks, thus identifying shocks that are likely to be contaminated by all other shocks to the economy. The consequences of all this can be best explained by looking at the results of M' Amanja and Morrissey (2006), still on Kenya. Both in a static, cointegrating regression with GDP growth as the dependent variable and in a dynamic regression of GDP growth on lagged fiscal policy variables, they find a positive coefficient on the tax revenue variable: far from being surprising, this is indeed most likely the result of reverse causation: when there is a positive shock to GDP, tax revenues increase (the first component above); no Granger causality analysis can overcome this problem. Similarly, they find a negative coefficient on productive government consumption (education, health and economic services); again, this could easily be explained by reverse causation: when there is a negative GDP shock, the policymaker increases government spending as a countercyclical measure (the second component above).

The importance of an accurate treatment of the joint endogeneity issues can be gathered by recent work on the effects of fiscal policy on the current account and the real exchange rate. Using the SVAR approach described above, Monacelli and Perotti (2007) find that, on a sample of four OECD countries (the US, the UK, Canada and Australia), a shock to government spending or the deficit tends to lower the current account surplus (consistent with many existing models) and to depreciate the real exchange rate (which can be rationalized only if international capital markets are not perfect). Using a VAR with a different identification scheme, however, Kim and Roubini (2005) find the opposite effect of a shock to the budget deficit on the current account surplus ("the twin deficits" hypothesis). The reason for this difference can be traced back entirely to differences in the identification scheme and the definition of the variables. Kim and Roubini (2005) define the budget deficit and the current account surplus as shares of GDP; and they use a Choleski decomposition in which GDP comes first and the budget deficit second: this

imposes by construction the restriction that a shock to government consumption has zero effect on GDP contemporaneously, although government consumption is part of GDP. However, a shock to GDP is allowed to affect the deficit. Intuitively, suppose there is a negative realization of the GDP shock: the deficit/GDP ratio increases both because the denominator falls, and because at the numerator tax revenues fall. This creates a spurious negative correlation between the deficit and the GDP innovations; but, as GDP falls, the trade balance improves, hence this also creates a spurious positive correlation between the deficit and the trade balance innovations.

### 3.4 Controversies

One should also be aware that the SVAR methodology illustrated so far is itself by no means uncontroversial. One important problem is that the fiscal shocks identified by the econometrician might not be entirely unanticipated by the private sector: exactly because, with quarterly data, it takes time to implement discretionary changes in fiscal policy, by the same token one can argue that these changes are known well before being implemented. This would imply that the observed innovations in fiscal policy in reality include an anticipated component, and the resulting impulse responses would be biased.

To see what this could imply, note that VARs on the US data typically find a positive effects of a shock to government spending on GDP and private consumption; this neo-keynesian result is at odds with the standard neoclassical model, where typically an increase in government spending causes a decline in private consumption because of the negative wealth effect it causes. However, it is easy to show that in the neoclassical model an increase in private consumption is the result one should expect in response to an *anticipated* government spending shock.

An alternative approach to the estimation of the effects of fiscal policy, due initially to Ramey and Shapiro (1997) and developed by Edelberg, Eichenbaum and Fisher (1999), consists in tracing the dynamic effects of a shock to dummy variables capturing the onset of a few episodes of military buildups, that can plausibly be thought of as exogenous to GDP and unanticipated by the private sector (the Korean War, the Vietnam military buildup, and the Carter - Reagan buildup). Under this approach, the response of private consumption to a fiscal policy shock is typically found to be negative. However, Perotti (2007a) argues that, when properly implemented, this approach delivers responses that are qualitatively similar to those of the SVAR approach (but see Ramey (2007) for an opposite view).

It is fair to say that very little of this debate has trickled down to time series studies of fiscal policy in developing countries. Yet, as we have seen, without a sound grasp of these problems of identification it is not clear what to make of a finding that an increase of government spending by  $x$  percent reduces private investment by  $z$  percent.

To all this, one should add that typically fiscal policy is much more volatile in develop-

ing countries, with sometimes very large changes around, for instance, sudden stops; that the available time series are much shorter; and that in periods of high inflation and large changes in relative prices deflating government spending is problematic. When all these problems are compounded, one should exercise an unusual amount of care in interpreting the time series studies of fiscal policy in developing countries. And, unfortunately, it is not clear how much progress can be made in the near future.

## 4 Estimating the long-run effects of fiscal policy and the returns to public infrastructure

I now consider estimates of the long-run effects of fiscal policy. These effects are relevant in particular in the case of public infrastructure<sup>4</sup>, and more generally of public investment in an economic sense (as opposed to a national account sense, hence possibly including items like investment in education etc.).

### 4.1 Production and cost function estimates, and growth regressions

The natural approach to estimating the long-run effects of government spending consists in estimating production functions or cost functions, via time series, panel or cross-section methods. In fact, the high rates of return to public infrastructure and education spending typically (but not always) estimated by this literature have been used extensively to motivate the call for more "fiscal space" and more spending on infrastructure and education.

In a seminal contribution on US annual data, Aschauer [1989] calculated that, holding constant private inputs, private GDP would increase permanently by more than one to one for every additional unit of non-defense public capital - in other words, that the annual marginal product of public capital is in excess of 100 percent. Aschauer's results were based on a static production function estimated with yearly US data in levels. Subsequent research estimating production functions using pooled US state data in levels (Munnell [1990]), disaggregating public capital into its main components (Finn [1993]), or using industry data (Fernald [1993]) also found similar effects, particularly for roads and highway capital. Time series estimates in levels might simply capture common trends; pooled state data in levels might simply capture underlying persistent state characteristics - richer states invest more in public capital. In fact, when the production function is estimated with aggregate US data in differences, or with state data with fixed effects, zero or even

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<sup>4</sup>In theory, public infrastructure can affect growth and, ultimately, welfare via a large number of potential channels: see Agénor and Moreno-Dodson (2006) and Romp and DeHaan (2007) for a recent review. Estache (2004) provides a very useful survey of the main policy issues concerning public infrastructure.

negative marginal products of public capital become typical (see Tatom [1991] and Hulten and Schwab [1991] for estimates in differences; Evans and Karras [1994], Hotz-Eakin [1994], Garcia-Milà, McGuire, and Porter [1996] for estimates with fixed effects).

A well known limitation of the production function approach is the joint endogeneity of private inputs and outputs. Besides using instruments of dubious validity in estimating production functions, a frequent response has been to use a cost function approach, which takes as given private input prices instead of quantities (for the US, see for example Nadiri and Mamouneas [1994] and Morrison and Schwartz [1996]). This is hardly a solution, though: at the typical level of aggregation of these studies (US states or industries) private input prices are also likely to be jointly determined with input and output quantities (see Houghwout [2002]).

Applications of these approaches to individual developing countries are rare: Albala-Bertrand and Mamaitzakis (2007) estimate a cost function using disaggregated data on different types of public capital in Chile; Albala-Bertrand and Mamaitzakis (2004) use the same Chilean data to estimate a production function. But it is certainly fair to say that they are not very common. More common for developing countries have been cross-section or panel data estimates of production functions, regressing GDP on private capital and public capital, often disaggregated by type: good examples are Canning and Bennathan (2000) and Calderón and Servén (2003). These are based on a careful reconstruction of different types of public capital stocks in a number of countries at all levels of income.

Cross section or panel production function regressions are similar in nature to growth regressions with public infrastructure on the right hand side<sup>5</sup>, pioneered by Easterly and Rebelo (1993), who found large positive effects of public infrastructure on growth, and by Devarajan, Swaroop and Zou (1996), who instead found weaker effects.<sup>6</sup>

Thus, whether cost functions, or production functions, or standard growth regressions, these all suffer from the same well-known problems of growth regressions, as reviewed for instance in Temple (1999), Durlauf, Johnson and Temple (2004) and Easterly (2004): among others, parameter heterogeneity, sensitivity to outliers, and model uncertainty. But for our specific purposes the most important problem, which is also shared by simple time-series estimates of production and cost functions for individual countries, is the endogeneity of public investment: in country-periods where growth is "unusually" high given the values of the right hand side variables, it is plausible to think that the policymakers will have the resources to spend more on public infrastructure projects (a positive correlation between the residual and the regressor); and in some country-periods with unusually low rates of growth, it is plausible to think that policymakers might spend more on infrastructure in an attempt to raise growth (a negative correlation). This problem can

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<sup>5</sup>The key difference is that the production function approach may impose some restrictions across the coefficients of the factors of the production function.

<sup>6</sup>Subsequent contributions are reviewed by Romp and de Haan (2005) and Briceño-Garmenda, Estache, and Shafik (2004), who also conclude that this particular literature is inconclusive.

be solved if one can find plausible instruments: but such instruments are exceedingly rare in the context of growth theory. For instance, typical instruments for the stock of public infrastructure capital are demographic variables like population density and urbanization (see e.g. Canning (1998) and Calderón and Servén (2004)): yet, it is difficult to argue that, over long periods of time, they are exogenous to growth.

Modelling explicitly the political-economy process driving public infrastructure investment is an alternative way to finding adequate instruments. The underlying assumption is that the politico-economic determinants of public investment affects growth only through the latter, but not directly. Cadot, Röller and Stephan (2006) apply this approach to a panel of French regions, and Kemmerling and Stephan (2002) to a panel of German cities; they find indeed evidence that regional public investment in transportation infrastructure is driven by regional lobbying power and not by the objective to maximize the economic returns to infrastructure; however because public investment is a small share of public capital, they also find that eliminating this source of bias does not alter much the OLS estimate of the social returns to public transportation infrastructure. However, this is hardly surprising because public investment is a minimal fraction of public capital. Note also that this approach does not address an alternative potential source of bias, that of regions experiencing higher growth spending more on infrastructure.<sup>7</sup>

## 4.2 Vector Autoregressions

As we have seen, in principle a Vector Autoregression approach can address these reverse causality problems, and can be used to estimate the long-run effects of shocks to government spending, in particular public investment. Kamps [2004] lists 20 VAR studies of the effects of public investment in OECD countries. With few exceptions, however, these studies use annual data, thereby making it difficult to separate true exogenous shocks to public investment from the endogenous response of public investment to other macroeconomic shocks. Quarterly data are used by Otto and Voss [1996], Voss [2002], Kamps [2004], Mittnik and Neumann [2001], Perotti (2007b), and Creel, Monperrus-Véroni and Saraceno (2007). Using this methodology, Perotti (2007b) finds that in four OECD countries for which the data are available (the US, the UK, Canada and Australia), there is little evidence that a shock to public investment raises GDP in the long run.

A potential problem with this approach when used to estimate the effects of public investment is that impulse responses at very long horizons are likely to have large standard errors. A second possible problem is that decision lags for public investment projects are likely to be longer than for government consumption; hence, the problem of predictability

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<sup>7</sup>Note that country, state or region fixed effects in yearly panel regressions would not take care of the problem. While they partial out persistent state specific determinants of public capital, they do nothing against endogeneity arising from countries (states, regions) states spending systematically more (or less) when GDP or growth are high.

of the estimated SVAR shocks is likely to be more serious. For these reasons, attempts at using VAR and other time series methodologies to estimate the effects of public investment and infrastructure should be interpreted with caution, particularly given the data limitations that are common in developing countries.

In addition, a candid analysis of the few existing studies on developing countries suggests that the standards used seem to be more lax than for the rest of the literature. Some of these studies (like Perkins, Fedderke and Luiz (2005) on public investment in South Africa) rely exclusively on cointegration analysis, which essentially reduces to a static regression of growth on government investment and other variables; besides suffering from other problems, in itself it cannot say anything on the direction of causality.

A widely cited study on the effects of infrastructure investment in Brazil, Ferreira and Araújo (2005), uses mostly cointegration analysis to infer a pattern of causality from infrastructure investment to growth. In a one page section the authors present results from the estimation of a VAR with a cointegration constraint imposed, and with a Choleski ordering to estimate the structural shocks. The impulse responses show that, in response to an initial shock to investment infrastructure by 1 percent of GDP, GDP itself increases in the long run by 10 percent. This is a seemingly staggering number, which should by itself warn against the soundness of the approach. Unfortunately no standard errors are provided.<sup>8</sup>

## 5 Optimal fiscal policy under constraints

Knowing the effects of fiscal policy is a precondition to study its optimality. This notion of optimality is obviously a constrained one. The first constraint is obvious: the intertemporal government budget. But there are potentially more: roughly speaking, we can group them under the headings of credit market imperfections and of political constraints. The remainder of this paper can be seen as a discussion of the effects of these constraints on the optimal fiscal policy. Let us start from the one constraint that is certainly always there: the government budget constraint.

### 5.1 Solvency and sustainability: definitions and tests

An important concern for international organizations is if the current fiscal stance is in some sense "appropriate" from a long-term perspective. The concept of sustainability is a useful tool for this assessment. It is important to distinguish between the notions of solvency and sustainability.

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<sup>8</sup>Indeed, the absence of standard errors is another common feature of several of these studies.

## 5.2 Sustainability: tests and measures of gap

Assuming for simplicity a constant interest rate<sup>9</sup> one can write the flow government budget constraint as:

$$B_t = (1 + r)B_{t-1} - (T_t - G_t) \quad (6)$$

Solving forward

$$B_t = \sum_{j=1}^{\infty} (1 + r)^{-j} (T_{t+j} - G_{t+j}) + \lim_{J \rightarrow \infty} (1 + r)^{-J} B_{t+J} \quad (7)$$

The government is **solvent** if the limit on the rhs is non positive: in this case, the government is not allowed to run a Ponzi scheme, i.e. to roll over debt forever. In other words, the government is solvent if the present discounted value of the flow of all revenues is enough to cover the value of outstanding debt plus the present discounted value of all spending. Fiscal policy is **sustainable** when, given the historical data generating process for spending and revenues, the solvency condition is satisfied.

The difference between the present discounted value of the surplus and the current debt (or net debt, if there are positive government assets) is sometimes called the "government net worth". If initially this difference is positive (i.e., if  $\lim_{J \rightarrow \infty} (1 + r)^{-J} B_{t+J} < 0$ ), a given change in fiscal policy could change the government net worth without affecting sustainability. Note, however, that a rational government in general will not want to have a negative limit: hence, the no-Ponzi scheme condition plus rationality by the government will imply that, in expectations, the initial debt is equal to the present discounted value of primary surpluses.

A large literature studies the construction of appropriate solvency tests. However, I will argue that this literature is more appropriately (and more usefully) testing sustainability. In essence, solvency tests are tests of the limit on the rhs being no greater than 0 (the no Ponzi game condition). There are several variants of this test, reviewed for instance in Chalk and Hemming (2000). A typical such test tests the existence of cointegration between revenues and spending, which is a sufficient condition for solvency.

The statistical shortcomings of such tests are well known, including their low power and their sensitivity to the existence or lack thereof of a unit root in debt and the surplus. But there is a more fundamental issue if these are interpreted as tests of **solvency**. Any theoretical model implies that the IGBC is satisfied ex ante: if the no-Ponzi condition were violated the private sector would not be optimizing (assuming the existence of infinitely lived agents, or, equivalently, that finitely lived agents are linked via intergenerational altruism). As a consequence, the fact that solvency is not satisfied given the historical data generating process simply implies that some adjustment will be needed in the future;

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<sup>9</sup>Also for simplicity, I assume 0 inflation, hence no distinction between the real and nominal interest rate.



such adjustment is presumably taken into account by the private sector.

These tests are more useful if interpreted as tests of **sustainability**. Calculating the difference over a medium-term horizon (say 5 to 10 years) between the sum of initial liabilities and the present discounted value (PDV) of spending on one hand, and the PDV of revenues on the other, given the historical generating processes, is useful in that it can provide an idea of the adjustment needed, in PDV terms, for the IGBC to be satisfied: the “intertemporal budget constraint gap”.<sup>10</sup>

This is conceptually very similar to a frequently used measure of sustainability, the Blanchard measure. From (6) written in terms of shares of GDP (and assuming for simplicity a constant growth rate of GDP  $\gamma$ )

$$b_t = \frac{1+r}{1+\gamma} b_{t-1} - (t_t - g_t) \quad (8)$$

in steady state one has

$$s^* = (r - \gamma)b^* \quad (9)$$

where  $s^*$  is the long-run surplus that stabilizes debt at some predefined level  $b^*$  (which could be the current level). If one instead writes this equality as

$$b^* = \frac{s^*}{r - \gamma} \quad (10)$$

it can be interpreted as providing the steady-state level of debt consistent with a certain long-run value of the surplus.

Strictly speaking, if solvency is satisfied, it is not clear why one should worry about sustainability. Presumably the real value of sustainability tests is that solvency is an elusive concept, and can always invoke solvency by appealing to some change in spending or taxation far into the future. But markets are not interested in the distant future, and for them sustainability is an important element of information.

### 5.3 The role of uncertainty

However, as remarked by Mendoza and Oviedo (2004), the important shortcoming of this measure is that it does not take into account the uncertainty surrounding future revenues and spending. Suppose a government is extremely averse to reducing spending below a certain level  $g_{\min}$ ; suppose also that in time of crisis revenues drop to a minimum of

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<sup>10</sup>The same notion can be applied to changes. Calderon and Servén (2003) estimate that in Latin American countries, especially those with high debts, cutting public investment had only a small positive impact on government next worth. Instead, on a sample of four OECD countries, and using a SVAR methodology, Perotti (2007b) finds that the positive impact on government net worth of a cut in public investment is been large,

$t_{\min}$ ; then the “Natural Debt Limit” is the maximum level of debt that the government can service even if there is a permanent state of fiscal crisis: in other words, a very risk averse government would not want to borrow more than the NDL. It is given by the growth adjusted annuity value of the surplus in a state of fiscal crisis.

$$b_{NDL} = \frac{t_{\min} - g_{\min}}{r - \gamma} \quad (11)$$

If uncertainty on tax revenues is modeled as a Markov process with  $t_{\min}$  set at, say, two standard deviations below the mean, clearly of two countries with the same  $g_{\min}$  and the same average tax rate, the one with the higher variance will also have the lower NDL; in contrast, for the Blanchard measure there is no difference between the two. In addition, in general the Blanchard measure will indicate as sustainable a debt level that is above the NDL according to this method.

Consideration of uncertainty also modifies all the tests reviewed so far. As Bohn (1995) shows, in the presence of uncertainty (and if individuals are not risk neutral) the correct discount factor to be used in evaluating the PDV of future surpluses is not the real interest rate on public debt, but the ratio of marginal utilities of consumption at different horizons. This result in the presence of a covariance term between the marginal rate of substitution in consumption and the surplus, which implies that, for the same sequence of primary balances, the one which is countercyclical (i.e., exhibits a positive correlation between the marginal utility of consumption and the primary balance, or a procyclical fiscal policy) can borrow more and still maintain fiscal solvency - a counterintuitive result. Bohn (1995) shows that ignoring uncertainty can lead to serious mistakes,. For instance, in a model with i.i.d. output growth and a balanced growth, if the debt ratio is constant and the rate of growth of GDP is higher than the real interest rate, the standard solvency condition would be violated, and yet the correct solvency condition under uncertainty would be satisfied.

Bohn (2005) shows that this reasoning leads to a new test of sustainability: in a regression of the primary balance on debt, holding constant other factors, the coefficient on debt must be positive. Mendoza and Ostry (2007) find that, in a sample of 34 developing countries and 21 industrial countries, most countries satisfy display a positive coefficient on debt, and conclude that fiscal solvency is not a problem. However, they also find that: (i) developing countries have on average a higher coefficient on debt - a result that does not necessarily imply "more sustainable" fiscal policies, but may simply indicate limited access to international financial markets, which would be consistent with the procyclical nature of fiscal policy. (ii) developing countries with higher debt level have an insignificant coefficient on debt, indicating that indeed this group of countries might face problems of sustainability.

## 5.4 Sustainability analysis in practice

Chalk and Hemming (2000) and IMF (2003a) provide a useful description of the typical sustainability analysis carried out by the IMF. Its core is a five year projection of the evolution of debt (partly based on the national authorities's programs), providing something akin to the "intertemporal budget constraint gap", i.e. an indication of the adjustment needed in PDV terms. A by-product of this process is an evaluation of the debt level at the end of the horizon: if it is higher than at the beginning, typically an alternative adjustment scenario is called for to ensure stable debt. Clearly this is in the spirit of the Blanchard measure, because it indicates that the projected fiscal stance does not generate a stable debt.

Other, less common, stages in the analysis of sustainability include: (i) a sensitivity analysis (or "stress test"), obtained by shocking a few variables driving the primary balance by two standard deviations, thus providing an assessment of a worst case scenario; and, less widespread;<sup>11</sup> (ii) a stochastic simulation approach, where an explicit probability function of the possible debt outcomes is computed; (iii) a scenario analysis, with less extreme assumptions about the driving processes.

There is clearly a trade-off between the simplicity of a stress test and the need to take into account a more realistic pattern of shocks. In a scenario analysis, a model is used to draw constellations of the variables involved in a more detailed version of (6) from a set of primitive shocks; in a stress test, extreme values of a few variables (some of which may be endogenous) are drawn. A scenario analysis is obviously more refined in principle, but the simplicity of a stress test has much to recommend itself.

Related to this analysis is the use of "debt thresholds" in the IMF and World Bank analyses: the results above by Mendoza and Ostry (2007) on the group of high debt developing countries provide a justification for this. In fact, after the financial crises of the nineties there has been a widespread interest in a system of early warnings, i.e. a threshold level of debt above which default becomes likely. An obvious candidate is a logit model of debt default, as a function of various macro determinants: Manasse, Roubini and Schinn (2003) provide such analysis. A less sophisticated, but perhaps more practical, alternative warning system is simply a growing debt level from the first stage of the typical sustainability analysis below: whenever debt is projected to increase, a warning is flagged.

## 5.5 Fiscal and macroeconomic space

### 5.5.1 Fiscal space

The intertemporal government budget constraint and the notion of sustainability are important, if obvious, starting points to think about optimal fiscal policy. In recent

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<sup>11</sup>IMF (2003) shows that a simultaneous shock of two standard deviations to the main macro variables is well within the bounds of what happened during the main financial crises of the nineties.

years, in the internal debate of international organizations different notions have come to the forefront, which to close scrutiny are very close to the concept of the intertemporal government budget constraint, but have confused rather than helped the debate: the notions of fiscal space and macroeconomic space.

In the aftermaths of the financial crises of the late 1990s, with all their fiscal policy consequences, a debate started on the perceived constraints on fiscal policy: many developing countries were perceived as sacrificing their long run growth potentials in order to show some sign of fiscal discipline. As we discuss later, the fiscal discipline that the market and international organizations demanded, and that later many of these countries themselves pursued willingly, could be ascribed to various (not all independent) reasons: fears of unsustainability, credit constraints, precautionary savings, etc. But there was a strong pressure on international organizations to help relax these constraints, and to provide a framework for thinking about the issue. Hence the concept of "fiscal space".

In one of the rare definitions, fiscal space is defined as "the availability of budgetary room that allows a government to provide resources for a desired purpose without any prejudice to the sustainability of a government's financial position." (Heller (2005), p.3). "Usually, the idea is that in creating fiscal space, additional resources can be made available for some form of meritorious government spending (or tax reduction)." (Heller (2005), p. 3).

These two passages illustrate well the two key features of the notion of "fiscal space". First, the notion is essentially a restatement of the intertemporal government budget constraint, and perhaps of the notion of sustainability. We certainly know that in order to increase some type of government spending now we need either to reduce other types of spending now or in the future, or increase current or future revenues (including seigniorage or foreign aid) - or inflate away existing nominal debt. Note also that, contrary to some interpretations, the notion of fiscal space is perfectly consistent with the idea of increasing debt today: in fact, it requires that higher deficits today be compensated by higher surpluses or lower deficits in the future. All this assuming, of course, that one knows how to measure the sustainability of public finances (on which more later).

The second feature of the notion of fiscal space also seems to be rather obvious: if one type of spending has a higher social marginal value than another and the same cost, resources should be moved from the second to the first. In the end, it all boils down to making an assessment of the economic effects of different types of fiscal policy, and of their impact on social welfare. But this was the problem all along.

### **5.5.2 Growth and distributional objectives**

"Social marginal value" can refer to several objectives, from distribution to growth. Often the notion of fiscal space is further specialized to refer to the creation of resources for growth-enhancing spending: "The incentive for creating fiscal space is strengthened where

the resulting fiscal outlays would boost medium-term growth and perhaps even pay for itself in terms of future fiscal revenue”; or [fiscal space] “can be seen to refer to constraints to public expenditure which have the potential to raise productivity and yield returns in the future or which would serve to achieve social goals (such as the MDGs).” Note that, in this refinement of the notion, the distributional aspects of government spending do not play any role.

The potential confusion between the growth and distributional aspects of fiscal policy, both of which have right of citizenship a priori in the notion of fiscal space, can be seen when one tries to operationalize this notion, as in a World Bank Report on fiscal policy in Ecuador defines fiscal space: “Fiscal space is the sum of resources available to finance the current-both non-wage and non-pension-primary expenditure required by individual programs and investment projects associated with the PRS. This is an intermediate definition of fiscal space between two extremes. A stricter definition would restrict it to investment spending, but this would exclude goods and services required to implement it, e.g. on basic infrastructure maintenance (roads). Alternatively, an extended definition would include wage and benefits, especially outlays associated to human capital formation (like teachers’ salaries and pensions). However, this would associate pension increases to pro-poor spending (which is not the case, even when restricted to the social sectors).” (World Bank (2004a), p. 47). It is hard to understand what is the rationale behind this definition. It seems to state that the “meritorious” spending for which one needs to generate “fiscal space” is public investment plus maintenance spending, and possibly all pro-poor spending that is associated with human capital formation. There is nothing wrong with this (although here the aggregate and distributive aspects of fiscal policy appear to be mixed together); but, once again, what it really seems to say is that Ecuador should spend more on infrastructure. In this instance, the forced use of the concept of fiscal space and the complications it introduces are decidedly unhelpful.

### 5.5.3 Macroeconomic space

A further source of confusion is that between "fiscal" and "macroeconomic" space. “‘Macroeconomic space’ exists when a government can increase expenditure without impairing macroeconomic stability. Since both solvency and stability must be safeguarded for long term growth, a government can undertake additional public expenditure when there is both fiscal and macroeconomic space”. Here too the expression is perhaps useful as a communication tool; but the relation between fiscal policy and macroeconomic stability (loosely defined) has always been at the forefront of the debate on the effects of fiscal policy in developing countries; for instance, the issue has played perhaps the key role in the debate on the 1997 crises, and the notion of macroeconomic space does not seem to add anything to it.

But when the two notions of space become mixed, then their use becomes needlessly

confusing, as in the following passage: “What is fiscal space? It can be defined as room in a government’s budget that allows it to provide resources for a desired purpose *without jeopardizing the sustainability of its financial position or the stability of the economy*” (italics added).

To sum up, the notions of fiscal space and macroeconomic space often suffer from loose definitions, and as such can be a source of confusion; when correctly defined, they do not appear to be particularly insightful.

## 6 Stabilization vs. growth

We can now go back to the key question of the optimal fiscal policy under constraints, and introduce more constraints. We have seen the role of the most obvious constraint, the intertemporal government budget constraint. Now we introduce other constraints, which for convenience can be grouped under the headings of credit constraints and political constraints.

It is frequently asserted that fiscal policy tends to be procyclical in developing countries, thus failing to support the economy exactly when it is needed most; it is also frequently asserted that "particularly in times of crises, too little attention is devoted to the growth function of fiscal policy", a statement that sometimes translates into the notion that "expenditure on public infrastructure and education is all too often sacrificed in times of crises". In this section, I will consider the available evidence and possible explanations. We will see that the explanations hinge mostly on credit and political constraints.

### 6.1 The cyclical behavior of fiscal policy: the facts

Several papers have studied the cyclical behavior of fiscal policy in OECD and developing countries. Some of the more widely accepted conclusions are (see e.g. Kaminsky et al. (2004) and Gavin and Perotti (1997)):

1) fiscal policy is typically procyclical in developing countries, namely the budget deficit is positively correlated with measures of economic activity like the output gap; in contrast, a zero or negative correlation is typically found in OECD countries;

2) these patterns of correlation of the deficit are due mostly to government spending, although, because we do not have information on tax rates (except inflation) in developing countries, it is not possible to assess soundly the cyclical properties of tax rates

3) the positive correlation of the output gap on one hand and the deficit or spending on the other is particularly pronounced during downturns;

4) both public investment and social spending (and particularly the more targeted programs) fall as a percentage of GDP during downturns (see De Ferranti et al. (2000)).

The cyclical behavior of fiscal policy is typically estimated via a regression of the type

$$g_t = \alpha y_t + \beta \bar{Z}_t + \varepsilon_t$$

where  $g$  is government spending,  $y$  is output, and  $\bar{Z}$  is a vector of other controls. When this equation is estimated via OLS, as mentioned above  $\alpha$  is typically found to be positive (a procyclical fiscal policy) in developing countries, and negative in industrialized countries. As Rigobon (2004) argues, this might simply reflect the fact that developing and industrialized countries are subject to different shocks. The obvious solution is to use instruments. The problem, as it is often the case, and as has been emphasized all along, is that good instruments are hard to find. Several studies (including most of those that do find a difference between industrialized and developing countries) use internal instruments, like lagged variables, with all the usual problems. Galí and Perotti (2003), on a sample of industrialized countries, use the GDP of trading partners; Rigobon (2004) uses the terms of trade, and finds that the corresponding IV estimates of  $\alpha$  do not vary systematically between industrialized and developing countries. He concludes that the finding of a different cyclical behavior of fiscal policy in developing and industrialized countries is just a consequence of the different shocks to which they are subject. A similar argument is made by Gopinath (2004). Clearly, this issue needs to be studied further.

## 6.2 Optimal fiscal policy over the business cycle

To study the optimal cyclical behavior of fiscal policy, it is important to be clear about the underlying assumptions. It is often the case that participants in the debate have different models and assumptions in mind, with different implications, when they discuss the issue.

Consider first the benchmark case of a world that is subject to some shock to income. Individuals and firms cannot insure: they can have at most access to a safe asset. Suppose also initially that utility is quadratic, hence there is no scope for "precautionary savings".

Depending on the interactions between various types of financial constraints and the assumptions about the effects of fiscal policy, one can obtain theories of optimal countercyclical but also of optimal procyclical fiscal policy.<sup>12</sup> Beyond the technicalities, these theories are essentially revisitations of the standard notions of the demand effects and the crowding out effects of fiscal policy. If fiscal policy mainly has demand effects, and shifts out the demand for goods, then clearly there is a role for a countercyclical fiscal policy during recessions, when individuals or firms are credit constrained. If instead fiscal policy

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<sup>12</sup>A note on the terminology: as emphasized by Kaminsky, Reinhart and Végh (2004), the notion of counter- and pro-cyclical fiscal policy is subject to some ambiguity because budget outcomes are typically expressed as shares of GDP. In times of high growth, the budget surplus as a share of GDP could fall even if in absolute terms it increases. What is relevant for our purposes is the absolute amount, which captures the contribution of fiscal policy to aggregate demand. .

mainly has a negative wealth effect on labor supply, and a crowding out effect on private investment, then there is a role for procyclical fiscal policy.

### 6.2.1 Optimal countercyclical fiscal policy

1) Suppose first that **all credit markets are perfect** for all agents, i.e. that individuals, firms and the government have access to the safe asset, hence they can do consumption smoothing. If taxation is distortionary, and assuming a constant flow of expenditure, a countercyclical deficit is an implication of Barro's tax smoothing model. To minimize lifetime distortions, the tax *rates* should be smoothed over time; this implies procyclical tax *revenues* (with constant tax rates, revenues fall in a recession and increase in an expansion), and countercyclical deficits.

2) Now suppose that **individuals are credit constrained**, i.e. they do not have access to a riskless asset, and as a consequence they cannot optimally smooth consumption. It is then optimal for government spending to be countercyclical to help smooth individual consumption, either by reducing tax rates in a recession or by increasing government spending (if the latter has a positive effect on the disposable income of individuals, because of demand effects of fiscal policy).

3) Now suppose that **firms are credit constrained**, as in Aghion, Angeletos, Banerjee and Manova (2006). Then a similar argument to 2) suggests that fiscal policy should be countercyclical. In a recession, firms' profits fall, and so does their capacity to borrow if there are credit market imperfections (for instance, if the amount firms can borrow is a function of current profits). The firms' ability to finance "innovative investment" also falls, thus exacerbating the effects of the negative shock. As a consequence, a countercyclical fiscal policy has a positive effect on productivity growth. It is then optimal for the government to conduct a countercyclical fiscal policy, for instance by increasing government spending that shifts out the goods' demand for these firms, or by subsidizing "innovative investment" directly. Note that in the last two models, the optimal degree of countercyclicity of fiscal policy is a positive function of the degree of imperfection of the financial system.

Note that these motivations for a countercyclical fiscal policy are conceptually very different from the "self-financed growth" argument of Gourinchas and Jeanne (2006) or Prasad, Rajan and Subramanian (2006). Empirically, and contrary to the prediction of a standard neoclassical model with perfect credit markets subject to productivity shocks, in developing countries there is a positive association between the current account and growth. The explanation advanced by these papers is that, because of internal credit market imperfections, a positive productivity shock causes private investment but especially private savings to increase, and the current account to improve. But this does not imply that fiscal policy should be countercyclical, i.e. that the government budget should be positively associated with growth.



## 6.2.2 Optimal procyclical fiscal policy

However, there are also theories of optimal procyclicality of fiscal policy, also relying on some form of imperfection in credit markets.

1) The first one, by Caballero and Krishnamurty (1999) and Caballero and Krishnamurty (2000), is based on the **interaction between domestic and international credit constraints**. In a financial crisis, the supply of international credit becomes vertical. Distressed firms have no direct access to international financial markets, and must rely on domestic investors. In a crisis, the financing needs of distressed firms become larger than their pledgeable resources, hence a fire sale of domestic assets ensues. If firms in distress cannot pledge their assets to domestic investors, there is less incentives for the latter to accumulate international liquidity. This means more frequent fire sales of assets, and more severe recessions in case of drying up of international funds to a country. The problem is that financial markets do not reallocate resources well to the distressed sectors; as a consequence, procyclical fiscal policy can be optimal: it is unlikely that government spending is the optimal place to allocate the marginal dollar. The government should reduce the deficit to free up resources to allocate to distressed firms, particularly if the government is no better placed than private investors to borrow abroad. This also implies that the procyclical adjustment of fiscal policy should mainly be done on the spending side, rather than on the tax side.

2) The crowding out effect of government deficit during a crisis is amplified by two more factors. The decline in domestic private investment reduces the liquidity of the country's assets; second, the lack of fiscal discipline also prompts international investors to revise their valuation of the country's assets. For both reasons, the liquidity premium increases further and the availability of external funding falls (Caballero and Krishnamurty (2004)). The implication is that in developing countries the crowding out of private investment is more severe during crises, for which they present some supporting evidence: it is thus optimal for fiscal policy to be procyclical, and the more so during crises, and the less developed financial markets are. IMF (2003a) finds that, by several measures, some fiscal expansion was appropriate in most of the countries that experienced a crisis, but was not undertaken to avoid consequences on market confidence.

3) Blanchard (2007) explores the interaction of current account deficits, sudden stops, fiscal policy and financial imperfections. Suppose there is a current account deficit, and a positive probability that the country will be shut off from the world financial markets. If this happens, the real exchange rate must depreciate to close the current account deficit. But suppose that after a long period of low profits, because of financial imperfections the tradable sector does not have the funds to expand:<sup>13</sup> then there is a role for fiscal policy: government spending on nontradables should fall in order to allow for an expansion of the tradables sector; but also government spending on tradables should increase (with

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<sup>13</sup>Caballero and Lorenzoni (2006) present a microfoundation of this mechanism.

infinitely elastic demand for tradables, a reduction in government spending on tradables does not reduce the demand for tradables, but it reduces wealth and therefore increases labor supply and the production of tradables). Overall, fiscal policy can be procyclical or countercyclical, and may not reduce the current account deficit initially.

The assumption on the financial market imperfection is similar to that of Aghion et al. (2006) above: because of low profits, in a recession firms cannot finance investment. Yet, the conclusions are nearly opposite: what changes is the assumption on fiscal policy: here, it only has a wealth effect; there it shifts the demand for the goods produced by firms, and therefore their profits.

### 6.3 Causes

What are the possible causes of the observed procyclical behavior of fiscal policy in developing countries?

1) The most obvious explanation is **credit constraints at the level of the government**: when the government needs or wants to increase the budget deficit, that's precisely when external credit is likely to dry up (in fact, Kaminsky et al.(2004) show that there is a negative correlation between the budget balance and capital inflows).

2) Several politico-economic reasons have been put forward, from the "voracity effect" of Tornell and Lane (1998) to the "starve the Leviathan" argument of Alesina and Tabellini (2005). The former is essentially a dynamic version of the common pool problem. In the latter, voters cannot observe precisely fiscal policy, in particular the liabilities accumulated by the government. When the economy is booming, to prevent the government from appropriating tax revenues, voters demand more public goods for themselves, imparting a procyclical bias to fiscal policy. The implication is that the procyclicality of fiscal policy should be stronger in more corrupt democracies, a result for which the authors find some empirical support.

3) The "hidden deficit" argument of Burnside et al (2001): although the official government accounts do not present particularly high deficits, the accumulation of contingent liabilities induces a cut in the deficit during sudden stops to make room for the costs of the bailout of the financial system, and other contingent liabilities associated with sudden stops.

## 7 Self-insurance vs. hedging

In a recession, the present discounted value of government revenues falls and that of spending increases: hence, a fiscal policy that was regarded as sustainable before the recession might not be sustainable afterwards: measures must be taken to restore sustainability. The problem is compounded if the government and/or the country face credit

constraints, and if the market is myopic, so that it looks at the flows rather than the whole intertemporal government budget constraint.

For all these reasons, something must be done. Critics of the recent fiscal performance of many developing countries, and of the advice of international organizations in the aftermaths of the financial crises of the late nineties, argue that the fiscal policy that was implemented actually reduced the country's net worth, by cutting productive government spending and thus future growth and revenues. Instead of supporting this strategy, international organizations should have gone against the market, by shifting the focus from the short run to the long run.

But the alternative is self-insurance. Suppose that utility is not quadratic, so that there is scope for precautionary savings. If it is optimal to conduct a countercyclical fiscal policy, and if the reason is the credit constraints on the government during downturns, then the obvious question is: why don't governments self-insure? Even if it cannot borrow, a government can always accumulate assets in an upturn, to be decumulated in a countercyclical fashion in a downturn.<sup>14</sup>

One view is that self-insurance is macroeconomically irrelevant: "It makes no sense for these economies to have to self-insure through large reserve accumulation or stabilization funds. Most individuals would be "underinsured" if they had to leave a million dollars aside for a potential car collision and the liabilities that would follow, rather than buying insurance against such event – countries are no different" (Caballero (2002)). According to this view, the only macroeconomically viable option is to acquire insurance, rather than self-insurance.<sup>15</sup>

However, this argument applies to catastrophic events, such as sudden stops: it is indeed extremely costly to self-insure against such relatively rare and large events. But the procyclicality of fiscal policy in developing countries is not due just to these episodes (see Kaminsky et al. (2004)); hence, self-insurance should be regarded just as a form of precautionary savings against "normal" shocks. The real questions are how much self-insurance one should have, and how to create an institutional set-up that is more conducive to such a self-insurance.

On the first question, the collection of essays in Engel and Meller (1993) presents some results, while Engel and Valdés (2000) discuss sub-optimal but implementable rules for self-insurance under various assumptions. Although these are important contributions, in particular because of their focus on implementable rules, more work is certainly needed on these issues. The second question introduces us to fiscal rules and stabilization funds.

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<sup>14</sup>In recent years, several countries (some of which previously hit by the financial crises of the nineties) have accumulated large foreign reserves, by historical standards. Exactly why they have done so, however, and what is the role of the government budget, is not entirely clear.

<sup>15</sup>The financial instruments for such an insurance are not available yet, and a discussion of how such a market could be created would take us too far (see e.g. Caballero (2002) and Draghi, Giavazzi, and Merton (2003)).

## 8 Stabilization funds and fiscal rules

These have typically a double role: to ensure discipline in fiscal policy, hence to ensure sustainability of public finances; and to avoid a procyclical bias in fiscal policy in the presence of credit constraints. Although these two objectives are perceived to be antithetical (fiscal rules are typically accused of generating more, not less procyclicality), in reality if properly understood they are complementary.

### 8.1 Stabilization funds

Stabilization funds are assets accumulation accounts that use specific proceeds to stabilize government spending over time. As Engel and Valdés (2000) emphasize, a stabilization fund is just part of the optimal design of fiscal policy: if the rest of fiscal policy undoes what the stabilization fund has achieved, there is not benefit from the latter. An example highlights the intuition: if expenditure out of oil wealth is stabilized completely, but the rest of the budget continues to set expenditure correlated with oil prices, then there is no benefit from a stabilization fund.

Thus, the difference between a stabilization fund and a well designed fiscal rule is purely notional. In fact, the cyclically adjusted fiscal rule of Chile, where the adjustment is with respect to the price of copper as well, can be interpreted as incorporating the notion of a stabilization fund. Indeed, the clear advantage of a unified rule is precisely that the government cannot undo a self-insurance policy without violating some self-imposed rule. Independent stabilization funds might have an advantage in terms of transparency and political visibility; however, it is important that divestiture rules be set clearly, to prevent the government spending the accumulated assets at will.

### 8.2 Numerical rules on the deficit

Numerical fiscal rules are a common feature in many industrialized and developing countries. I will focus on two types of rules: numerical rules on fiscal aggregates, mainly the budget deficit or debt, and rules concerning the composition of the budget, in particular the Golden Rule.

Numerical rules on budget aggregates are a typical example of the trade-off between rules and discretion. As mentioned above, their obvious goal is to enhance the sustainability of fiscal policy. But they are frequently criticized, on several grounds:

(i) a limit on the budget deficit induces a procyclical behavior of fiscal policy in times of negative shocks

(ii) it can also jeopardize public investment, because typically the latter is politically the easiest item to cut in the short run;

(iii) a numerical rule induces budget gimmickry in order to circumvent them de facto. In particular

(iii.a) it invites budget gimmicky to reclassify expenditure items so that they are no longer subject to the rule; it is also unlikely to cover quasi-fiscal operations, that in many countries are the main source of fiscal problems in times of crisis;

(iii.b) it can be satisfied by measures that do not alter the present discounted value of spending and revenues, but simply reallocates them over time (see Easterly (1999) and Milesi-Ferretti (2003));

All these facts are well understood; but they miss two key points, namely:

1) Fiscal rules are second-best options that are typically used in situations where institutional and political problems cause fiscal policy to be extremely volatile and erratic. From this perspective, quite simply fiscal rules can be instrumental in preventing crises and in preserving market access. As instruments of self-insurance, they help enhance the creditworthiness of the country, and automatically facilitate the return to countercyclical capital flows to the country as a whole, which in itself is a stabilizing factor. Thus, it is true that, **conditional on a crisis occurring**, a numerical fiscal rule on the budget might induce a procyclical behavior of fiscal policy; but **over longer periods** they can also reduce the probability of a crisis occurring.

2) In addition, a rule based on the cyclically adjusted deficit is compatible with any degree of countercyclicity of fiscal policy: the actual degree of countercyclicity depends on the extent to which automatic stabilizers are built in the government budget. At present, in most developing countries there are virtually no automatic stabilizers on the spending side. But if the share of automatic stabilizers were to increase, so would the stabilizing role of fiscal policy, even with a fiscal rule (if based on the cyclically adjusted deficit).

The key issue with cyclically adjusted budget rules is that the cyclical adjustment itself is bound to be a controversial issue, for three reasons. To construct the output gap, one needs an estimate in real time of the current economic conditions, and of potential output: both are controversial; and the estimate of the various tax and spending elasticities are also riddled with uncertainty. Blanchard (1993) proposes instead estimating what the budget balance would be if the current policies were applied at the economic conditions prevailing in the previous period. This removes two sources of controversy: it does not require an estimate of potential output, and it uses information on GDP and unemployment in the previous period, rather than the current one.<sup>16</sup>

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<sup>16</sup>The case of the Chilean fiscal rule studied below indicates that these problems are not forbidding in practice. One advantage of the Chilean fiscal rule, however, is that much of the cyclical adjustment depends on the price of copper, which is available in real time. The long run price, however, must still be estimated: as we will see, this is done by asking a group of experts.

However, in one respect the focus on the budget deficit might appear misguided. If one goal of the rule is to enhance the creditworthiness of the country, it should probably be formulated as a target on government debt rather than the deficit: presumably, international capital markets look at the stock of debt outstanding rather than the flow. However, conceptually what matters is the net liabilities of the government; but the asset side of the net liability position is always difficult to measure and somewhat

Numerical limits on the deficits, in various forms, have been in force in most US states for several decades; recently, they were adopted by the US in 1990 (the Gramm-Rudman-Holling Act), Canada in 1991, New Zealand in 1994, by several Latin American countries in the nineties (various forms of Fiscal Responsibility Acts), and of course by several European countries via the Maastricht Treaty and then the Growth and Stability Pact. Econometric investigations display mild evidence that these rules have some effects on the budget outcomes, both at the level of US states (Alt and Lowry (1994), Bohn and Inman (1996)) and in Latin American countries (Alesina et al. (1999)). However, this type of investigations run against some key difficulties: first, it is hard to collapse the different provisions of these rules into one or more numerical indicators; almost certainly these rules are endogenous (one can argue that countries resort to them when they perceive a problem, and presumably a consensus has been formed to do something); and, in the case of Europe where a rule has been forced on a number of countries at the same time, it is difficult to distinguish the effects of the rules from other trends occurring at the same time. To take just one example, although Alesina et al. (1999) find that on average the Fiscal responsibility Acts of the nineties in Latin America have been successful in reducing the deficit, there is a wide perception in the last few years that in most cases they were largely ineffectual, and in fact in several instances were abandoned at the first important negative shock (see e.g. Perry (2003)).

Regarding the effects of rules on the cyclical behavior of fiscal policy, Galí and Perotti (2003) find no evidence that fiscal policy in European countries in the post-Maastricht years became more procyclical than in the pre-Maastricht years. Sorensen et al (2001) find that US states with more stringent budget rules have more pro-cyclical fiscal policies, while Alesina and Bayoumi (1996) do not find a significant effect.

### 8.3 The Golden Rule

Consider now rules on the composition of the budget. The most famous of such rules, the Golden Rule, essentially states that, while current government spending must be covered by revenues, capital spending can be financed with debt. The rationale for this rule is that the social return of public investment is such that "it pays for itself", i.e. if the intertemporal government budget constraint was satisfied before the investment, it will be satisfied even after the investment *at the existing tax rates*. This is obviously an empirical issue, and the analysis above on the estimate of the social rates of return to public investment makes it very doubtful that this condition is satisfied in practice. Of course, this does not mean that public investment should not be carried out: if the social rate of return is higher than the social user cost of capital, than a given public investment

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arbitrary (what types of assets should be counted?). In addition, as we have argued for various reasons international capital markets might look at flows even more than stocks. For these reasons, focusing on the deficit is not only more practical but also appropriate.

project should well be carried out even if the financial return to the government is zero. And it does not even mean that the Golden Rule should not apply: it might well have a political or communication significance. But it does mean that this specific rationale for the Golden Rule does not appear to be supported by the data.<sup>17</sup>

The Golden Rule has an additional, important shortcoming that is particularly severe in developing countries: it creates strong incentives for creative accounting, to reclassify all sort of current spending items as government investment, in order to allow for a larger deficit: this can be seen very clearly in the case of Colombia, studied by Ayala and Perotti (2005).

#### 8.4 A fiscal rule in practice: the case of Chile<sup>18</sup>

It is often argued that fiscal rules are however difficult or impossible to implement because of technical difficulties. I will discuss this issue in the case of Chile, which has probably the most successful and long-lasting fiscal rule among developing countries.

Since 2001, Chile has adopted a rule that constrains the cyclically adjusted budget surplus to be no less than 1 percent of GDP. It is important to note that this rule was conceived in the late nineties precisely as a measure to break the procyclical behavior of fiscal policy. When the rule was introduced, the common expectation was of buoyant copper prices and an expanding economy: the rule was designed as a means of constraining the pressure to spend the high expected revenues.

The rule has held up quite well so far: in the 4 year period 2001-2004, the average cyclically adjusted surplus has been about .8 percent of GDP. It has also withstood considerable political pressure. In July of 2003 the “long-term price” of copper for 2004 (which is used to compute cyclically adjusted government revenues, and hence the maximum government spending) was set at 88. But by the end of 2003, while the budget was being discussed, the price of copper increased to 120. However, despite political pressure to raise the long term estimate, the Finance Ministry resisted, and government spending was set on the basis of a price for 2004 of 88.

Thus, operationally the rule has held up surprisingly well so far. In fact, it seems to enjoy widespread popularity among academics, government officials, and public sector officials of different political hues. It also illustrates that some widespread criticisms

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<sup>17</sup>There is an issue as to what definition of investment should be debt financed. A rule allowing debt financing of gross investment ("gross investment Golden Rule") could be a way to protect public investment, but asymptotically implies a level of the public debt above the public capital stock. A rule allowing debt financing of net investment only ("net investment Golden Rule") implies an asymptotic level of public debt that is equal to the public capital stock (if inflation is 0 - see Blanchard and Giavazzi (2005)).

<sup>18</sup>This section is based in part on Giavazzi and Perotti (2005). See also Fiess (2002) for a description of the Chilean fiscal rule.

of fiscal rules can be handled quite effectively in practice - of course given the right institutional environment. I now consider two such criticisms.

1) *The rule is easy to manipulate.*

The forecasts of copper prices and of the output gap are produced by two groups, which in 2004 were composed of 12 and 14 experts respectively. One could argue that some of these agents might have an incentive to provide biased forecasts. However, this criticism is of limited practical relevance. The outliers are always discarded; and reputational mechanisms are likely to play a key role. In any case, if anything the evidence so far suggests that these experts tend to underpredict copper prices. Thus, while between 2001 and 2003 actual copper prices increased by about 70 percent, the long-term forecast of the panel of experts actually fell, if only slightly.

2) *The rule is not transparent, and therefore it is not easy to communicate.*

This criticism has two distinct components: the notion of cyclically adjusted revenues and spending is hard to communicate to the media and the politicians; and the construction of the output gap and the long run copper price is convoluted. Consequently, the rule is perceived as arcane. However, from several conversations with politicians, academics and government officials in Chile, exactly the opposite position seems to emerge, that a cyclically adjusted rule is an easy and effective benchmark to communicate to politicians. In any case, the alternative - to base the rule on the actual deficit - would plunge Chile back into the problems caused by a pro-cyclical fiscal policy—the main cause underlying the extreme volatility of output growth throughout the rest of Latin America. Chilean policymakers seem to be well aware of this issue. Clearly the correct approach is highly dependent on the characterization of the stochastic process of the copper price - a highly controversial issue. This, in the end the current approach might be just right: an alternative that puts more weight on the recent copper prices to predict the future would, among other things, imply much more variability of fiscal policy.

## 8.5 The political economy of self-insurance

So sound fiscal rules on the cyclically adjusted deficit seem to be feasible after all. Why then do we observe so little self-insurance? As we have seen, for some self-insurance is too costly. But procyclical fiscal policy is costly too.

It is likely that the true reason has to do with the realm of political economy. Quite simply, in good times it is politically impossible to put aside tax revenues and withstand the accusation of neglecting needy sectors like health, education and infrastructure. Policymakers and politicians are often quite aware of the need for self-insurance, but find it politically self-defeating. Existing politico-economic explanations of the procyclicality of fiscal policy in developing countries do not capture this simple but probably crucial aspect. Sustainability Councils have been proposed precisely to overcome some of these political problems.



## 8.6 Alternative solutions: a Sustainability Council

In principle, a Sustainability Council such as proposed e.g. by Charles Wyplosz and Jurgen von Hagen could solve all the problems outlined above with fiscal rules:

(i) it could make a better assessment of sustainability than by relying on current deficit only

(ii) it could assess the impact of productive spending

(iii) it could assess the cyclical position of the government.

However, as we have seen these are highly contentious issues, on which even well trained economists disagree strongly. Note that the academic or other qualifications of the Council are not the issue here. The case of Ireland in 2001 and its treatment by the European Council of Ministers might provide a useful analogy. Ireland's 2001 stability programme included a fall in income and indirect taxes as a share of GDP by about .6 pp in 2001 and another .6 pp in 2002; and an increase in public investment by .2 and .6 pp of GDP in 2001 and 2002, respectively. It also envisaged a fall in the cyclically adjusted surplus by .3 percentage points in 2001, and stable in 2002. At the time Ireland had a budget surplus, the highest rate of growth in the world (after China) for the previous 120 years, and a low inflation rate. Yet, the European Council of Ministers (in charge of evaluating the program) issued the strongest form of censure on this fiscal program (the only time it ever used it) on the ground that "... the Council considers that the stimulatory nature of the budget for 2001 poses a considerable risk to the benign outlook in terms of growth and inflation...[... ] the strategy of inducing labor force increases through an alleviation of the direct tax burden, which was recommended in the 2000 broad economic policy guidelines (BEPG)... may have become less effective than in the past, because it took place in the context of an expansionary budgetary policy... Further, while indirect taxes cuts have a once-and-for-all effect on the price level, they probably have no lasting effect on the rate of inflation but clearly further stimulate demand" (Official Journal C 077, 9.3.2001, p.7).

Thus, the passage makes the following points:

(i) higher demand causes higher inflation;

(ii) indirect tax cuts cause higher demand;

(iii) indirect tax cuts causes reductions in inflation, but only in the short run.

Clearly (iii) is inconsistent with (i) and (ii); also, no empirical evidence on these points (or their opposites).

In the same passage the Council makes several other important factual points on the empirics of fiscal policy. It asserts that:

(i) a reduction in the cyclically adjusted budget surplus by .3 percentage points of GDP has a measurable positive impact on inflation;

(ii) on the other hand, an increase in government investment has a negative impact in inflation;

(iii) a reduction in income taxes has a negative effect on inflation....

(iv) . . . . but only if it does not take place in “the context of an expansionary budgetary policy”.

Note (iv) is a rather exotic statement on cross-derivative of inflation to taxes and change in budget deficit.

This example demonstrates that, based on our current state of knowledge, a perfectly respectable body can make **any** statement on fiscal policy. A Sustainability Council will necessarily be a political appointment. There will be plenty of people among likely political appointees that will be willing – in perfectly good faith - to make this kind of statements.

What would happen if the debt Board and the government disagreed on the projections and on the assumed effects of fiscal policy? Perhaps the Debt Board could make different, more realistic assumptions on the endogenous variables, like the future rate of growth of the economy. But could it make different assumptions on the fiscal policy instruments, say, the increase in the retirement age? This would require a much higher degree of political involvement than acceptable to all parts.

But let’s assume away all these problems. The key to the credibility of a Sustainability Council is that whatever powers society delegates to them, they must be permanent: if delegation withdrawn at first difficulty, credibility of the Council is destroyed.

Fiscal policy is fundamentally different from monetary policy: much stronger distributional impact. Even if agreed on a public finance assessment for the short and medium run, the same goal could be achieved with a continuum of measures with enormously different distributional impacts: no government will credibly delegate these powers forever to an independent, unelected body.

Perhaps after many years the Sustainability Council might show a better track record at forecasting: but the notion of the standard error of forecasts is usually not part of the political discourse – for a reason. And if the political survival of the government is at stake, the winner cannot be the Sustainability Council.

Ultimately, its role can only be to make more visible, hence politically costly, a fragrant departure from realism and plausibility. This would be akin to Congressional Budget Office in the US. But in addition, Sustainability Council would also have the power to issue informal warnings, a kind of whistle-blower of fiscal policy. Any power beyond this is unrealistic, and in any case unlikely to survive the first political skirmish.

## 9 Distributional aspects

There is a huge literature on the distributional aspects of fiscal policy, mostly focusing on health spending, social insurance (pensions) and social assistance, and some subsidies, which with good enough data can be imputed directly to income classes. A large part of this research concerns Latin America, where the stylized facts are (see the excellent contribution of Lindert, Skoufias and Shapiro (2006) based on household surveys):

(i) health and social insurance programs, including pensions, are not progressive, partly because they concern mostly the formal sector

(ii) social assistance programs tend to be more progressive, but are usually much smaller than social insurance; in addition, only the Conditional Cash transfer programs introduced recently in many Latin American countries seem really progressive. Many other social assistance programs are extremely fragmented (see e.g. Perotti (2005)) and are extremely difficult even to track down, let alone to evaluate.

(iii) many subsidies, like fuel subsidies, are very badly targeted (see Coady et al. (2006))

(iv) spending on education beyond the primary level is often regressive, particularly spending on tertiary education that is often free but attended mostly by the upper quintiles.

A growing literature also studies the distributional effects of the large crises of the 1990s. Because of its excellent data and its large crisis, Indonesia has been extensively studied; Halac and Schmukler (2003) also find large regressive transfers associated with the failure of financial institutions.

Because these facts are fairly uncontroversial, and because the literature on the subject is very large, I will not dwell further on it here; in the next section I will illustrate some issues that in my opinion are still open, or worthwhile insisting on.

## 10 Open questions

### 10.1 Estimating the effects of fiscal policy

#### 10.1.1 The short run

The key issue here is to increase the standards of the empirical analysis. Some background papers for certain World Bank studies do not seem to meet the minimal requirements. Not in all cases the available data will be enough to make a proper empirical analysis; and even when the data are available, some methodologies are simply not acceptable, largely because they make unabashedly causal statements from analyses that do not even begin to address the issue of causality, i.e. of a proper identification.

When data are available (presumably in few countries) it would be useful to try and estimate the short-run effects of fiscal policy from local data on firms, employment and government spending. This has long been in the mind of many economists, although to my knowledge very little has been done along these lines even for countries with excellent data, like the US or Canada. The reason, I suspect, is partly because it is not clear what methodology one should use: a lot of thinking will have to be put into this.

### 10.1.2 The long run

At the theoretical level, there are plenty of papers detailing all possible mechanisms through which public infrastructure can affect welfare. The list of possible channels is nearly infinite, and it does not seem productive to think of yet more channels. The key issue is empirical.

Whatever one thinks of cross-sectional or panel regressions, it is likely that this approach has said most of what it had to say on the rates of return to infrastructure. Even accepting the prevailing wisdom that it typically shows high rates of returns to infrastructure, it is hard to see what else it can do besides creating a cultural climate favorable to infrastructure investment. But such climate already exists, at least in words: the issue is how to budget resources for infrastructure, and especially **for which** infrastructure. On this, cross-sectional regressions have little to say.

The recent World Bank effort of evaluating Public Investment in a number of Pilot Countries (see World Bank (2005)) provides a timid attempt at estimating the relation between public investment and growth in time series in each individual country, in the form of a correlation between public investment and growth. Clearly, such an approach is a non-starter: one cannot hope to provide meaningful policy advice with such crude simple time series correlations.

The same report points out that there are at the moment two approaches to quantify the need for public investment in these countries: the "catching up" approach of Calderon and Serven (2004), based on the distance from the "regional leader" in terms of infrastructure; and the implied demand for infrastructure, from projected GDP growth, from Fay and Yepes (2003). While informative, both approaches are not based on any social marginal return calculation.

The key issue, not surprisingly, is a cost-benefit analysis of individual projects or sectors in individual countries. But very few countries have in place the manpower to do solid project appraisal: possibly only Chile, which perhaps not coincidentally has the strongest reputation for soundness of its public investment. The report also notes that in all these countries inadequate importance is given to maintenance and rehabilitation spending.

These two areas - project appraisal and maintenance - seem key in terms of research. Of course, these two issues are not unknown to international organizations. But particularly on the second one little systematic research seems to exist. It would be useful to document more extensively how little resources are devoted to maintenance (see Eustache (2004)) and cases of wasteful duplications of investment when proper maintenance would have achieved the same at a fraction of the cost.

Clearly, political factors play an important role in the neglect of maintenance: it is much more visible, and politically rewarding, to construct a new highway rather than repairing an existing one. Here too it would be useful to document systematically the importance of these political factors and of corruption.

The distributional aspect of public infrastructure is also a relatively neglected issue: as Estache (2004) argues, there is very little research on this issue, mostly by just a few researchers - P. Lanjouw, Ravallion, Van de Valle, and Wodon. And there is even less research on the effects of corruption on public investment and its efficiency. These are two more issues that seem of fundamental importance in assessing the desirability of public investment in developing countries, and on which again cross-sectional regressions do not have much to say.

## 10.2 Cyclical issues and self-insurance

Although there tends to be a consensus that fiscal policy in developing countries is probably less countercyclical than it should be, as we have seen the optimal cyclical behavior of fiscal policy depends on a number of features, that only now begin to be discussed. A systematic discussion of these features is however still missing; in particular, we do not have a sense of which are more important and where, and what are the implications for the optimal management of individual types of government spending. Here, for once theoretical research seems useful. An example is a clarification of the issue I discussed briefly in section 6: depending on the nature of the financial imperfection, but especially of the assumed effect of fiscal policy (wealth vs. demand effects), one can reach opposite conclusions about the optimal cyclical behavior of fiscal policy in a financial crisis. This issue is not well understood, and needs clarification both at a theoretical and empirical level.

Another important issue is what frequency of procyclicality is relevant. Hnatovska and Loayza (2005) argue that the "crisis component of volatility", rather than the overall volatility, is what is really damaging growth in developing countries. It might be that something similar is true for the observed procyclicality of fiscal policy: perhaps it does not matter much, except in times of substantial crisis.

The value of and scope for self-insurance are also substantially different depending on the structure of the economy: for instance, self-insurance is conceptually relatively straightforward and relatively easy to implement (except for political constraints) in oil producing and commodity exporting countries. Its implementation and motivation is different in other countries that are trying to enhance their creditworthiness. It would be important to construct a taxonomy of countries in this dimension that could be used for policy purposes.

## 10.3 Solvency and sustainability

There is not much to say on this issue. The technicalities of solvency theory and tests can become overwhelming, but their practical implications are limited. The sustainability analysis performed by the World Bank and IMF seems sound, and appears much more

useful than the standard solvency tests.

Debt stabilizing primary surpluses are useful communication devices. Perhaps they could be improved in the direction suggested by Tanner (2003): use historical probability distributions on a number of macro variables to assess the probability that a certain primary surplus stabilizes the debt ratio.

As stressed by IMF (2003), however, they are useful only in as much as they are based on data that cover the whole general government (including the social security funds), and possibly the whole public sector; and only if they are based on a sound evaluation of the underlying contingent liabilities. The impact of the real exchange rate on sustainability and debt dynamics is also an important issue, as the experience of Brazil during East Asian crisis has shown. All these issues are clearly well appreciated by international organizations, so there is not much to say besides the opportunity to insist on these data issues more than on solvency tests with no practical impact.

## 10.4 Rules

The key issue here is why we observe so little self-insurance in most countries that have intermittent access to financial markets. An obvious explanation is political; but then it would be useful to study easy, implementable and transparent rules that have good economic properties and are politically feasible.

There is instead little point in trying harder to estimate the effects of fiscal rules from cross section or panel regressions. Issues of endogeneity appear to be overwhelming, and difficult to overcome convincingly; also, because of the little exogenous time variation at high frequency, it is difficult to distinguish the effects of rules from concurrent trends in fiscal policy and other variables.

Despite this, there is no question that a well designed rule could help a country that is trying to establish a minimum of fiscal credibility. To this end, a first requirement seems to be that the rule must be designed to withstand at the first sign of fiscal stress; in this sense, a rule on the cyclically adjusted deficit like that of Chile seems a must, despite the well known technical difficulties in cyclically adjusting the budget. Despite its popularity in many academic and policy circles, the Golden Rule is not a good idea, especially in developing countries: it invites budget gimmicks, and has little economic rationale.

## 10.5 Distributional issues

International organizations, and particularly the World Bank and the Inter American Development Bank, have a very large number of publications studying the distributional impact of government spending. Yet, it is not obvious that the main message has trickled out to the policy debate: namely, how little targeted and progressive many of these spending items are. Here, the problem seems more one of communication than research.

Perhaps one problem of the existing research is that its methodology is not well established, and that CGE models (on which these results are often based) are not very popular outside the international organizations; it might be useful to set up a dedicated program of study to take advantage of the frontier microeconomic techniques to assess the distributional impact of fiscal policy from non-experimental data.

Perhaps the fragmentation and dispersion of social assistance programs in many developing countries is not always adequately appreciated (see e.g. Perotti (2005) on Colombia). Here, it would be useful to document systematically the sometimes overwhelming fragmentation of the welfare state in these countries.

Finally, there seems to be no question that in terms of researchable issues and richness of data the most promising area of research is the investigation of the several experimental cash transfer programs set up in various Latin American countries.

## References

- Agénor, Pierre-Richard and Blanca Moreno-Dodson (2006): "Public Infrastructure and Growth: New Channels and Policy Implications", World Bank Policy Research Working Paper No 4064, The World Bank, Washington, D.C.
- Aghion, Philippe, Gerge-Marios Angeletos, Abhijit Banerjee, and Kalina Manova (2005): "Volatility and Growth: Credit Constraints and Productivity Enhancing Investment", NBER Working Paper No. 11349
- Alabal-Bertrand, J.M., and E.C. Mamatzakis (2007): "The Impact of Disaggregated Infrastructure Capital on the Productivity Growth of the Chilean Economy", *The Manchester School*, 75(2), pp. 258-73
- Aschauer, David [1989]: "Is Public Expenditure Productive", *Journal of Monetary Economics*, 23, pp. 177-200
- Ayala, U. and R. Perotti (2005): "The Colombian Budgetary Process", in Alberto Alesina, ed.: *Institutional Reforms: The Case of Colombia*, MIT Press
- Baxter, Marianne and Robert King (1993): "Fiscal Policy in General Equilibrium", *American Economic Review*, June
- Blanchard, Olivier (2007): "Current Account Deficits in Rich Countries", NBER Working Paper No. 12925
- Blanchard, Olivier and Francesco Giavazzi (2004): "Improving the SGP Through a Proper Accounting of Public Investment", CEPR Discussion Paper No 4220
- Blanchard, Olivier and Roberto Perotti (2002): "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output", *Quarterly Journal of Economics*
- Bohn, Henning (1995): "The Sustainability of Budget Deficits in a Stochastic Economy", *Journal of Money, Credit and Banking*, Vol. 27, pp. 257-71
- Bohn, Henning (2005): "The Sustainability of Fiscal Policy in the United States", mimeo, University of California, Santa Barbara
- Burnside, Craig, Martin Eichenbaum, and Jonas D.M. Fisher (2004): "Fiscal Shocks and Their Consequences", *Journal of Economic Theory* 115, pp. 89-117
- Caballero, Ricardo (2002): "Insuring Emerging Markets", mimeo, MIT



- Caballero, Ricardo and Arvind Krishnamurthy (2004): "Fiscal Policy and Financial Depth", NBER Working Paper No 10532
- Caballero, Ricardo, and Guido Lorenzoni (2006): "Persistent Appreciations, Overshooting, and Optimal Exchange Rate Interventions", mimeo, MIT
- Cador, Olivier, Lars-Hendrik Röller, Andreas Stephan (2006): "Contribution to productivity or pork barrel? The two faces of infrastructure investment", *Journal of Public Economics*, 90, pp. 1133-1153
- Caldara, Dario and Cristophe Kamps (2006): "What Are the Effects of Fiscal Policy Shocks? A VAR-Based Comparative Analysis", mimeo, Stockholm University and European Central Bank
- Calderón, César, and Luis Servén (2003): "The Output Cost of Latin American Infrastructure Gap", in: William Easterly and Luis Servén: *The Limits of Stabilization*, The World Bank, Washington, D.C.
- Calderón, César, and Luis Servén (2004): "The Effects of Infrastructure Development on Growth and Income Distribution", World Bank Policy Research Working Paper No 3400, The World Bank, Washington, D.C.
- Canning, David (1998): "A Database of World Stocks of Infrastructure 1950-95", *The World Bank Economic Review* 12, 529-47
- Canning, David, and Esra Bennathan (2000): "The Social Rate of Return to Infrastructure Investment", World Bank Policy Research Working Paper No 2390
- Chalk, Nigel and Richard Hemming (2000): "Assessing Fiscal Sustainability in Theory and Practice", IMF Working Paper No 00/81
- Coadi, David, Moataz El-Said, Robert Gillingham, Kngni Kpodar, Pauol Medas, and David Newhouse (2006): "The Magnitude and Distribution of Fuel Subsidies: Evidence from Bolivia, Ghana, Jordan, Mali, and Sri Lanka", IMF Working Paper 06/247, Washington D.C.
- Cochrane, John (1998): "What Do VARs Mean?: Measuring the Output Effects of Monetary Policy" *Journal of Monetary Economics* 41:2, April, pp. 277-300
- Creel, Jérôme, Paola Monperrus-Véroni, and Francesco Saraceno (2007): "Has the Golden Rule of Public Finance Made a Difference in the UK?", OFEC Working Paper No. 2007-13;

- Demetriades, Panicos O., and Theofanis P. Mamuneas [2000]: "Intertemporal Output and Employment Effects of Public Infrastructure Capital: Evidence From 12 OECD Economies", *Economic Journal*, (110), July, pp. 687-712;
- Devarajan, S., V. Swaroop, and H. Zou (1996); "The Composition of Public Expenditure and Economic Growth", *Journal of Monetary Economics*, 37, pp. 313-44
- Devereux, Michael B., Allen C. Head, and Beverly J. Lapham (1996): "Monopolistic Competition, Increasing Returns, and the Effects of Government Spending", *Journal of Money, Credit and Banking*, 28(2), May, pp. 233-54
- Easterly, W. and S. Rebelo (1993); "Fiscal Policy and Economic Growth; An Empirical Investigation", *Journal of Monetary Economics*, 32, pp. 417-48
- Eichenbaum, Martin and Jonas D.M. Fisher (2004): "Fiscal Policy in the Aftermath of 9/11", mimeo, Northwestern University
- Edelberg, Wendy, Martin Eichenbaum, and Jonas D.M. Fisher (1999): "Understanding the Effects of a Shock to Government Purchases", *Review of Economics Dynamics*, pp. 166-206
- Engel, Eduardo and P. Meller (1993): *External Shocks and Stabilization Mechanisms*, Inter-American development Bank and Johns Hopkins University press, Washington, D.C.
- Engel, Eduardo, and Rodrigo Valdés (2000): "Optimal Fiscal Strategy for Oil Exporting Countries", mimeo, Central Bank of Chile
- Estache, Antonio (2004): "Emerging Infrastructure Policy Issues in Developing Countries: A Survey of the Recent Economic Literature", World Bank Policy Research Working Paper No 3442
- Evans, P. and G.Karras [1994]: "Are government activities productive? Evidence from a panel of US states", *Review of Economics and Statistics*, (76), pp. 1-11;
- Fay, Marianne, and Tito Yepes, 2003, "Investing in Infrastructure: What is Needed from 2000 to 2010?" World Bank Policy Research Working Paper, No. 3102 (Washington, DC: World Bank).
- Fernald, John [1993]: "Roads to Prosperity? Assessing the Link Between Public Capital and Productivity", *American Economic Review*, 89(3), pp. 619-38
- Ferreira, Pedro Cavalcanti, and Carlos Hamilton Vasconcelos Araujo (2006): "On the Economic and Fiscal Effects of Infrastructure Investment in Brazil", Fundação Getulio Vargas Working Paper No 613

- Fiess, Norbert (2002): "Chile's New Fiscal Rule", mimeo, The World Bank
- Finn, Mary G. [1993]: "Is All Government Capital Productive?", *Federal Reserve Bank of Richmond Economic Quarterly*, 79, Fall, pp. 53-80
- Finn, Mary G. [1998]: "Cyclical Effects of Government Employment and Goods Purchases", *International Economic Review*, 39(3), 635-57;
- Galí, Jordi, J. David López-Salido and Javier Vallés [2007]: "Understanding the Effects of Government Spending on Consumption", forthcoming, *Journal of the European Economic Association*
- Galí, Jordi, and Roberto Perotti (2003): "Fiscal Policy and Monetary Integration in Europe", *Economic Policy*, October, 37, pp. 535-573
- Garcia-Milà, Teresa, Therese J. McGuire, and Robert H. Porter [1996]: "The Effects of Public Capital in State-Level Production Functions Reconsidered", *Review of Economics and Statistics*, pp. 177-80;
- Gavin, Michael, and Roberto Perotti (1997): "Fiscal Policy in Latin America", *1997 NBER Macroeconomic Annual*, MIT Press
- Gopinath, G. (2004): "Comments to Kaminsky et al.", in *2004 NBER Macroeconomic Annual*, MIT Press
- Gourinchas, Pierre-Olivier and Olivier Jeanne (2006): "Capital Flows to Developing Countries: The Allocation Puzzle", IMF Working Paper,
- Gramlich, E. M. [1994]: "Infrastructure Investment: a Review Essay", *Journal of Economic Literature*, (32), 1176-96;
- Halac, Marina and Sergio Schmukler (2003): "Distributional Effect of Crises: The Role of Financial Transfers", World Bank Policy Research Working Paper No. 3173
- Hnatkovska, Viktoria and Norman Loayza. (2005): "Volatility and Growth." Chapter 2, pp. 65-100, in *Managing Economic Volatility and Crises: A Practitioner's Guide*, edited by Joshua Aizenman and Brian Pinto. Cambridge University Press, 2005
- Hotz-Eakin, Douglas [1994]: "Public Sector Capital and the Productivity Puzzle", *Review of Economics and Statistics*, (76), pp. 12-21;
- Houghwout, Andrew F. [2002]: "Public Infrastructure Investments, Productivity, and Welfare in Fixed Geographic Areas", *Journal of Public Economics*, 83, pp. 405-28

- Hulten, Charles R. and Robert M. Schwab [1991]: "Public Capital Formation and the Growth of Regional Manufacturing Industries", *National Tax Journal*, December, 44(4), pp. 121-34
- International Monetary Fund (2002): "Assessing Sustainability", Washington, DC
- International Monetary Fund (2003a): "Sustainability Assessment - Review of Application and Methodological Refinements", Independent Evaluation Office, Washington, DC
- International Monetary Fund (2003b): "The IMF and Recent Capital Account Crises", Washington, DC
- Kaminsky, Graciela, Carmen Reinhart, and Carlos Végh (2004): "When It Rains, It Pours: Procyclical Capital Flows and Macroeconomic Policies", in: *2004 NBER Macroeconomic Annual*, MIT Press
- Kamps, Christophe [2004]: "The Dynamic Effects of Public Capital: VAR Evidence for 22 OECD Countries", mimeo, Kiel Institute for World Economics
- Kim, Soyoung and Nouriel Roubini (2005): "Twin Deficits or Twin Divergence? Fiscal Policy, Current Account, and the Real Exchange Rate in the U.S.", mimeo, New York University
- Lindert, Kathy, Emmanuel Skoufias, and Joseph Shapiro (2006): "Redisistributing Income to the Poor and the Rich: Public Transfers in Latin America and the Caribbean", Social Safety Nets Primer Series
- Lynde, C. and J. Richmond [1992]: "Public Capital and Long Run Costs in UK Manufacturing", *Economic Journal*, vol. 103, pp. 880-93
- López-Salido, David J. and Pau Rabanal (2006): "Government Spending and Consumption-Hours Preferences", mimeo, Federal Reserve Board
- Mendoza, Enrique and Marcelo Oviedo (2004): "Public debt, Fiscal Solvency and Macroeconomic Uncertainty in Latin America: the Cases of Brazil, Colombia, Costa Rica and Mexico", NBER Working paper No 10637
- Mendoza, Enrique and Marcelo Oviedo (2007): "International Evidence on Fiscal Policy: Is Fiscal Policy "Responsible"?", IMF Working Paper, 07/56
- Mittnik and Neumann [2001]: "Dynamic Effects of Public Investment: Vector Autoregressive Evidence from Six Industrialized Countries", *Empirical Economics*, 26 (2), pp. 429-446

- Monacelli, Tommaso and Roberto Perotti (2007): "Fiscal Policy, the Trade Balance, and the Real Exchange Rate: Implications for International Risk Sharing", mimeo, Bocconi University
- Morrison, C. and A. E. Schwartz [1996]: "State Infrastructure and Productivity Performance", *American Economic Review*, (86) 5, pp. 1095-1111
- Munnell, Alicia H. [1990]: "How Does Public Infrastructure Affect Regional Economic Performance?", *New England Economic Review*, September/october, pp. 11-32
- Munnell, Alicia H. [1992]: "Infrastructure Investment and Economic Growth", *Journal of Economic Perspectives*, vol. 6, no. 4, pp. 189-98
- Nadiri, M. Ishaq and Theofanis P. Mamouneas [1994]: "The Effects of Public Infrastructure and R&D Capital on the Cost Structure and Performance of U.S. Manufacturing Industries", *Review of Economics and Statistics*, February, pp. 22-37
- Perotti, Roberto (2005): "Public Spending and Social Protection in Colombia: Analysis and Proposals", in Alberto Alesina, ed.: *Institutional Reforms: The Case of Colombia*, MIT Press
- Perotti, Roberto (2007a): "In Search of the Transmission Mechanism of Fiscal Policy", forthcoming in 2007 *NBER Macroeconomics Annual*
- Perotti, Roberto (2007b): "Public Investment: Another (Different) Look", mimeo, Bocconi University
- Prasad, Eswar, Raghuram G. Rajan and Arvind Subramanian (2006): "Patterns of International Capital Flows and Their Implications for Economic Development." In: *The New Economic Geography: Effects and Policy Implications. A symposium sponsored by the Federal Reserve Bank of Kansas City*, August 24-26. Jackson Hole, Wyoming.
- Perkins, P., Fedderke, J.W., and Luiz, J.M., 2005, An Analysis of Economic Infrastructure Investment in South Africa, *South African Journal of Economics*, 73(2), 211-28.
- Perry, Guillermo (2003): "Can Fiscal Rules Help Reduce Macroeconomic Volatility in the Latin American and Caribbean region", World Bank Policy Research Working Paper No. 3080
- Ramey, Valerie A. and Matthew D. Shapiro (1998): "Costly Capital Reallocation and the Effects of Government Spending", *Carnegie Rochester Conference on Public Policy*, pp. 145-194

- Ravn, Morten, Stephanie Schmitt-Grohé, and Martín Uribe (2006): "Deep Habits", *Review of Economic Studies*, January
- Rigobon, R. (2004): "Comments to Kaminsky et al.", *2004 NBER Macroeconomic Annual*, MIT Press
- Ropp, W. and J. De Haan (2005): "Public Capital and Economic Growth", EIB Papers, 10(1), pp. 41-70
- Servén, Luis (2005): "Fiscal Discipline, Public Investment, and Growth", mimeo, The World Bank
- Tatom, John A. [1991]: "Should Government Spending on Capital Goods Be Raised?", *Federal Reserve Bank of St. Louis Review*, March/April, pp. 3-15
- Voss, G.M. [2002]: "Public and Private Investment in the United States and Canada", *Economic Modelling*, 19 (4), pp. 641-664
- World Bank (2005): "Public Investment and Fiscal Policy - Lessons from the Pilot Country Studies", The World Bank, Washington, D.C.
- World Bank (2006): "Infrastructure: Lessons from the Last Two Decades of World Bank Engagement", Discussion Paper, Infrastructure Network, The World Bank, Washington, D.C.