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FISCAL POLICY AND FINANCIAL DEPTH

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ABSTRACT

Most economists and observers place the lack of fiscal discipline at the core of the recent Argentine crisis. This begs the question of how countries like Belgium or Italy (pre-Maastricht) could run large fiscal deficits and accumulate debts far beyond those of Argentina, without experiencing crises nearly as dramatic as that of Argentina? Why is it that Argentina cannot act like Belgium or Italy and pursue expansionary fiscal policy during downturns? We argue that advanced and emerging economies differ in their financial depth, and show that lack of financial depth constrains fiscal policy in a way that can overturn standard Keynesian fiscal policy prescriptions. We also provide empirical support for this viewpoint. Crowding out is systematically larger in emerging markets than in developed economies. More importantly, this difference is extreme during crises, when the crowding out coefficient exceeds one in emerging market economies.

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1 Introduction

Most economists and observers place the lack of fiscal discipline at the core of the recent Argentine crisis. This begs the question of how countries like Belgium or Italy (pre-Maastricht) could run large fiscal deficits and accumulate debts far beyond those of Argentina, without experiencing crises nearly as dramatic as that of Argentina? Why is it that Argentina cannot act like Belgium or Italy and pursue expansionary fiscal policy during downturns?

We provide an answer to these questions based on the observation that advanced and emerging market economies differ in their *financial depth*. We show that lack of financial depth constrains fiscal policy in a way that can overturn standard Keynesian fiscal policy prescriptions.

By financial depth we mean the supply of funds available to the government and private sector of an emerging market. Investing in an emerging market requires far more expertise than investing in an advanced one. For example, it requires knowledge of political risk, exchange rate risk, and the degree and form of corporate, judicial and government corruption. Segmentation is a prevalent feature of emerging markets. We refer to the small set of investors who have the investment expertise on these markets as specialists. The financial depth of a country is limited by the liquidity controlled by these specialists.

As in our previous work (see Caballero and Krishnamurthy 2001, 2002, 2003, 2004), we model an external crisis as an event in which financial depth is limited.[1] In this context, the country faces a quantity financial-constraint on its borrowing. Any government expenditure crowds out private investment; therefore loose fiscal policy may in fact be contractionary. The crowding-out problem is amplified if expansionary fiscal policy worsens the quality of the country's assets. We illustrate two channels of amplification. First, as the rising share of public debt to private assets reduces the aggregate liquidity of the country's assets, specialists increase their required liquidity premium and this further reduces financial depth. Second, if the lack of fiscal discipline sparks investors' fears regarding the fiscal responsibility of the government, specialists endogenously lower their valuation of the country's assets and financial depth also is reduced further.[2]

We provide empirical support for our crowding-out hypothesis by examining the differential response of emerging and advanced economies to fiscal shocks. We first extend the

[1] See Broner et al (2003) for extensive evidence of limited supply of funds during external crises.

[2] This second, signaling channel has a resemblance with some of the explanations in the literature on "expansionary fiscal contractions" sparked by Giavazzi and Pagano (1990), and discussed by Blanchard (1990) and Drazen (1990). See also, e.g., Alesina and Perotti (1995), Giavazzi and Pagano (1996), and Hemming et al (2002). More generally, the tight connection between fiscal policy and cost of credit in an environment of tight capital flows is consistent with the evidence in Favero and Giavazzi (2003) on the behavior of the Brazilean yield curve.

results in (IADB 1997) and show that fiscal policy is indeed more pro-cyclical in emerging economies than in advanced economies. We then turn to estimating the effect of a fiscal expansion on private investment. We show that this coefficient is more negative in emerging economies than in advanced economies. However, our main results are from a "difference-in-difference" regression. We show that the difference between the response in crises and in tranquil times is much bigger (more negative) in emerging economies than in advanced ones.

In section 2 we make the basic connection between crowding out and financial depth during sudden stops of capital inflows. Sections 3 and 4 are the core of the paper and present two models of extreme crowding out. In the first one we we model the decline in the liquidity of a country's assets as the share of government debt in total assets rises, while in the second one we highlight the negative signaling of a government that refuses to adjust its fiscal accounts. The simple dynamic model of illiquidity in Section 3 is of independent value. Section 5 present empirical evidence, and section 6 concludes.

2 Crowding out

We consider a government that has a stock of debt, D, which it needs to refinance. The private sector has a total of I projects that it needs to fund. Each of these projects has a marginal product of r. In sum, the financing need of the government and the private sector is $I + D$.

The international interest rate is r^*. During normal times, there are sufficiently many lenders (or collectively they have sufficient funds), so that all government debt and private investment are financed at the interest rate of r^*.

Our central assumption is that during an external crisis this supply of funds is constrained. At this point, the country has limited financial depth. Formally, we assume that there are many specialists, each with some limited funds to lend. The specialists are indexed by q, where q is their effective opportunity cost of lending ($q \geq r^*$). In aggregate, the supply schedule of funds is given as $F(q)$, where $F(\cdot)$ is the mass of funds available for lending by specialists whose opportunity cost is less than q.

Equating the demand for funds with the supply of funds yields,

$$I + D = F(q).$$

Since the private sector has marginal product of r, it is willing to pay up to r in order to borrow funds. Thus in equilibrium,

$$I + D = F(r). \tag{1}$$

¿From this relation, we see an immediate constraint that the loss of financial depth during a crisis places on fiscal policy: If the government increases D, there is a one-for-one crowding out of private investment. Figure 1 illustrates this scenario. On the vertical axis we measure gross returns and on the horizontal the amount of external loans. During an external crisis, the interest rate jumps to the maximum return the private sector can offer, which pins down the maximum (and actual) loans the country receives. Any new loan to the government, means one less loan to the private sector.

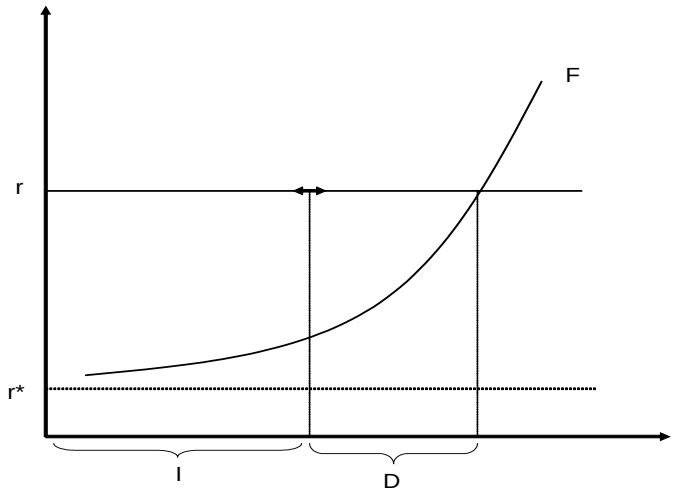

Figure 1: Crowding out

In the next sections we develop dynamic versions of this simple model and illustrate potentially more drastic forms of crowding out.

3 Aggregate illiquidity and crowding out

In this section we show that if specialists have any liquidity preference, then as the share of government debt in the economy increases, the liquidity of all of the country's assets falls. Specialists require a larger liquidity premium in response, and further reduce their supply of funds. The reason behind this effect is that the aggregate liquidity of a country is ultimately linked to the productivity of its private assets. Government assets may be backed by domestic transfers but they do not themselves generate aggregate returns. Thus, as crowding out increases and returns from private assets decrease, the liquidity of the country's assets falls.

Our dynamic model is a fairly straightforward extension of the previous static model, to which we add a government in order to derive the dynamics of government debt.

Time is continuous. Our analysis starts with the onset of an exogenous crisis and finishes with either the reversal of the crisis, or a final attack which may precipitate a government default. In any time interval dt, the reversal of the crisis occurs with exogenous probability λdt. The attack event is endogenously determined by the behavior of specialists (see below). For now, we denote the attack probability in the next dt as $\mu_t dt$.

During the crisis period financial depth is limited and the supply of funds to the country is equal to $F(q)$. We introduce some liquidity concerns among the specialists. We assume that there are "long-term" and "short-term" specialists. The long-term specialists have opportunity cost of funding of $q < \bar{q}$, with corresponding total mass of funds of $\bar{F} = F(\bar{q})$. Short-term specialists have cost of funding of $q > \bar{q}$. In addition to higher q's, short-term specialists also face the possibility of liquidity shocks. We model this by assuming that with flow probability of δdt a sunspot occurs in the next interval of time. If the sunspot occurs, then the short-term specialists may exit the market for the next dt and cease lending.

Loans from specialists to both the government and private sector are assumed to be short term (i.e. instantaneous). As before, since the marginal product of the private sector's projects is r, the interest rate on these loans is also r. If loans are repaid, they yield a flow excess return of $(r - q)dt$ to an investor of type q. If there is default, the return is -1.[3]

The government values an expansionary fiscal policy, while it completely ignores the effect of its actions on private sector investment. We make this extreme assumption in order to capture the short horizon of the type of governments that concern us here. The flow benefit is $g_t dt$. So, the government either continues an expansionary fiscal policy that sets $g_t = \bar{g} > 0$, or balances the budget by setting $g_t = -rD_t$. The growth in public debt is equal to,

$$\dot{D}_t = rD_t + g_t.$$

As mentioned, the crisis may end in a final attack in which the government is unable to roll over its debt, and has to reconcile its debt. We assume that the government cares about the growth in the stock of debt because the cost of dealing with the attack is increasing in D_t. But not all governments perceive the same cost. We assume that a government has a type, θ, that parameterizes how concerned it is with the debt. In particular, a government of type θ views the cost of debt as,

$$(1 - \theta)C(D) \quad C' > 0,\ C'' > 0.$$

[3]Note also that we have assumed full default, rather than partial default or restructuring. This is not essential. What is important to our model is that there is a discrete expected loss when default takes place. This holds as long as the degree of illiquidity after the run is substantial, which is the case in our model except of a measure zero event (when the final crisis takes place at the first instant in which it is feasible). See below.

Our preferred interpretation of θ is that in the attack event, the government may react as a "populist" and expropriate all financial assets. We assume that a government of type θ expropriates with probability $0 < \theta < 1$. In any interval of time dt, the probability of expropriation is then $\mu_t \theta dt$. Therefore, the supply of funds from specialists is $F(r - \mu_t \theta)$, so that the analogue of (1) is,

$$I_t + D_t = F(r - \mu_t \theta_t). \tag{2}$$

The model has a sovereign principle built in, as default/expropriation occurs on all debts, regardless of whether these were issued by the country's private sector or the government. Thus, foreign investors value corporate and government debt equally.

We next describe the liquidity concerns of specialists and link this to the attack probability μ_t. As noted earlier, a sunspot occurs in the next interval of time with flow probability of δdt. The sunspot may serve to coordinate an attack.

We assume that the sunspot is only observed by the short-term specialists. It is easy to show that any short-term specialist that has seen a sunspot will withdraw from the country for the next dt and not renew his financing on any government or corporate loans. The reason is that the benefit of continuing to invest in the country is $(r - q)dt$, which is of order dt. On the other hand, if the attack occurs and the government defaults, the cost is -1, which is an order of magnitude larger than the benefit. Thus, as long as there is any chance of default, the optimal strategy for the short-term specialist is to withdraw.

The long-term specialists, on the other hand, continue lending regardless of events. We assume that $\bar{q} > r - \delta\theta$. This ensures that they always earn a surplus on specialist lending for all levels of D_t. Also, since they do not observe the sunspot of the short-term specialists, the do not cease lending based on this sunspot.[4]

Then, in aggregate, if a sunspot occurs specialists will unwind a position of $F - \bar{F}$ assets. There is no problem in unwinding the corporate position, since these are short-term loans on completed projects. The problem may arise with the government loans. The government will not repay these loans without first securing financing from other specialists. Thus the question is whether the specialists that did not observe the liquidity shock have sufficient resources to finance the government bonds of the exiting specialists. These resources will be insufficient if,

$$D_t > \bar{F}, \tag{3}$$

[4]There is still the possibility of a "run" equilibrium in which all of the long-term specialists do not renew their financing. We are implicitly ruling this out. One can imagine a sunspot also coordinating the short-term specialists. In this case, we are analyzing a situation where the probability of this sunspot is very small.

in which case the government is not able to refinance its debt and defaults with probability θ.[5]

There are two cases to consider. For small levels of $D_t < \bar{F}$, this inequality is not satisfied, so that even if a sunspot occurs, there is sufficient liquidity to refinance all of the government's debt. In this case, $\mu_t = 0$. For large levels of $D_t \geq \bar{F}$, a sunspot always results in distress and $\mu_t = \delta$.

$\bar{F}$ is a maximum debt level a government can take on without risking a final attack. Thus, as D_t passes through this threshold the supply of funds from specialists falls from $F(r)$ to $F(r - \delta\theta)$. In other words as the government crosses through the threshold, the country's assets become illiquid, and crowding out is more than one-for-one. More generally, as long as government deficits lower the liquidity of a country's assets, crowding out will be more severe.

Intuitively, when D_t is large, the marginal lender is a short-term specialist who is financing an implicitly long-term government liability. This is the source of the instability. As in Diamond and Dybvig (1983), there is a "run" equilibrium, which we resolve with a sunspot. Whenever the latter takes place, it precipitates an attack.

Note also that illiquidity has a more severe effect on worse governments (i.e. higher θ's). That is, as government debt passes through the threshold, a worse government experiences stronger crowding-out.

The model can be solved recursively because of the assumption that the government is not concerned about private investment, and because the interest rate is constant during the crisis. The government problem can be solved without regard for what investors think of its actions, since the residual claimant of these actions is the domestic private sector. The investor's problem can be solved next, taking the actions of the government as given.

If the crisis ends before the attack occurs, the debt is repaid with taxes (which the government does not internalize), and the government's perception of the benefits of a fiscal expansion vanishes as well.[6]

[5] In a richer model, the government may be able to change the promised interest rate on its debt. Allowing the government to increase the interest rate would smooth our results somewhat but it would not change anything qualitatively. There would be a region of crisis and default, linked to the same considerations discussed above. The main difference is that prior to the default event, the government would raise the interest rate it pays on its bonds above r, thereby delaying the crisis. This would be realistic as highly indebted governments (relative to the size of the specialists pool and private sector's assets) would see more frequent interest rate spikes. The point, however, is that there is still a D_t beyond which there is no interest rise that can prevent the crisis from taking place.

[6] All that we require is that the government values g more during the crisis than during normal times.

The government's Bellman-Jacobi equation during the external crisis is:

$$0 = \max_{g_t \in \{-rD_t, \bar{g}\}} \left\{ V'(D_t)(rD_t + g_t) - (\lambda + \mu(D_t))V(D_t) + g_t - \mu(D_t)(1-\theta)C(D_t) \right\}. \quad (4)$$

Given the convexity of $C(\cdot)$, it is easy to see that the solution to this problem is a stopping rule:

$$g_t = \begin{cases} \bar{g} & \text{if} \quad D_t < D^*(\theta), \\ -rD_t & \text{otherwise.} \end{cases}$$

The government begins with debt D_0. In order to keep the problem interesting, we assume that $D_0 < D^*(\theta)\ \forall\theta$.[7]

Clearly no government will stop spending as long as $D_t < \bar{F}$, which means that $D^*(\theta) \geq \bar{F}$. Consider a θ such that $D^*(\theta)$ is strictly larger than $\bar{F}$. In this case, substituting $g_t = -rD_t$ into equation (4) gives the boundary condition,

$$V(D^*(\theta)) = -\frac{rD^*(\theta) + \delta(1-\theta)C(D^*(\theta))}{\lambda + \delta}, \quad (5)$$

where we have also used the fact that $\mu = \delta$. At $D_t = D^*(\theta)$ the government is indifferent between setting g_t equal to $\bar{g}$ and setting it equal to $-rD_t$. Manipulating this indifference condition gives us the smooth pasting condition:

$$V'(D^*(\theta)) = -1. \quad (6)$$

This gives us an equation that we can solve for D^*. The solution applies as long as it is greater than $\bar{F}$.

Suppose that $C(D) = D^\gamma$ with $\gamma > 1$, then combining conditions (5) and (6) yields:[8]

$$D^*(\theta) = \max\left[\frac{1}{\gamma} \left(\frac{\lambda + \delta - r}{\delta(1-\theta)} \right)^{\frac{1}{\gamma - 1}}, \bar{F} \right]. \quad (7)$$

The first term in squared brackets is increasing in θ. A good type of government stops its spending sufficiently early that it never runs the risk of an attack, and crowding out is only one-for-one. A worse type of government continues spending beyond $\bar{F}$ so that it creates the more than one-for-one crowding out.

[7] We also assume that $D^*(\theta) < F(r - \delta\theta)$. That is no government ever fully crowds out the private sector. This holds as long as $\frac{1}{\gamma}\left(\frac{\lambda+\delta-r}{\delta(1-\theta)}\right)^{\frac{1}{\gamma-1}} < F(r - \delta\bar{\theta})$. Without this assumption, the interest rate rises above r when the private sector is fully crowded out, which unnecessarily complicates our analysis.

[8] It may be surprising that $\bar{g}$ does not appear in the above first order condition, and hence in the expression for D^*. This is due to the linearity assumption in the objective function. The only role of $\bar{g}$ in our model is to control the speed at which the government accumulates debt along the path. It does not affect the marginal flow-utility of government expenditure.

4 Fiscal fears and crowding out

We now illustrate a second dynamic channel whereby crowding out is more than one-for-one. Investors often worry that an emerging-market government may be fiscally irresponsible. The government in charge may be too willing to run up expenditures, expecting not to be around when the bills come due. Thus, another cost of fiscal expansions during a crisis is that it may spark investor fear that the government is fiscally irresponsible. This further reduces financial depth as the number of specialists willing to lend to the country falls.

Although there are some interactions between the informational problem we highlight here and the liquidity mechanism in the previous section, our point is best made by turning off the liquidity mechanism. Thus, we make two modifications of our previous model. First, we simplify the liquidity story and assume that the attack parameter, μ, is exogenous and constant (alternatively, we are looking only in the region where $D > \bar{D}$). We assume that all of the specialists are of the same type, indexed by q, as in Section 2. Second, we assume that the type θ is not publicly known. The unconditional distribution of the latter is $\theta \sim U[0, \bar{\theta}]$.

Investors infer the type of the government from the history of government actions since the beginning of the crisis and its initial level of debt,

$$\widehat{\theta}_t \equiv \mathrm{E}[\theta | \{g_s\}_{s=0...t}, D_0].$$

The expected return on lending in an interval dt is,

$$(r - \mu\widehat{\theta}_t)dt,$$

and the corresponding supply of funds faced by the country is:

$$F(r - \mu\widehat{\theta}_t). \tag{8}$$

Our analysis is conducted in the region where $r - \mu\widehat{\theta}_t > r^*$.

The analysis of the problem is very similar to the previous case. In particular, since the government is not concerned with private investment, it does not try to signal its type through its actions. Thus the government problem is identical to that of the previous section. The solution is a stopping rule:

$$g_t = \begin{cases} \bar{g} & \text{if} \quad D_t < D^*(\theta), \\ -rD_t & \text{otherwise,} \end{cases}$$

which, for the parametric case $C(D) = D^\gamma$ with $\gamma > 1$, has:

$$D^*(\theta) = \frac{1}{\gamma}\left(\frac{\lambda + \mu - r}{\mu(1-\theta)}\right)^{\frac{1}{\gamma-1}}. \tag{9}$$

Since $D^{*\prime}(\theta) > 0$, the more populist a government is, the slower its fiscal tightening. Investors understand this and update their priors with respect to the government's type based on the path of government's expenditures. If $g_t = \bar{g}$, investors know that the type of government is *worse* than that which would have stopped at $D^* = D_t$. Inverting (9), we have that

$$\theta \geq \max\left\{0, 1 - \frac{\lambda + \mu - r}{\mu(\gamma D_t)^{\gamma-1}}\right\}.$$

Conversely, if the fiscal deficit is eliminated, investors learn that the value of θ is the best of all those that were possible before adjustment took place.

The solid line in Figure 2 illustrates the path of expected default, $\mu\widehat{\theta}$, as the external crisis goes on and the government does not adjust its fiscal deficit. The dashed line, on the other hand, shows the path of expected default for the best θ possible, given the level of D_t. When a government adjusts, it shifts the market perception from a point on the solid line to the corresponding point on the dashed line. At this time there is full revelation and updating stops, $\widehat{\theta}_{t'} = \theta \ \forall t' \geq t$.

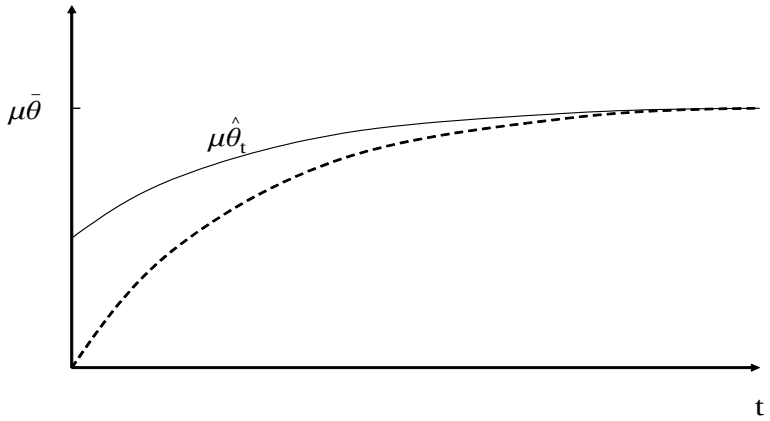

Figure 2: Expected Default

Again, this environment exhibits a more extreme form of crowding out than that in the static model of Section 2. During the external crisis, the country faces an aggregate financial constraint:

$$I_t + D_t = F(r - \mu\widehat{\theta}_t). \tag{10}$$

Taking beliefs about the type of government as given, fiscal expenditure crowds out private investment one-for-one (as in Section 2). But an expansionary fiscal policy during the crisis does not leave beliefs unchanged. This negative updating further reduces the supply of

funds to the country, and private investment falls more than one-for-one with the rise in fiscal expenditure.

The other face of this perverse relation between fiscal policy and the availability of financial resources is the great benefit of adjustment. Adjustment leads $\widehat{\theta}$ to fall sharply and there is a jump in the resources made available by specialists.[9] Note, however, that cutting the deficit late does not take the economy to the same point as would cutting the deficit early. The reason is that along the path, investors have learned that the government is more populist than a government that reacts early. That is, the country's "fundamentals," which include the perceived quality of its government, are no longer the same.[10]

5 Empirical Evidence

This section begins with some facts on the cyclical behavior of public deficits in countries with and without financial depth. It concludes with tests supporting the hypotheses that crowding-out is larger in emerging economies than in advanced ones and, most importantly, that this difference rises significantly during crises.

5.1 Cyclicality of Deficits

Let us contrast the behavior of fiscal variables in advanced economies *vis a vis* emerging economies. Beginning with an example, we contrast the experience of Italy during the 1980s with that of Argentina and Brazil in the late 1990s. Each of these country-episodes is known for a high fiscal deficit within its respective comparison group and the centrality of the deficit in public debate about macroeconomic outcomes. Panel (a) in Figure 3 presents the evolution of public debt and overall fiscal deficit as a percentage of GDP for Italy during the 1980s. Debt is reported on the left axis while the deficit is measured on the right axis. Panels (b) and (c) repeat this figure for Argentina and Brazil, respectively, during the late 1990s. It is apparent from this figure that both the level and change of public debt (i.e. roughly public deficits) are significantly larger for Italy than for Argentina and Brazil in the relevant periods. While the maximum deficit in Italy was above 15%, it was below 4% in Argentina. Public debt in Italy was more than twice as large as in Argentina and Brazil.

[9] A recent example of this scenario is the sharp fall in Brazil's sovereign spreads when investors, after seeing Lula's fiscal austerity plan, realized that he was less populist than feared.

[10] We have made extreme assumptions to isolate our main points. One of these assumptions is that the government is not concerned about signaling since the cost of a bad signal is paid in full by the private sector, which does not concern the government during the crisis. If we reintroduce some concern by the government, then one may find that a government is willing to stop spending early when the signaling gain is large, but not late when the bad reputation is already too hard to undo. See Angeletos et al (2003) for recent developments on policy signaling models.

It is also interesting to point out, although this is not the main point that concerns us in this section, that Brazil made a significant effort to reduce its deficits while Argentina did not.

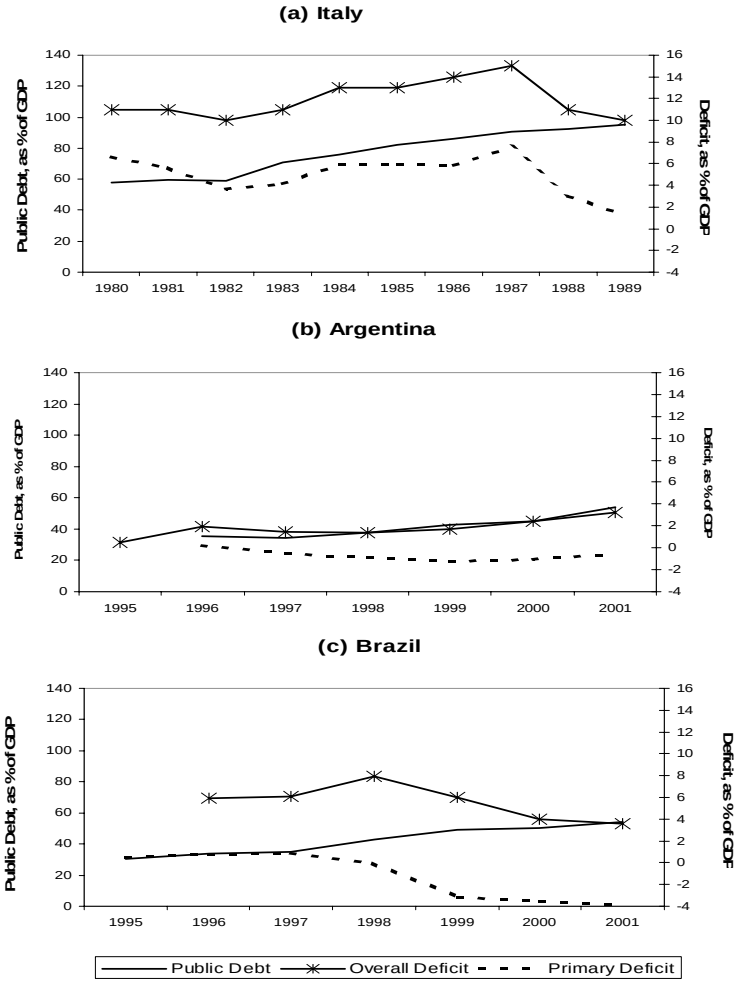

Figure 3: Debt and Deficits

The cyclical behavior of these deficits is also very different across these economies. In Italy the deficit is countercyclical, while it is not in Argentina and Brazil. The correlation between the cyclical component of the public deficit and the cyclical component of GDP is -0.53 for Italy, and 0.02 and 0.28 for Argentina and Brazil, respectively.[11] This difference is also apparent when looking only at the expenditure side. The correlation between the cyclical component of government expenditures and GDP is -0.38 for Italy, and 0.83 and

[11]The cyclical components are computed using the Hodrick-Prescott filter. For these introductory numbers we use data beginning in the 1960s, when available. Later on in our regressions we use data for the 1980s and 1990s for developed economies and for the 1990s for emerging markets. These shorter samples yield similar conclusions.

0.51, for Argentina, and Brazil, respectively.

These patterns extend beyond these few economies. They can be generalized to differences between emerging and advanced economies. The top of Table 1 reproduces the above evidence while the bottom report the medians of similar statistics for emerging and advanced economies.[12] While the differences are not as dramatic as for the extreme country/episodes in our example, it is still apparent that the use of countercyclical fiscal policy is a reality for advanced economies but not for most emerging market economies.[13]

	Public Deficit, GDP	Government Expenditures, GDP
Argentina	1.96%	83.03%
Brazil	28.37%	50.83%
Italy	-52.69%	-37.94%
Emerging (median)	-4.41%	45.60%
Advanced (median)	-47.09%	9.08%

Table 1: Procyclicality of Fiscal Policy

We argued with our models that an important candidate for explaining the differences between both groups of countries is financial depth. In emerging markets, limited funding constrains the use of fiscal policy during crises.

Measuring financial depth as the ratio of credit to the private sector over GDP, Argentina and Brazil have ratios of 25% and 30% in the late 1990s, while in Italy the ratio exceeds 70% during the 1980s (i.e. the period of large public deficits).

More generally, Table 2 presents cross-country regressions of two measures of fiscal procyclicality on indices of financial development (private credit over GDP and liquid liabilities over GDP).[14] We report OLS and IV (using legal origins as instruments, along the lines of LaPorta, et al., 1998) results. Virtually all combinations tell the same story: there is a significant and negative effect of financial development on the degree of procyclicality of fiscal variables. That is, more financially developed economies experience more countercyclical fiscal policy.

These results are economically significant. For instance, a representative country in the top quartile of the distribution of private credit has a correlation between the cyclical

[12]The sample in this exercise corresponds to 88 emerging and 22 advanced economies with information in the 1960-2002 period. The classification of emerging and advanced economies follows that of the IMF.

[13]This was one of the central messages in IADB (1997).

[14]The source of our measures of financial development is the Financial Structure Database of the World Bank. Private credit includes credit by commercial banks and other financial institutions. Liquid liabilities include currency and deposits (time and interest-bearing) in banks and other financial intermediaries. (See Beck at al. (1999) for a detailed description of the original sources.)

components of GDP and deficit of -0.39; while that of a country located in the bottom quartile of the distribution is -0.04.[15]

Dependent variable: Correlation of:	Expenditures and GDP	Public Deficit and GDP
	Private credit	
OLS	-0.093	-0.098
	(0.007)	(0.027)
IV	-0.290	-0.374
	(0.048)	(0.004)
Number of countries	90	90
	Liquid liabilities	
OLS	-0.157	-0.100
	(0.003)	(0.073)
IV	-0.505	-0.439
	(0.019)	(0.008)
Number of countries	85	85

Table 2: Procyclicality of Fiscal Variables and Financial Development. Robust standard errors are reported in parentheses.

5.2 Evidence of State Dependent Crowding-Out

We now turn to assessing how crowding-out of private investment varies across advanced and emerging market economies, especially during severe contractions and crises. For this, we estimate:

$$I_{it} = \lambda I_{it-1} + \alpha D_{it} + \beta D_{it} C_{it} + \gamma X_{it} + \theta X_{it} C_{it}. \tag{11}$$

I, D and C, respectively, are (private or total) investment over GDP, public deficit over GDP, and an indicator function that takes a value of one if there is a "crisis" and zero otherwise. X is a group of controls, including a constant, and the relative price of capital.[16,17]

[15]The median country in the top quartile is South Africa with a ratio of private credit to GDP of 50%, while the median country in the bottom quartile is Nepal where private credit to GDP is only about 10%.

[16]We also have conducted robustness checks including the domestic real interest rate and domestic private credit growth as well as interactions of these variables with the crisis indicator. The results are unaffected by these additions. Probably, this is partly due to standard problems for interest rates to appear significant in investment equations. As well as due to the fact that in practice crowding out takes place through many channels which are only partially captured by domestic interest rates and bank loans.

[17]Aside from our specific tests, this specification is justified in more detail by Serven (2003).

All specifications include fixed effects and the lagged dependent variable on the right hand side is instrumented using the second lag of the dependent variable.

5.2.1 Data and samples

We obtain the data from multiple sources. Total investment and the relative price of capital are from Heston et al. (2002). We construct private investment by removing government investment from total investment. We obtain the former from the Government Finance Statistics of the IMF (GFS). The latter is also the source for the public deficit information. Growth of private credit and real interest rates were obtained from the World Bank's World Development Indicators.

Our panels are unbalanced, with the sample restricted to countries that have a minimum of five observations. We split the sample into two groups: one including 18 advanced economies and another including 13 emerging economies. We use the IMF's classification system to allocate countries to each of these groups. We include all the advanced economies in that classification: Australia, Belgium, Canada, Denmark, Finland, France, Greece, Ireland, Italy, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, UK, and USA. For less developed economies we restrict the sample to those countries that are sufficiently developed so as to have access to capital flows. Moreover, we exclude the transition economies because they experienced shocks and reforms of a very different nature during the 1990s. These two criteria plus the minimum of five observations for each variable reduce that sample of emerging markets to: Argentina, Chile, Colombia, Egypt, Indonesia, India, Mexico, Malaysia, Peru, Philippines, South Africa, Thailand, and Venezuela. We study periods when international capital flows are relevant for each of the groups: the 1980s and 1990s for the advanced economies, and the 1990s for the emerging market economies.

A key variable for us is the indicator of crisis. For this, we use three indicators built from the current account to GDP ratio, GDP growth, and country risk. The latter is measured as 100 minus the Euromoney country risk rating, which is available for the 1980s and 1990s for advanced economies and for the 1990s for emerging economies.[18] Our crises indicators take first differences of each of these variables. Crises are periods when these are located in the highest (lowest) quartile of the distribution of changes, across all countries, of current

[18]Note that the popular EMBI/EMBI+ constructed by JPMorgan is only available for a subsample of emerging economies and at most from 1994. The Euromoney country risk rating has been used in other papers, for instance Haque, et al., (1996) use this indicator to study determinants of country risk. The Euromoney index is built using polls of economists and political analysts. The index goes from 0 to 100, with an increase meaning a rise in creditworthiness and is a weighted average of analytical indicators (weight of 40%, including political risk, economic risk, and economic performance), credit indicators (weight of 20%, payment record and rescheduling), and market indicators (weight of 40%, access to bond markets, selldown on short-term paper, and access to discount available for forfeiting).

account and country risk (GDP growth). Table 3 summarizes the fraction of observations identified as crises for each set of countries.

	Definition of Crises			
	Period	Growth	CA	Country Risk
Emerging economies	1990s	7.3	7.3	9.3
Advanced economies	1980s	5.1	7.0	8.8
Advanced economies	1990s	2.9	2.1	2.0

Table 3: Fraction of crises-observations, by countries and periods

5.2.2 Main results

Tables 4 and 5 presents our main results from estimating equation (11). The former table reports results for private investment while the latter does it for total investment. The top half of each table contains the results for emerging market economies, while the bottom half reports the results for the advanced economies. The conclusions are quite clear and robust across most of the specifications:

- Crowding out is present in advanced and emerging economies but is much larger in the latter group (coefficient in the D_{it} rows).
- Most importantly for our hypothesis, while in advanced economies the extent of crowding out is similar across tranquil and crises times, in emerging markets crowding out rises significantly during crises (sum of coefficient in D_{it} and $D_{it}C_{it}$).
- In fact, in most cases crowding out during crises exceeds one even in the short run. The long run estimates, which simply divide the short run results by one minus the coefficient on I_{it-1}, typically exceed two – a very extreme form of crowding out.

6 Conclusion

We have shown how limited financial depth during crises constrains fiscal policy and limits its use as a countercylical policy instrument. In fact, using it in this fashion may backfire.

Emerging markets crises invariably stem from a combination of bad luck and financial factors. Argentina was no exception to these factors. However, one of the factors that set the Argentine experience apart was the poor response of the authorities to the initial phases of the crisis. Argentina was too late in adjusting its fiscal accounts. Along with

Emerging Countries			
I_{it-1}	0.475	0.535	0.439
	(0.000)	(0.000)	(0.000)
D_{it}	-0.739	-0.662	-0.793
	(0.000)	(0.000)	(0.000)
$D_{it}C_{it}$	-0.664	-0.159	-0.681
	(0.043)	(0.502)	(0.023)
C_{it}	-2.009	-3.403	-0.291
	(0.043)	(0.000)	(0.780)
Obs./Countries	106/13	106/13	106/13
Time Period	1990s	1990s	1990s
Crisis indicator	Growth	CA	Country Risk
Long-Run Crowding-Out			
Tranquil	-1.408	-1.424	-1.414
Crisis	-2.672	-1.766	-2.627
Advanced Countries			
I_{it-1}	0.482	0.488	0.472
	(0.000)	(0.000)	(0.000)
D_{it}	-0.178	-0.170	-0.229
	(0.000)	(0.000)	(0.000)
$D_{it}C_{it}$	0.101	0.177	0.057
	(0.346)	(0.029)	(0.223)
C_{it}	-1.357	-2.155	-0.332
	(0.064)	(0.001)	(0.373)
Obs./Countries	297/18	297/18	297/18
Time Period	1980-1990s	1980-1990s	1980-1990s
Crisis indicator	Growth	CA	Country Risk
Long-Run Crowding-Out			
Tranquil	-0.344	-0.332	-0.434
Crisis	-0.149	0.014	-0.326

Table 4: Private Investment. P-values are presented in parentheses. Covariates include the (log of)relative price of capital and interactions of this variable with the crisis indicator.

Emerging Countries			
I_{it-1}	0.504	0.537	0.455
	(0.000)	(0.000)	(0.000)
D_{it}	-0.746	-0.728	-0.800
	(0.000)	(0.000)	(0.000)
$D_{it}C_{it}$	-0.482	-0.066	-0.624
	(0.099)	(0.779)	(0.019)
C_{it}	-2.384	-2.583	-0.444
	(0.013)	(0.006)	(0.660)
Obs./Countries	112/13	112/13	112/13
Time Period	1990s	1990s	1990s
Crisis indicator	Growth	CA	Country Risk
Long-Run Crowding-Out			
Tranquil	-1.504	-1.572	-1.468
Crisis	-2.476	-1.715	-2.613
Advanced Countries			
I_{it-1}	0.436	0.448	0.450
	(0.000)	(0.000)	(0.000)
D_{it}	-0.215	-0.211	-0.255
	(0.000)	(0.000)	(0.000)
$D_{it}C_{it}$	0.083	0.164	0.063
	(0.405)	(0.019)	(0.127)
C_{it}	-1.105	-2.094	-0.437
	(0.106)	(0.000)	(0.178)
Obs./Countries	309/18	309/18	309/18
Time Period	1980-1990s	1980-1990s	1980-1990s
Crisis indicator	Growth	CA	Country Risk
Long-Run Crowding-Out			
Tranquil	-0.381	-0.382	-0.464
Crisis	-0.234	-0.085	-0.349

Table 5: Total Investment. P-values are presented in parentheses. Covariates include the (log of)relative price of capital and interactions of this variable with the crisis indicator.

the political environment, this poor response worsened the quality of Argentina's assets by reducing aggregate liquidity and reigniting fears of populism.

The recent experience of Brazil under President Lula reflects the other side of the coin. Faced with deteriorating external financial conditions, and contrary to expectations, Brazil's government endorsed tight fiscal discipline. Markets were positively surprised that the government was not as populist as many feared. The reaction was a sharp reversal of capital outflows.

Our model captures these events. Slow fiscal adjustment weakens investors' perception of the country's assets through two channels: it lowers the perceived quality of the government; and it reduces the liquidity of the country's assets by crowding out productive investments. Conversely, early adjustment can result in a dramatic improvement in the country's performance.

Our evidence points clearly in the direction of a crowding-out mechanism that is more severe in emerging market economies than in advanced ones. More importantly, this difference rises during periods of crises. In emerging markets, crowding-out is more than one-for-one during crises, suggesting that fiscal expansions at those times are in fact very contractionary. This, together with the direct impact of capital flow reversals, may explain why fiscal policy is much less countercyclical in emerging market economies than in advanced ones.

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