
Inflation targeting and the fiscal policy regime: the experience in Brazil⁽¹⁾

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This article reviews the recent experience of Brazil showing that credit risk is at the centre of the mechanism through which a central bank might lose control of inflation. Brazil during 2002 came close to a situation where fiscal policy hindered the effectiveness of monetary policy. But in early 2003 a change in investors' perception of the long-run fiscal stance brought the economy back to normal conditions, reducing credit risk, stabilising the exchange rate and, through these two variables, inflation expectations, inflation and the dynamics of the public debt. Brazil's experience could thus offer useful lessons for other emerging market economies, which consider adopting inflation targeting as their monetary policy rule.

Introduction

After the transition to a floating exchange rate, in January 1999, Brazil adopted an inflation-targeting regime. Analysis of monetary policy decisions since the floating of the currency shows that the central bank, the Banco Central do Brasil, has adjusted the short-term interest rate, the Selic, based on expected developments in consumer price inflation. This regime was initially a success. After a 60% devaluation in January 1999, consumer price inflation remained essentially stable: the yearly rate of increase of consumer prices, measured by the IPCA index, was 8.9% in 1999 and 6% in 2000. In 2001 the exchange rate fell again, by 25%, but inflation remained below 8%.

The honeymoon ended in early 2002. During that year the exchange rate depreciated by 38% and consumer price inflation jumped to 12.5%. This was not the result of a shift in monetary policy: interest rate decisions

continued to be based on developments in inflation expectations, and the Selic rate rose to 26.5%. Since early 2003, inflation expectations and actual inflation have declined, while the exchange rate has recovered significantly.

The Brazilian case is interesting. Brazil's public debt is about 60% of GDP, a relatively high ratio for an emerging market, and total tax revenues are 30% of GDP. Brazil's debt level is consequently more comparable with that of a European country where debt is around 100% of GDP, and taxes are close to 50% of GDP. Brazil's public debt, moreover, is either of very short duration, or indexed to the dollar. In such an environment, an increase in interest rates could lead to higher debt, higher credit risk, an exchange rate depreciation and, so, to higher rather than lower inflation. This effect could dominate more traditional channels. In such an environment, fiscal policy and perceptions of it have a prominent role to play in fighting inflation.

(1) This article draws freely from recent research on monetary and fiscal policy in Brazil jointly conducted with Olivier Blanchard, Carlo Favero, Alessandro Missale and Charles Wyplosz (Blanchard (2003), Favero and Giavazzi (2002, 2003), Missale and Giavazzi (2003) and Wyplosz (2003)). I thank them for having allowed me to use here many of the arguments and results presented in those papers.

(2) The Houblon-Norman Fund, a registered charity, was created in 1944 in commemoration of the Bank's 250th anniversary. It was named after Sir John Houblon, the first Governor of the Bank and Montagu Norman, the retiring Governor in 1944. Fellowships are awarded 'to promote research into and disseminate knowledge and understanding of the working, interaction and function of financial business institutions in Great Britain and elsewhere and the economic conditions affecting them.' George Fellowships were established within the Fund in June 2003, in recognition of the life-long achievements and service to the Bank of Sir Edward George and in particular his role as the first chair of the Monetary Policy Committee. The Houblon-Norman/George Fund is administered by Trustees, on the advice of an expert Committee. Senior Fellowships are awarded to distinguished researchers who have established a reputation in their field. Fellowships are also available for younger post-doctoral or equivalent applicants.

Fiscal dominance: theory and lessons from Brazil

The difficulties of running monetary policy in an environment where financial markets think that fiscal policy is unsustainable—in the sense that the expected sequence of future primary surpluses is considered, by investors, not to be large enough given the level of the public debt and the cost of debt service—are well known. Sargent and Wallace (1981) were among the first to point out that a reduction in the growth rate of money can result in higher, rather than lower, inflation if the government relies on seigniorage as a source of revenue, and the budget surplus is not adjusted after the fall in seigniorage revenue.⁽¹⁾

Sometimes, and often with specific reference to Latin America, this situation is referred to as a ‘regime of fiscal dominance’.⁽²⁾ More recently, the inability to control inflation if fiscal policy is believed to be unsustainable has been mentioned as an example of the ‘fiscal theory of the price level’, a view according to which fiscal, rather than monetary, policy is the main determinant of inflation.⁽³⁾

In the model analysed by Sargent and Wallace (1981), the mechanism through which the central bank loses control of inflation is the expectation that it will eventually have to give in and finance the government budget through money creation. In models of the fiscal theory of the price level, the mechanism is different but the final outcome is similar. In these models the price level is the only variable that can balance the government’s intertemporal budget constraint. Assuming that the sequence of future budget surpluses is given, there is only one price level that makes the stock of nominal bonds inherited from the past consistent with the present value of those primary surpluses. Consequently, it is the government’s intertemporal budget constraint that determines the price level.

While analytically elegant, these models are too simple to describe financial markets in emerging market economies. That is because they typically overlook credit risk, a variable that is at the centre of

macroeconomic developments in these countries. The experience of Brazil shows, in particular, that credit risk is the channel through which international financial shocks can push an emerging market economy into a regime of fiscal dominance.

Our illustration of how an inflation-targeting central bank might lose control of inflation will thus start from an analysis of the determinants of credit risk, and then move on to study how this interacts with the exchange rate, inflation, domestic monetary policy and the dynamics of public debt.

Credit risk, the exchange rate, monetary policy and the debt

The Brazilian economy has been heavily influenced by the fluctuations in the emerging markets bond index (EMBI) spread. This spread, which measures the difference between the yield on a dollar-denominated bond issued by the Brazilian government and a corresponding one issued by the US Treasury, indicates the market assessment of the probability that Brazil might default on its debt obligations.⁽⁴⁾ The Brazilian EMBI spread was 700 basis points in February 2002 and reached a peak of 2,400 basis points in September; after the October election the spread has gradually fallen, returning to around 670 basis points in September 2003 (for reference, throughout this period the Mexican spread has fluctuated between 200 and 400 basis points).

Fluctuations in the EMBI spread have been accompanied by similar fluctuations in the exchange rate (see Chart 1). Capital flows are part of the reason for this close correlation. An increase in the risk premium leads to a sudden halt to capital flows and thus to a (real) depreciation, which is needed to generate the trade surplus required to offset the decline in capital inflows. Since half the Brazilian public debt is denominated in dollars, fluctuations in the exchange rate thus produce corresponding fluctuations in the ratio of debt to GDP (see Chart 2 and Table A).

Domestic interest rates at all maturities are also indirectly affected by fluctuations in the EMBI spread. The policy rate, the Selic rate, is affected because

(1) See also Drazen and Helpman (1987) for an example where the fall in money creation results from the decision to peg the exchange rate. Sims (2003) discusses the limits of inflation targeting also in relation to fiscal dominance.

(2) See for instance Tanner and Ramos (2002) for a discussion of fiscal dominance in the Brazilian context in an earlier period. The difficulties of targeting inflation in the presence of fiscal dominance are also discussed in Fraga, Goldfajn and Minella (2003).

(3) See Woodford (2001) and Loyo (1999) for a specific application to Brazil.

(4) The EMBI is computed by JP Morgan.

Chart 1
Brazil, the EMBI spread and the exchange rate

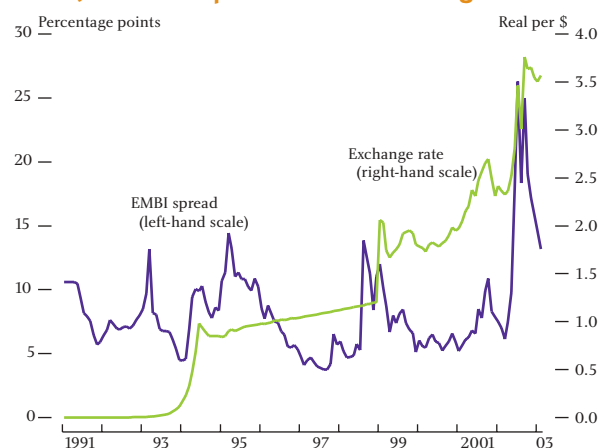


Chart 2
Brazil, the exchange rate and the net public debt

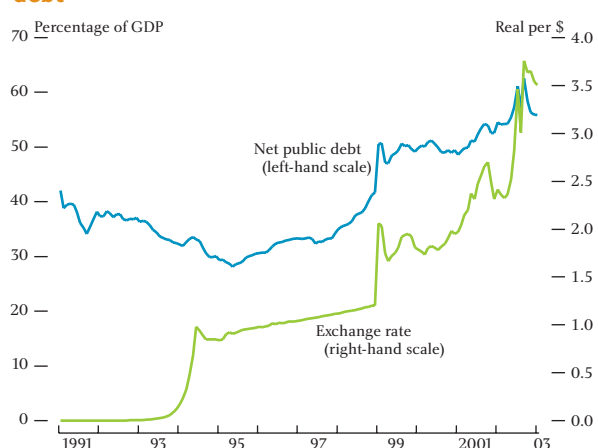


Table A
Composition of the Brazilian public debt,
December 2002

Per cent

Dollar-denominated bonds issued abroad	25.8
Fixed-rate bonds	3.0
Inflation-indexed bonds	8.5
Domestic bills indexed to the dollar	23.9
Domestic floaters linked to the Selic rate	31.1
Other	7.7

exchange rate fluctuations affect inflation expectations, and the central bank looks at inflation expectations when deciding on the level of the Selic rate. Moreover, an increase in the EMBI spread can affect inflation expectations directly if it is accompanied by concerns about the possibility of future monetisation of part of the public debt.

Domestic interest rates at longer maturities (where 'longer' means one to six months) are affected by the

EMBI spread via two channels: indirectly, because fluctuations in the Selic rate move the term structure, and directly because domestic financial instruments of longer maturities are not immune from credit risk.

The bottom line is that the cost of servicing the public debt, and the debt level itself, fluctuate very closely with the EMBI spread. Understanding what determines the EMBI spread is thus central to any discussion of macroeconomic policy in Brazil.

What determines the Brazilian EMBI spread?

The empirical evidence documents a high correlation between emerging market spreads and common international factors.⁽¹⁾ Calvo (2003), for instance, has observed that changes in such spreads are correlated with worldwide measures of investors' appetite for risk, such as the spread between US corporate bonds and US Treasuries. In fact, Calvo goes as far as suggesting that once one accounts for the US corporate spread, domestic factors in emerging markets appear to be irrelevant in explaining the spread.⁽²⁾

In the case of Brazil one also finds a positive correlation between its EMBI spread and the US corporate spread. This correlation, however, is not constant over time (see Chart 3): it appears to depend on the state of domestic macroeconomic fundamentals, and fiscal fundamentals in particular. When these are sound, the response of the EMBI spread to the US corporate spread is muted compared with periods when the fiscal fundamentals are relatively weak. Favero and Giavazzi (2003) find that the elasticity of the EMBI spread with respect to the US corporate spread is about 0.4 for a ratio of debt to GDP below 0.55, which increases asymptotically to 0.8 as the debt ratio rises.⁽³⁾

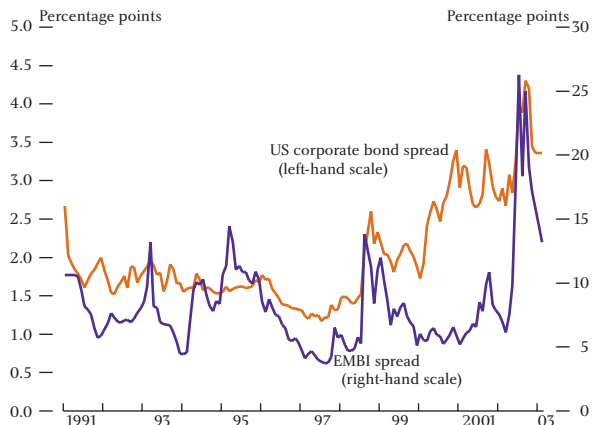
This finding has important implications for Brazil. It suggests that the ability of the economy to withstand international financial shocks critically depends on investors' perception of the country's future fiscal stance. Our estimated threshold—a debt-to-GDP ratio of 0.55—might capture the moment where investors' perceptions shift. The reason for such a shift could be the perception that beyond a given debt-to-GDP ratio, fiscal policy is not flexible enough to respond to

(1) Dungey *et al* (2000), for instance, find that most of the variability of world spreads is explained by a common international factor. There are, however, different views as to what such a factor might be. Arora and Cerisola (2001) find that the stance and predictability of US monetary policy are significant in determining capital market conditions in emerging markets. Kamin and von Kleist (1999) and Eichengreen and Mody (2000) report a negative relationship between the level of long-term US interest rates and emerging market spreads.

(2) Calvo's finding is confirmed in Herrera and Perry (2002).

(3) See Blanchard (2003) for empirical results along the same lines.

Chart 3
Brazil, the EMBI spread and the US corporate bond spread



fluctuations in the debt. Consider, for example, the effects of an international shock that raises the risk premium and thus the cost of debt service—the more so, the higher the debt ratio. The increase in the primary surplus required to keep the debt sustainable is larger, the higher is the initial debt ratio. If fiscal policy is not flexible enough, the initial increase in the risk premium is amplified, further widening the gap between the country’s primary surplus and the level that would be necessary to stabilise the debt.

There might thus be two very different monetary policy regimes, depending on the interaction between international factors (investors’ appetite for risk) and domestic fiscal policy. In the ‘good’ regime, the country is resilient enough to withstand international financial shocks, credit risk is low and monetary policy works in the usual way. Instead, when fiscal fundamentals are weak—because the debt is high and/or fiscal policy is unsustainable—credit risk and the economy may shift to a ‘bad’ equilibrium, where monetary policy can have perverse effects.

The dynamic effects of monetary policy in the bad equilibrium (the one characterised by fiscal dominance) can be described as follows. With a short duration of the public debt, an increase in the Selic rate raises the cost of debt service: if the primary budget surplus remains unchanged, the debt level rises, and so does the EMBI spread. The increase in the spread adds to the initial increase in debt, because it is accompanied by a depreciation of the exchange rate, which raises the value of dollar-denominated bonds in terms of domestic GDP. The exchange rate depreciation also affects inflation expectations and, eventually, actual inflation. This induces the central bank to increase the Selic rate

further, which again raises the cost of debt service, and so on.

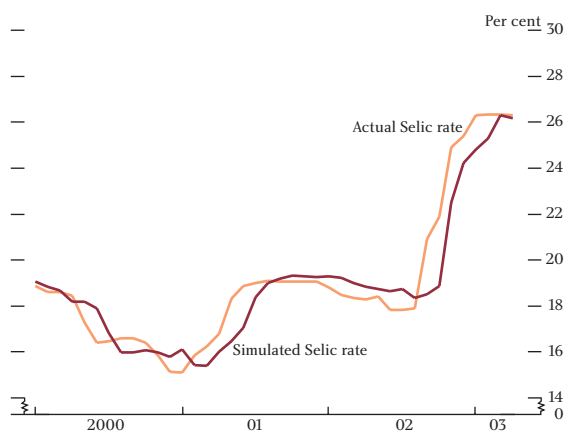
There is one caveat in this description. An increase in the Selic rate has two effects on the exchange rate. The direct impact, related to interest rate arbitrage, is positive: an increase in the Selic rate appreciates the exchange rate. But there is also a second effect: if an increase in the Selic rate raises the debt level and credit risk, the EMBI spread will rise and the exchange rate will depreciate. The second channel explains why monetary policy may have perverse effects.

Inflation targeting in Brazil

The best way to describe Brazilian monetary policy since the adoption of a floating exchange rate regime is through a simple monetary policy rule where the Selic rate responds to one year ahead inflation expectations. A measure of inflation expectations is available, in Brazil, from the daily survey conducted by the central bank.

Estimation of such a rule, over a sample period starting with the adoption of inflation targeting in early 1999, finds that the response of the Selic rate to an increase in one year ahead (survey-based) inflation expectations is greater than unity, a finding that suggests that monetary policy does not accommodate inflation and that real interest rates are raised when inflation expectations increase. The Selic rate also appears to be rather persistent, with an autocorrelation coefficient of 0.84. Chart 4 shows the path of actual Selic rates since January 2000, and the Selic rate obtained through the (dynamic) simulation of the estimated policy rule (see Favero and Giavazzi (2002) for a description). The chart shows that the estimated rule performs rather well. It is

Chart 4
Brazil, actual path of the Selic rate and path simulated using estimates from a policy rule



interesting to note that if one augments this simple monetary policy rule by adding more explanatory variables, such as, for instance, the exchange rate or a measure of the output gap, none of them appears to be significant, suggesting that the Banco Central do Brasil applies a rather 'clean' version of inflation-forecast targeting.

Inflation targeting under different fiscal policy rules

In this section, using a simple macroeconomic model of Brazil, we illustrate how the economy might end up in a regime where inflation targeting has perverse effects, and what would be needed to return it to a normal situation. The model is estimated in Favero and Giavazzi (2003) and consists of two main equations: one for the determinants of the EMBI spread, which we discussed above, and another that specifies a fiscal rule. These are complemented by three more equations, for the exchange rate, for inflation, and for inflation expectations.

A regime of fiscal dominance is one in which the primary budget surplus does not respond, or not enough, to fluctuations in the level of the debt and in the cost of debt service. The estimated fiscal policy reaction function for Brazil over the period January 1999 to January 2003 shows that the primary surplus is rather persistent (despite having increased from around 2% to just above 4% of GDP since 1998) and that neither the response to fluctuations in the debt, nor in the cost of debt service are very significant. In such a situation even small international shocks, such as those that hit Brazil in 2002, might be enough to push the economy into a bad equilibrium.

Charts 5 and 6 help to understand the dynamics of the economy in the bad and the good equilibrium.

Monetary policy with the estimated fiscal rule

We start from the macroeconomic conditions prevailing at the beginning of 2003. At that time, the debt level was 57% of GDP, just above the estimated threshold; the primary surplus was 4% of GDP, inflation was 12%, the central bank inflation target had just been raised to 8.5%, and the Selic rate was 25%. We then simulate the model from July 2003 onwards, using the inflation target

path announced by the central bank: 8.5% in 2003 and 5.5% in 2004.

We keep the inflation target constant at 8.5% throughout 2003. In 2004 we then allow the target to fall gradually, reaching 5.5% in December. Moreover, we keep the federal funds rate and ten-year US interest rates fixed at their levels in January 2003 (of 1.25% and 3.36% respectively). The results are shown in Chart 5.

The simple monetary policy rule brings the Selic rate as high as 32%, but the jump in the risk premium prevents monetary policy from stabilising the exchange rate and the debt level rises. Although the debt does not spiral out of control and inflation does not diverge from target, the risk premium effect has important consequences and monetary policy has a perverse effect on the exchange rate. Inflation fluctuates at very high levels, despite the aggressive monetary policy. The increase in the debt ratio induces a tighter fiscal stance, but the increase in the primary surplus from 3.9% to 4.1% of GDP is insufficient to stabilise the economy.⁽¹⁾

Monetary policy with a more aggressive fiscal rule

Next, we ask what change in the fiscal rule would be necessary to make monetary policy effective. We experiment with rather mild modifications in the estimated fiscal rule, which we change in three ways.

- We increase the response of the primary deficit to deviations of the ratio of debt to GDP from 55%.
- We reduce the persistence of the primary deficit.
- We increase the long-run surplus from 4% to 5%.

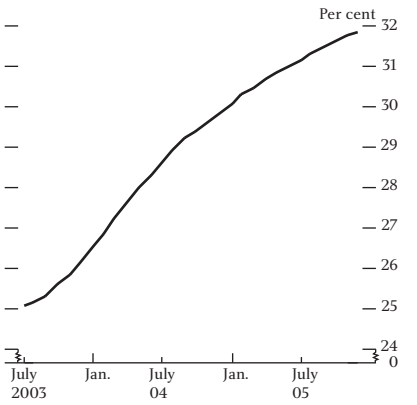
The results are reported in Chart 6. With the new fiscal rule, a small increase in the Selic rate is enough to appreciate the exchange rate. That is because the effect of the Selic rate now dominates in the exchange rate equation, causing the exchange rate to appreciate. The appreciation lowers the debt ratio immediately, and is accompanied by a fall in the EMBI spread. Inflation also falls.

In this exercise a rather minor change in the fiscal rule is sufficient to eliminate the perverse effect of monetary policy. That is because the Brazilian debt level in early

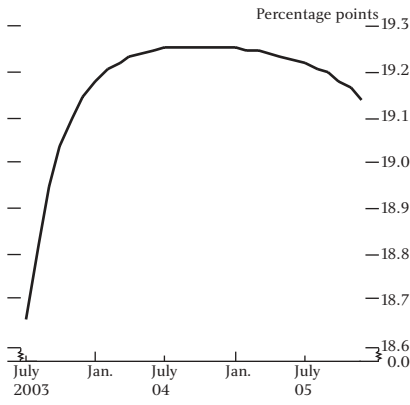
(1) This exercise does not display the explosive inflation behaviour described in Loyo (1999) and Sims (2003) in the case of a 'non-Ricardian' fiscal regime. That is because the estimated fiscal policy reaction function implies an increase in the primary surplus as the debt ratio rises: it is thus 'Ricardian', though only weakly so. However, the fact that the EMBI spread remains high prevents the monetary authority from bringing inflation back close to the target.

Chart 5
The simulated effects of targeting inflation with a less aggressive fiscal policy rule

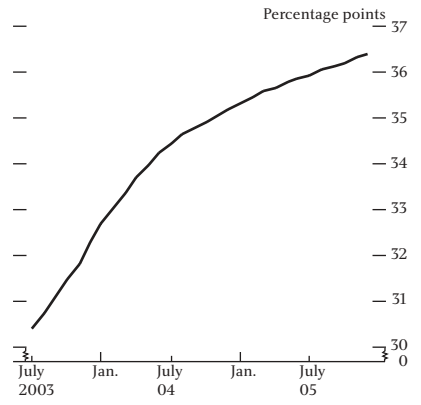
Selic rate



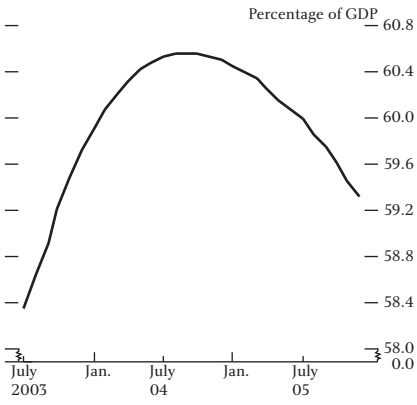
EMBI spread



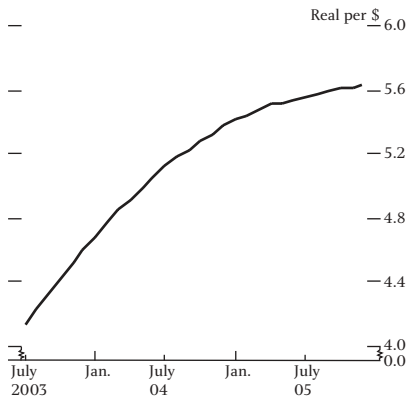
Swaps spread



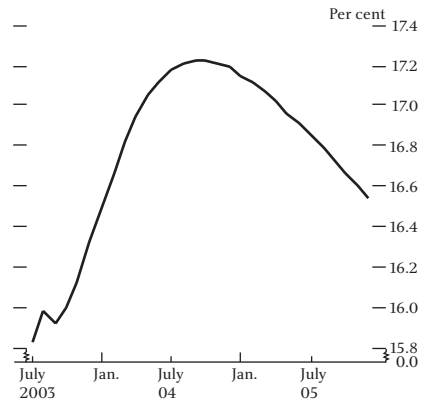
Net public debt



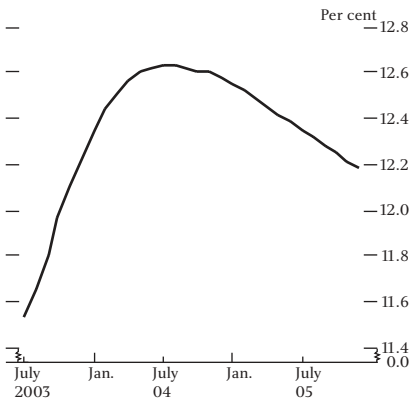
Exchange rate



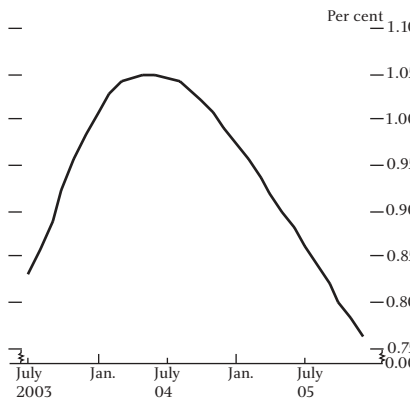
Inflation



Inflation expectations



Output gap



Primary deficit

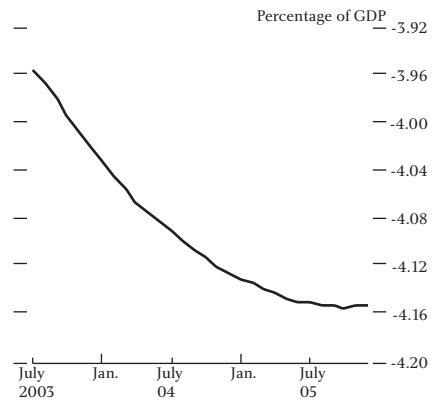
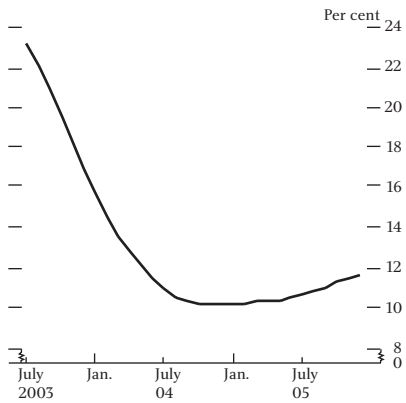
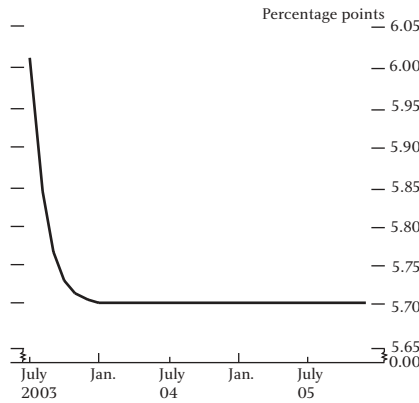


Chart 6
The simulated effects of targeting inflation with a more aggressive fiscal policy rule

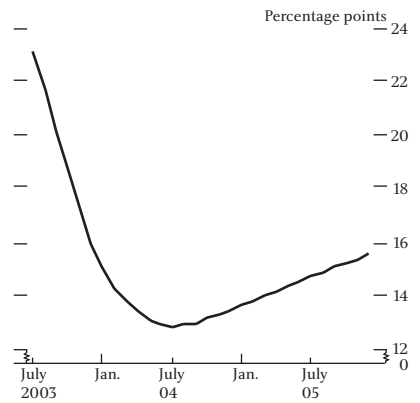
Selic rate



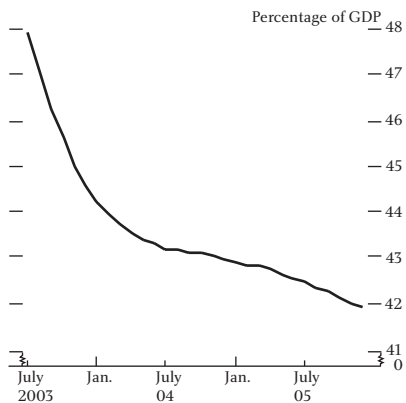
EMBI spread



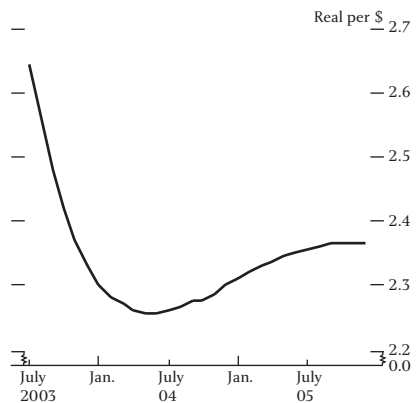
Swaps spread



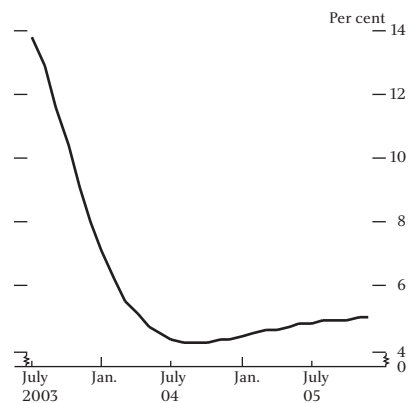
Net public debt



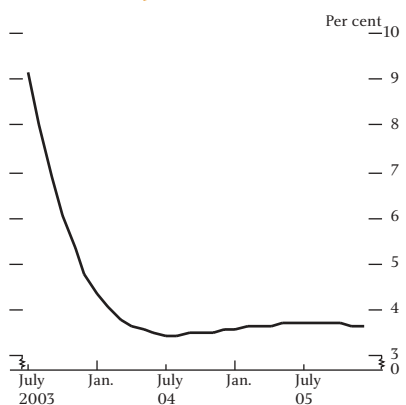
Exchange rate



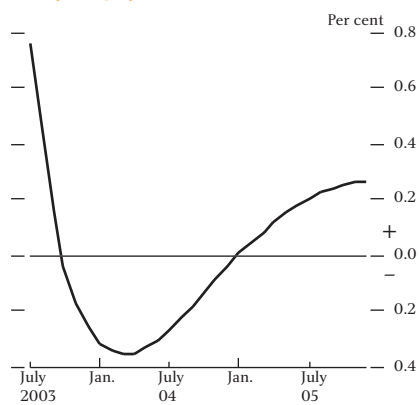
Inflation



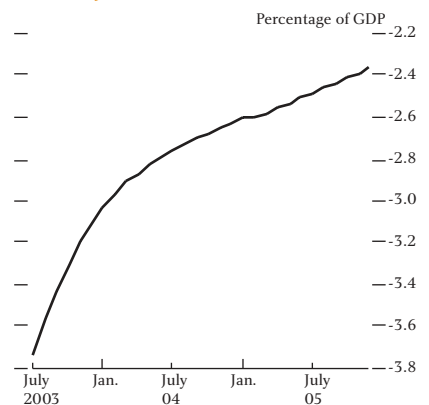
Inflation expectations



Output gap



Primary deficit



2003 was very close to the point where investors' perceptions of solvency shift, as estimated in Favero and Giavazzi (2003).

As discussed above, what we may be describing are the effects of a shift in investors' perceptions of the future fiscal stance induced by a small change in current fiscal policy.

Fiscal policy under the Lula government

One of the first announcements of Brazil's new President, Ignacio Lula da Silva, was an increase in the target for the primary budget surplus, from 3.75% to 4.25%. The outcome for 2003 might actually be even better, since the increase in inflation has improved the budget: revenues are indexed to GDP, while expenditure is generally fixed in nominal terms. The change in fiscal policy was apparently minor, but may have served to shift the economy to a 'good' equilibrium.

Conclusions

We have reviewed the recent experience of Brazil to show how credit risk can be at the centre of the mechanism through which a central bank that targets inflation might lose control of inflation—in other words, of the mechanism through which the economy might move

from a regime of 'monetary dominance' to one of 'fiscal dominance'.

The literature, from Sargent and Wallace (1981) to the modern 'fiscal theory of the price level', has discussed how an unsustainable fiscal policy may hinder the effectiveness of monetary policy, to the point that an increase in interest rates can have a perverse effect on inflation. We have shown that credit risk reinforces the possibility that a vicious circle might arise, making the fiscal constraint on monetary policy more stringent.

Having analysed the recent experience of Brazil, we believe that we have identified an interesting episode where this could have happened. But the episode also shows how critical the behaviour of fiscal policy is. The economy could have fallen into a bad equilibrium, where fiscal policy would have hindered the effectiveness of monetary policy. But a small change in the fiscal stance in January 2003, coupled with a change in investors' perceptions of long-run fiscal policy, appears to have been sufficient to bring the economy back to normal conditions, stabilising the EMBI spread, the exchange rate, and, through these two variables, inflation expectations, inflation and the dynamics of the public debt.

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