Inflation Targeting in the Context of IMF-Supported Adjustment Programs

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I. Introduction

Explicit inflation targeting, as a formal framework for conducting monetary policy, is not a new element in the analytical toolbox utilized by the IMF staff in its examination of the macroeconomic conditions of its member countries. However, while the IMF has indeed been engaged for several years in assessing the functioning and the effectiveness of explicit inflation targeting in countries that have embraced that framework, such an involvement has been part of its surveillance function—i.e., has been connected to the analysis performed during the yearly consultations that the IMF undertakes with its members. In other words, the concept of inflation targeting has not been directly associated with IMF lending operations.

In recent years, however, an increasing number of countries, including many emerging market economies, have abandoned their fixed exchange rate regimes and have moved towards a more flexible exchange rate system and, in the process, have adopted inflation targets as their monetary anchor. In this context, it became increasingly likely that the IMF was bound to face a situation in which it is called to provide financial assistance—and therefore agree on a financial program—with a country that is using, or has decided to adopt, explicit inflation targets as the key component of its monetary policy framework. Indeed, shortly after adopting a floating exchange rate regime in mid-January 1999, the Brazilian authorities announced their intention to put in place a formal inflation targeting

framework and, in the months that followed, the inflation targeting framework was implemented, in the context of the ongoing IMF-supported adjustment program.

These developments posed particular analytical and practical challenges in terms of the operational procedures of the IMF in its financial relations with its member countries. The challenge resulted from the need to reconcile the inflation targeting framework with the conceptual and practical aspects of ***conditionality.*** Conditionality is the device utilized by the IMF, in the context of its financial programs, to establish safeguards that would increase the certainty that its resources are only temporarily used. This, in turn, implies the adoption of so called *performance criteria,* i.e. formal quantitative targets on a defined number of variables, agreed between the member country and the IMF. The evolution of these variables are subject to verification, and the fulfillment of these criteria are the condition for a disbursement to take place. In the monetary policy area, performance criteria in Fund programs have traditionally been set in terms of specific quantitative limits on the evolution of certain monetary variables. Typically, a floor is set for the level of net international reserves (NIR) and a ceiling is established on the net domestic assets (NDA) of the central bank.

At first sight, therefore, it would appear that the inflation targeting framework, by the very nature of its operating procedures, may not be compatible with the traditional monetary conditionality framework usually embodied in Fund programs. This is so because the actual implementation of inflation targeting is largely based on the premise that an independent central bank can use, at its own discretion, its various instruments, in the proportions considered appropriate in each particular circumstance, in order to ensure the attainment of

its inflation goal. This seems to clash with a scheme that sets explicit and somewhat rigorous quantitative objective for key monetary variables.

In this circumstances, and considering that it is the prerogative of the member countries to adopt the specific monetary framework of their choice, the IMF faced the question of whether and how to adapt monetary conditionality to the specific features of monetary policy under inflation targeting. It was concluded that, in principle, inflation targeting could be accommodated within the traditional structure of monetary conditionality in Fund programs, given that this conditionality focuses primarily on a program's balance of payments objective. At the same time, it may be desirable to modify and supplement traditional monetary conditionality by introducing features that reflect the specific functioning of the inflation targeting framework.[2]

The main objective of this paper is, therefore, to consider the issues that arise from the adoption of inflation targeting in the context of the conditionality embodied in Fund programs, and to discusses a number of options for adapting the monetary conditionality of the programs to these particular cases. The next section briefly reviews in more detail the role of monetary conditionality in Fund programs; section III discusses traditional monetary policy conditionality and consider the practical problems that may arise in the context of inflation targeting; section IV explores different options for implementing and strengthening

[2] A number of internal documents were prepared and discussed within the IMF in order to clarify the various aspects of this approach. Some of the considerations and arguments raised in these discussions are reflected in various part of this paper.

monetary policy conditionality in the context of inflation targeting; section V shows, briefly, how conditionality was adapted to inflation targeting in the context of Brazil and tests how some of the alternative options, particularly simple Taylor rules, would have fared in the context of Brazil during the first year of operating under the inflation targeting framework. The paper concludes with some general conclusions, preliminary in nature, that are largely intended to stimulate further discussion.

II. Fund Programs: The Role of Conditionality

In Fund programs, conditionality refers to the linkage between the achievement of a set of policy objectives and the continuous access to IMF resources.[3] The policy objectives are agreed between the IMF and the authorities of the member countries and, while these objectives vary, the attainment of a viable balance of payments position is the *sine qua non* target in every Fund program. In this manner conditionality provides a safeguard for the IMF's financial resources. The specification of the policy objectives—and the calibration of the quantitative targets--should ensure that the need for such financing is only temporary and that the borrowed funds will be repaid. Put another way, conditionality provides a yardstick for evaluating whether the policies that are being carried out are moving the country toward the achievement of the policy objectives, in particular a sustainable external balance . By doing so, conditionality also ensures the temporary use of the IMF's resources.

The effective implementation of conditionality does not involves day-to-day monitoring of a country's macroeconomic policies but requires a mechanism for assessing whether policies are on track for achieving their stated goals, or whether they need to be adjusted in response to unanticipated shocks, changes in economic relationships, or other new information. The monitoring mechanism in Fund programs consists of a set of explicit criteria—particularly ***performance criteria***, but also ***indicative targets***, and ***structural***

[3] The word "conditionality" does not appear in the Articles of Agreement of the IMF and the concept has evolved in stages. For a discussion of the legal aspects of the development of IMF conditionality, see Gold (1979); Guitián (1981) discusses the evolution of Fund conditionality from an economic point of view.

benchmarks—that should be met if a country wishes to make further drawings under the Fund program. These performance criteria typically refer to key macroeconomic variables—fiscal and monetary policy outcomes, including fiscal balances (e.g., the overall or primary balance), indebtedness (e.g., public sector debt, public external debt, and its short-term component), and monetary variables, such as NIR and NDA[4]—that indicate whether macroeconomic policies are on track. In addition, programs may include performance criteria related to certain structural reform measures (structural benchmarks). While performance criteria permit a backward-looking assessment of policies, periodic program reviews, which are often carried out quarterly, provide for a forward-looking overall assessment of the Fund program vis-à-vis the government's macroeconomic policy objectives.

Quantitative macroeconomic performance criteria in Fund programs do not typically rely on a specific macroeconomic model. They do, however, make use of various balance-sheet identities that link monetary and fiscal variables with the balance of payments, to ensure that the Fund program is internally consistent. Moreover, performance criteria are typically not hard and fast targets; rather they can be thought of as signaling devices that flag a possible need for corrective action in case of deviations.

[4] Usually, NDA are defined to equal base money minus NIR.

III. Monetary Conditionality—The Traditional Approach and its Implications for Inflation Targeting

Monetary policy conditionality has been at the core of Fund conditionality. As mentioned above, it has traditionally relied on two performance criteria: a ceiling on central bank's NDA and a floor on its NIR.[5] Originally rooted in the concepts that arise from the so-called "monetary approach to the balance of payments," this methodology has been utilized under a variety of conditions and monetary policy frameworks. Its primary focus has always been to ensure that a program leads to external viability rather than tight control over inflation. In this context, performance criteria that set a floor on NIR are designed to indicate whether a Fund program is likely to achieve its external objective. On the other had, the ceiling on NDA could be seen as an additional protection, since it seeks to ensure that the external objective is not jeopardized by excessive credit expansion or by sterilized intervention, i.e., by compensating unprogrammed NIR losses through additional credit creation. The analytical underpinnings of this framework is rooted on the assumption that the demand for base money matters from a macroeconomic perspective, and that it is stable and predictable.

[5] While these have been by far the most common variables used in the design of monetary conditionality, in many countries other monetary aggregates have been targeted and, in some cases, sub-ceilings for specific types of domestic assets were also implemented.

In practice, the expected functioning of the NIR/NDA performance criteria would be as follows.[6] An anticipated, or baseline, path for net international reserves is projected and a floor for NIR is set at or somewhat below the baseline. At the same time, the NDA ceiling is established at a level that, in conjunction with the projected evolution of velocity, is consistent with the NIR baseline. If a country's actual NIR start falling toward the agreed NIR floor—maybe because of a sudden external shock—monetary policy needs to be tightened, usually through open market operations. The resulting increase in interest rates would be expected to stop further NIR losses. More generally, as long as actual NIR remain close to their baseline, the ceiling on NDA effectively limits base money expansion, thereby preventing monetary policies from putting additional pressure on the external balance and fueling inflation. Thus, the NIR/NDA mechanism sets off warning signals when NIR fall too low or when there is significant sterilization of unprogrammed sales of foreign exchange. However, the NIR/NDA framework does not prevent larger-than-programmed NIR increases from fueling monetary expansion and thus inflation.

It is within this framework that the appropriateness of the traditional NIR/NDA framework under an inflation targeting regime may be questioned. One may argue that, as inflation targets go hand-in-hand with floating exchange rate regimes, floors on NIR have no place or are simply irrelevant.[7] However, while under inflation targeting the central bank

[6] Also see Table 1 for an overview.

[7] Of course, some inflation targeting countries maintain (or did maintain in the past) a managed float, sometimes even with exchange rate bands. This could lead to conflicting objectives between the inflation target and the exchange rate band.

would not be expected to use its NIR to stabilize the exchange rate per se, it may react to movements of the exchange rate to the extent that they threaten the inflation target. As most floats are not pure floats, trade-offs between domestic objectives (i.e., inflation) and external objectives (i.e., external viability) may be unavoidable, at least conceptually. Thus, even when the exchange rate is flexible, retaining a NIR floor simply reflects the fact that one important aspect of a Fund program is to safeguard external viability.

While an NIR floor safeguards external viability independent of the monetary policy framework, retaining an NDA ceiling in the context of inflation targeting would seem somewhat more problematic. With a central bank that targets inflation and a Fund program that focuses on the quantity-based framework of NDA ceilings, there could be cases where there would be little correspondence between the monetary objectives underlying these programs, and the relevant instruments to achieve the inflation targets. In addition, the communication with the markets and the public regarding the stance of monetary policy could easily become outright confusing. This is important, because inflation targeting, by its very nature, relies critically on transparency of the central bank's policy actions. This general problem would be compounded by the fact that inflation is, in most cases, not primarily a function of NDA or its components and, therefore, it is unlikely to respond predictably or immediately to changes in NDA or base money.

Hence, an NDA ceiling could easily set off false alarms and confuse markets when there is, in fact, no need to change monetary policy from the point of view of the inflation objective. For example, one may easily conceive a situation where actual NDA exceeds the

NDA ceiling, while both actual and projected inflation are still within their target. Should monetary policy be tightened in these circumstances, or should the NDA ceiling be revised upward? Since inflation is the target, an upwards adjustment seems to be the only appropriate course of action. Similarly, when actual NIR is running significantly above the NIR floor while base money is close to the projected baseline, monetary policies could only be eased to the extent that the inflation objective is not jeopardized. In general, as shown in Table 2, when inflation is the overriding objective, having an NDA ceiling may be considered somewhat superfluous or, at least, a nonbinding constraint.

IV. Options for Implementing and Strengthening Monetary Conditionality under Inflation Targeting

With an increasing number of countries abandoning fixed exchange rate regimes and moving toward formal inflation targeting, and given the potential inconsistencies that could arise in the context of Fund programs, it seems that monetary conditionality needs to be modified in order to reflect more closely the main parameters of decision making under inflation targeting. Ideally, under inflation targeting monetary conditionality should be geared towards the evaluation of the monetary policy stance vis-à-vis the government's announced inflation target. However, this would require an exceedingly good understanding of the transmission channels and of the precise parameters of monetary policy.

Moreover, monetary conditionality should primarily apply to specific policy actions and policy instruments, since country authorities cannot commit to achieve a particular level of a variable over which they do not exercise some decisive degree of control. Hence, ideally,

monetary conditionality should involve the parameters of a *policy reaction function*, i.e., the summary forward-looking rule governing the policy responses to projected deviations of inflation from the inflation target. Following this reasoning, a conditionality device that could potentially be included in Fund programs under inflation targeting could be an operational rule for reacting to actual or expected deviations from the targeted inflation path. This rule should, again ideally, be a simple but robust reaction function that relates changes in an instrument (e.g., interest rates) to deviations of inflation from its target. In practice, however, it would be difficult, if at all possible, to specify the exact timing and size of the response parameter, e.g., by how much and when should an interest rate be adjusted when projected inflation deviates from its target by a given amount. Also, while a very specific reaction function may work in one program, this may not be sufficiently general and flexible to accommodate different approaches to inflation targeting, and therefore, given the IMF's commitment to provide equality of treatment to all its members, this could possibly entail some problems of cross-country comparability.

Despite these limitations, and while it may not be possible to specify a very precise and robust policy reaction function, it may still be useful to strengthen monetary policy conditionality by having a simple forward-looking mechanism for gauging the monetary policy stance vis-à-vis the inflation target. In this context, it could be useful to consider simple monetary policy rules, such as Taylor rules for the short-term interest rate, or a McCallum rule for the monetary base. These rules are quite flexible to encompass a range of

information that is deemed relevant. A simple Taylor rule,[8] for example, can be expressed as

$$r = r^* + a(Y - Y^*) + b(p - p^*),$$

where r is the nominal short-term interest rate, r^* is an estimated nominal equilibrium interest rate that is consistent with the target inflation rate (that is $r^* = \bar{r} + p^*$ with $\bar{r}$ being the equilibrium real interest rate and p^* being the relevant inflation target); Y is output and Y^* is capacity output; B is inflation (either actual or projected); and $"$ and $\$$ are coefficients, with $a \geq 0$ (and typically between 0 and 0.5, depending on the degree to which the output gap figures in the central bank's reaction function) and $b > 0$ (and typically between 1.5 and 2, so that the nominal short-term interest rate moves significantly in response to deviations of inflation from the inflation target). In an open economy, one could add a number of other variables in this rule, e.g., the external current account, or the foreign output gap. Also, the rule could include other variables that reflect conditions in the domestic economy such as the budgetary balance or other fiscal variables.

In fact, within this context it is also feasible to include in a Taylor rule different inflation measures, such as in the following rule:

$$r = r^* + a(g(p^a - p^*) + (1-g)(p^p - p^*)),$$

where p^a is actual inflation and p^p is projected inflation and $0<(<1$. Moreover, one could include competing inflation projections in a similar fashion. Hence, a Taylor-rule is a very

[8] See Taylor (1993) for the original formulation.

flexible formulation and can be specified to encompass a number of country-specific considerations.

Given that a key element in a Taylor rule is the parametric reaction to deviations between actual or projected inflation and the inflation target, an obvious weakness of such an approach is that, by definition, it would not react to shocks that are omitted from its specification. Clearly, a Taylor rule would only show a reaction to an external shock if that shock is, in one way or another, part of the rule. However, while a Taylor rule is likely to be only of limited use to policymakers facing real-time decisions, it may serve as a simple and easily understood starting point for thinking about monetary policy.[9] Such type of considerations could also be an argument for including a Taylor rule in an Fund program: as a rough check on the monetary policy stance. In practice, the exact specification of the rule would probably involve some trial and error. To reduce the likelihood of false alarms, one could consider specifying the rule somewhat cautiously. For example, one can choose $\bar{r}$, the equilibrium real interest rate that underlies r^*, to be slightly lower than the best available estimate based on historical data; this would add some limited flexibility for lowering interest rates.

In practical terms, the question of adapting monetary conditionality, beyond the incorporation of some Taylor-type rule, continues to turns around the question of the NIR/NDA framework. It could be said that, as of current thinking—and as discussed below

[9] See, for example, Kozicki (1999) for a review.

in the context of the Brazilian program—the view is that NIR floors would continue to be needed to safeguard the program external objectives, but NDA ceilings may not necessarily remain the preferred choice for monetary conditionality. The ceiling on NDA could be justified because it would probably prevent large departures from inflation objectives, but it may well not provide adequate guidance to a monetary policy aimed at a more precise inflation target. The main objective of the quantitative limits in inflation target situations would be to reinforce the country's commitment to a flexible exchange rate policy and to limit sterilized foreign exchange market intervention and base money expansion when the external position is weak.[10]

Another element in the adaptation of conditionality should be the enhanced role of ***policy reviews***, particularly to include an assessment of monetary policy in the context of inflation targeting (including, but not limited to, the agreement on a reaction function, or the possible specification of a Taylor rule). The program would need to specify a quarterly inflation path consistent with the authorities inflation targets and, in the context of the review, current and projected inflation would be compared with these targets, and agreement on specific policy actions would be reached whenever the outlook suggested that inflation objectives are likely to be missed.

[10] Such safeguards seem especially relevant when the authorities tend to view any exchange market pressure as essentially short lived.

V. Adapting Monetary Conditionality to Inflation Targeting: the Case of Brazil

Brazil has been the first inflation targeting country with a Fund program. Given institutional constraints that require similarity of treatment and, hence, a high degree of comparability of Fund programs across countries, it took some time to tailor the Fund program with Brazil to the floating exchange rate regime with the nominal inflation anchor. Initially, the Fund program with Brazil made recourse to the standard monetary conditionality—an NIR floor and an NDA ceiling—although it introduced some interesting innovations. In general, as shown in Table 3, whereas the initial Fund program with Brazil in December 1998—under the fixed exchange rate regime—relied mainly on a strict NDA ceiling for conditionality in the monetary area, the NDA ceilings were made less binding after Brazil adopted the inflation targeting framework, and were completely phased out in June 2000 with the inflation targeting framework fully established. In contrast, while the initial program included an NIR floor that was intentionally fixed at a low (or nonbinding) level to allow the BCB to use part of its actual NIR to defend the fixed exchange rate, if needed, the NIR floor became the key instrument of conditionality in the first few reviews in 1999, in an environment where uncertainty concerning the new nominal anchor was still considerably high. In July 1999, the NIR/NDA conditionality was supplemented with a general consultation mechanism on inflation targets. In November 1999, less than six months after the inflation targeting framework was established, the Fund program introduced a formal consultation band on inflation to supplement the floor on NIR.

The progressive shift away from NDA ceilings following the adoption of the inflation targeting framework reflected the need to adapt the program better to the changes in the monetary policy regime. The shift also reflected the growing realization of the fact that base money does not appear to play a significant role in the monetary transmission mechanism in Brazil.[11] Money demand in general, and the demand for base money in particular, seem not very sensitive to interest rates in Brazil. Seasonalities, remonetization under the *Real* plan, and the effects of tax changes have been quantitatively more important and statistically more significant determinants of base money than variables like income or the interest rate.[12]

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[11] In general, the main transmission channels of monetary policies are the exchange rate, wages, asset prices, and aggregate demand. In the case of Brazil, and in light of the economic conditions that have prevailed since the inflation targeting framework was established in mid-1999—characterized by still fairly high real interest rates, tight fiscal policy, relatively subdued aggregate demand, and negative real wage growth—it would seem that the exchange rate was the main actual channel of transmission to inflation. This would be consistent with recent findings which suggest that the unwinding of real exchange rate misalignments in the context of a depreciation has been the most important determinant of inflation in developing economies (Goldfajn and Werlang (2000); also see Schwartz (1999) for the case of Brazil). Of course, in a floating exchange rate regime, the exchange rate itself is not a policy variable. For a discussion of the transmission mechanism of monetary policy in Brazil, also see Rabanal and Schwartz (2000a).

[12] For the purpose of establishing NDA ceilings, the demand for base money was estimated as the sum of its two parts: currency issued and reserves on demand deposits. Currency issued was usually estimated using a linear trend (to capture the ongoing remonetization of the economy), various seasonal dummies (e.g., for December, January, and February), and lagged dependent variables. Demand deposits were usually estimated using seasonal dummies, dummies for tax effects (e.g., changes in the tax on financial transactions (CPMF), and the nominal interest rate). Reserves on demand deposits were derived by applying an effective reserve rate to the projected level of demand deposits. In the short term, these projections fared quite well, but larger deviations from the econometric estimates occurred at times of shifts in seasonalities (e.g., carnival in March instead of February), or when special factors, such as tax changes (e.g., in the CPMF) or the "Y2K bug" did not have the anticipated effects.

The formal consultation mechanism on inflation, introduced in the November 1999 review of the Fund program, was based on the annual central inflation target and the tolerance bands announced by the Brazilian government.[13] Under the program, a simple linear quarterly path was established where the central inflation target and the outer band surrounding the target decline by 0.5 percentage points each quarter. Also, the program established an inner consultation band of +/-1 percentage point ("inner band") around the target path, which follows the exact same linear quarterly pattern as the target path and the outer band. Accordingly, and this was the innovation in conditionality, the Brazilian authorities would informally consult with IMF staff on the appropriate policy response if the observed 12-month rate of inflation were to go above the inner band; they would more formally consult with the IMF Executive Board on the appropriate policy response if the observed 12-month rate of IPCA inflation were to go above the outer band.

How has this mechanism worked? Figure 1 shows Brazil's actual inflation performance in relation to the consultation bands. The BCB met its end-1999 inflation target and is well on its way to meet its targets for the year 2000. A small excess over the inner-band threshold in September 2000 triggered an informal consultation with staff. It reflected a temporary surge in monthly inflation rates in July and August, due to unanticipated supply shocks that abated in September; core inflation had already remained relatively more subdued throughout the third quarter of 2000.

[13] Specifically, 8 percent at end-1999 and 6 percent at end-2000, each with a tolerance band of +/-2 percentage points ("outer band") around the central target.

VI. Actual Policies and Taylor Rules: A Simulation for Brazil

Mainly for illustrative purposes, this section explores the usefulness of some simple Taylor rules as an option for strengthening the monitoring of monetary policy stance in the context of a Fund program in a country operating under an inflation targeting framework. The basic idea is simple: if it were possible to conclude that a simple monetary policy rule tracked actual policies fairly well, then it may be possible to use the same rule to help evaluate the appropriateness of the current monetary policy stance vis-à-vis the inflation target. For this purpose, we use as an example the experience of Brazil during its first year under inflation targeting as an example. Given the BCB's success with inflation targeting, we ask whether a simple Taylor rule—a rule of the type that could in principle be included in a Fund program—would have provided a useful assessment of the monetary policy stance.

Figures 2 and 3 show the actual interest rate, the SELIC rate, plotted against two alternative Taylor rules, with different values for the α and β parameters. In the first alternative, α, the parameter on the output gap, equals 0.5 and β, the parameter on the deviation of actual inflation from target, equals 1.5. The second version is an "aggressive" Taylor rule, where only the deviation of inflation from target features in the rule $(b = 2)$. Figure 3 differs from Figure 2 in that it includes an interest smoothing parameter *D*, which is

set equal to 0.6.[14] Initially, in both Figures 2 and 3 the actual twelve-month rate of inflation is used in the simple Taylor rule. The Taylor rule "bands" shown in these two figures are generated by different assumptions on the equilibrium real interest rate $\bar{r}$, ranging from 10.5 percent to 12.5 percent. For the purpose of the simulations, the potential output growth rate was assumed to be 4 percent, although a lower potential growth rate (of 3 percent) resulted in an only slightly higher nominal interest rate.

In both Figures 2 and 3 we can clearly distinguish three periods. In the first period, between July 1999 and September 1999, the BCB was keeping the annual overnight interest rate (SELIC) at a higher level than what a simple Taylor rule would have suggested; this basically reflects the relatively low passthrough that had occurred in the first couple of months after the Real was left to float. When the inflation targeting framework was launched in July 1999, inflation was at a very moderate level but expected to rise. Concerned about an increasing passthrough (given the existing transmission lags), and having to establish its reputation, the BCB initially adopted a tougher policy stance than what would have been suggested by a simple Taylor rule without expectational variables.

The second period runs from October 1999 to January-February 2000, when inflation had already picked up significantly, and had reached its peak in December 2000. During that period, the BCB basically "remained put," and, in particular did not raise the SELIC, as

[14] The interest smoothing parameter introduces some inertia into the Taylor rule by mitigating the extent to which the central bank reacts to new information. See the Appendix for further detail on the simulations that were carried out.

would have been suggested by a simple Taylor rule. The increase implied by a simple Taylor rule would have been particularly large without interest smoothing (Figure 2), whereas with interest smoothing (Figure 3), and depending on the value that is used for the equilibrium real interest rate ($\bar{r}$), the suggested increase would not necessarily have needed to be large. It is clear that, although in the last quarter of 1999 inflation was higher than expected, this was perceived by the authorities as transitory. This view is also supported by the market surveys at the time. As a result, the actual SELIC was kept somewhat below the rate that our simple Taylor rule without expectational variables would have suggested.

The third period started in February-March 2000. In this period, inflation has continued on a downward trend and remained in line with the inflation target. Due to the reduction in inflation, the actual SELIC has remained within the bands of our Taylor rule, as shown in Figures 2 and 3. The actual SELIC remained basically unchanged at an annualized rate of 18.5 percent until June, when a reduction by 100 basis points took place; a further reduction by 50 basis points (to an annualized rate of 17 percent) took place on July 7.

The stabilization of consumer price inflation is actually quite remarkable given the presence of various factors that could have induced a temporary increase in prices, such as the increase in wholesale prices, the increase in import prices, the increase of minimum wages and the discussion surrounding it, uncertainty about the behavior of the exchange rate in the context of more volatile international capital markets, as well uncertainty stemming from the potential fiscal costs of some pending court rulings.

This simple exercise may be interpreted in different ways, which basically depend on what the rule is being used for. Simple mechanistic rules are not useful in policy making; in fact, the models used by the BCB and other central banks are much more sophisticated, although they are still considered "small-scale models."[15] At the same time, simple rules may provide a rough first evaluation of a policy stance. This is probably also one of the reasons why the U.S. Federal Reserve Bank of St. Louis, for example, has been publishing the results of simple Taylor rules and McCallum rules in its monthly economic reports.[16] Simple Taylor rules may only be expected to perform satisfactorily in an environment where relatively low inflation has already been achieved, and where the overall macroeconomic environment is fairly stable (e.g., continued tight fiscal polices, and a stable exchange rate). In a more unstable or uncertain environment, other variables should probably be included to make the Taylor rule more "realistic."

However, a more realistic Taylor rule would not necessarily involve a more complicated rule. Central banks do not only react to current levels of specific variables but also to their expected future levels—they are clearly forward looking. Since the different channels of transmission of monetary policy are known to operate with some lags, all central banks forecast the behavior of inflation in one way or another.

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[15] See Bogdanski, Tombini, and Werlang (2000). Also see Rabanal and Schwartz (2000b) for a review of the inflation forecasting performance of the small-scale model used by Brazil's central bank.

[16] See the Federal Reserve Bank of St. Louis (1999-2000).

Accordingly, in Figures 4 and 5 we simulate again a simple Taylor rule but use market projections of inflation, as derived from the Central Bank's daily survey on market expectations.[17] In these examples, the Taylor rule suggests that in the second period (from October 1999 to January/February 2000), there was less of a need for the BCB to react to the pickup in inflation that occurred in the last quarter of 1999. While, initially, markets (and the BCB) may have been surprised by the inflationary outcome in the last three months of 1999, it was perceived as transitory. In early 2000 markets were expecting the Real to appreciate in nominal terms; this in turn was accompanied by expectations of a reduction of the inflation rate (or the "passthrough"). As a result, a Taylor rule that uses expected inflation seems to converge to the actual SELIC rate slightly faster than a rule that only uses the current inflation rate.

VII. Concluding Remarks

In Fund programs, conditionality refers to the linkage between the achievement of a set of policy objectives and the continuous access to IMF resources. Conditionality provides a yardstick for evaluating whether the policies that are being carried out are moving the country toward the achievement of the policy objectives, in particular a sustainable external balance. By doing so, conditionality also safeguards the temporary use of the IMF's resources.

[17] For the purpose of the Taylor rules, the expected inflation for a given month was generated by using the average expected inflation for that month, as shown in surveys carried out by the BCB in the month immediately preceding that month.

Traditionally, Fund program conditionality in the monetary area has relied on two performance criteria: a ceiling on central bank's NDA and a floor on its NIR. The primary focus of this approach has always been a program's external viability, rather than inflation. The main role of the NIR floor is to indicate whether a Fund program is likely to achieve its external objective, while the ceiling on NDA seeks to ensure that this objective is not jeopardized by excessive credit expansion or by sterilized intervention, i.e., by compensating unprogrammed NIR losses through additional credit creation. The framework assumes that the demand for base money matters from a macroeconomic perspective, and that it is stable and predictable.

As argued in this paper, in cases where it is warranted by the monetary framework in place, it would seem helpful to adapt the Fund's traditional monetary conditionality to take into account the specific features of inflation targeting. This would help to improve the correspondence between the monetary objectives of the central bank and the targets of the IMF-supported adjustment program, and the instruments that are used to achieve these targets and objectives. By the same token, it would also facilitate communication of central bank policies to the markets.

Clearly, as a first step, a Fund program could include, as was the case in Brazil, the government's inflation target itself. Often, this may require specifying the target in some more detail than the official target. For example, most countries operate with annual inflation targets; however, as Fund programs are frequently monitored on a quarterly basis, additional

quarterly inflation objectives may have to be added. Furthermore, there needs to be a mechanism for consultations that allows for program reviews to take place if inflation goes off-track. This, in turn, would require establishing parameters around the targeted inflation rate that would trigger such reviews. In the case of Brazil it was decided to establish consultation bands around the central target, where, depending on the size of the deviation from the target, consultations with either Fund staff or the Fund's Executive Board would be triggered.

A potential drawback of monitoring a Fund program on the basis of inflation outcomes—for example, on the basis of the actual 12-month rate of inflation vis-à-vis the target 12-month rate of inflation—is that this is largely backward looking, i.e., the inflation outcome itself offers no guidance as to the appropriateness of the stance of monetary policies. Hence, inflation targets in the context of a Fund program work much in the same way in which they are used by the government: they are a parameter that helps to carry out an ex-post analysis of central bank policies. However, to be able to say something about the appropriateness of the current monetary policy stance, it is not enough to look at actual inflation. This raises the question whether there are additional options for further strengthening monetary conditionality under inflation targeting in the context of a Fund program.

One option that has been explored in this paper, and on which further analysis would be desirable, is to consider simple monetary policy rules, such as Taylor rules or McCallum rules. While simple policy rules would not be a useful device for policy making, they do

provide a rough first evaluation of a policy stance. To illustrate the point, we tested various simple Taylor rules, using Brazil in its first year under inflation targeting as an example, where, after all, we know that the central bank has successfully met its inflation target. The results of the simulations suggest that simple mechanical rules may indeed provide some rough initial guidance on the appropriate level of interest rates, particularly in an environment where relatively low inflation has already been achieved, and where the overall macroeconomic environment is fairly stable (e.g., continued tight fiscal polices, and a stable exchange rate).

To strengthen Fund conditionality, and, in particular, to help monitor the stance of monetary policies vis-à-vis a government's inflation target, Taylor rules or other rules that provide for a rough evaluation of central bank policies may indeed be an area to be usefully explored further. In general, to be useful in a Fund program context, the rules should be kept simple, and forward looking, in the sense that they should include inflation expectations.

Appendix: Simulation of Taylor Rules

We simulate a simple Taylor rule for Brazil during 1999-2000 to compare actual policy outcomes with rule-based policy prescriptions. Using monthly data, the rule we simulate takes the standard form, with $r_t = \rho r_{t-1} + (1-\rho)\cdot[r^* + \alpha y_t + \beta(p_t - p_t^*)]$ and $r^* = \bar{r} + p_t^*$, where r_t is the annualized overnight interest rate (SELIC) in period *t*; *D* is the interest smoothing parameter with $0 \le \rho \le 1$; y_t is the output gap in period *t*; p_t is the 12-month inflation rate in period *t*; p_t^* is the inflation target applicable to period *t*; r^* is the equilibrium nominal interest rate; and $\bar{r}$ is the equilibrium real interest rate. Parameters α and β are the parameters of the Taylor rule, were, for simplicity, we choose those suggested in Taylor's original formulation with α equal to either 0 or 0.5, depending on whether or not output considerations can be assumed to be part of the central bank's objective function, and β being wither 2 or 1.5, accordingly.

In general, we use monthly end-of period data for the annualized overnight (SELIC) interest rate and the other variables in the model. The output gap was first estimated by fitting a linear trend on the natural logarithm of monthly GDP, as estimated by the BCB. This yielded a relatively low potential real output growth, and we consequently used values in the range of 3-4 percent as being more realistic assumptions. The value of the equilibrium real interest rate was initially assumed to be 12.0 percent, but we then used values in the 10.5 percent to 12.5 percent range to generate the Taylor rule bands.

The inflation target for each month is a linear extrapolation of the quarterly targets for December 1999 to December 2000 that are used under the program with the IMF. For the period before December 1999, when inflation was still low, we used the lower band of the target range to simulate the Taylor rule and then linearly increased it to reach 8 percent (the central target) in December 1999. Hence, for July 1999, we assume that the BCB did set its inflation target in the lower limit of its annual band for 1999 (6 percent), and that it increased this linearly to reach the inflation target of 8 percent in December 1999. However, using the December 1999 target for the period leading up to December 1999 did not change the qualitative outcomes.

We consider four policy rules to simulate: the original Taylor rule (with α = 0.5 and β =1.5), a more aggressive rule that only targets inflation (α = 0, β = 2), and for both rules we consider the case of no interest rate smoothing (ρ = 0) and with interest rate smoothing (ρ = 0.6). Choosing ρ = 0.6 would seem to strike a balance between having a fairly high degree of interest rate smoothing and letting the effect "die out" after only a few periods.

Table 1: General Overview on the Functioning of the NIR/NDA Mechanism

		Net Domestic Assets (NDA)	
		Higher than programmed	Lower than programmed
Net International Reserves (NIR)	Higher than programmed	Usually reflects an overexpansion of base money, even beyond nonsterilization of the above program NIR; it could also reflect a flawed initial projection of base money. Policy action: monetary policy tightening to reduce NDA.	The program targets have been met. No policy action needed.
	Lower than Programmed	Insufficient monetary tightening; NIR losses have been oversterilized. Policy action: monetary tightening to reduce NDA.	Loss of NIR can be sterilized as long as actual NDA is below the NDA ceiling; interest rates are most likely kept above the assumed baseline path to stem the NIR losses. No further sterilization of NIR losses is allowed once actual NDA reaches the NDA ceiling.

Table 2: Monetary Conditionality with NDA and Inflation Targets

		Inflation Target (IT)	
		Threatened	Not Threatened
Actual NDA Relative to Program Assumption	Higher than programmed	NDA and IT give the same signal: tighten monetary policy.	NDA and IT give a different signal: NDA suggests tightening; IT suggests no tightening is needed.
	Lower than programmed	NDA and IT give a different signal: IT suggests tightening; NDA suggests no tightening is needed.	NDA and IT give the same signal: no tightening of monetary policy is needed.

Figure 1. Brazil: Twelve-Month Rate of Inflation Under the IPCA and the Inner and Outer Consultation Bands for the Inflation Target

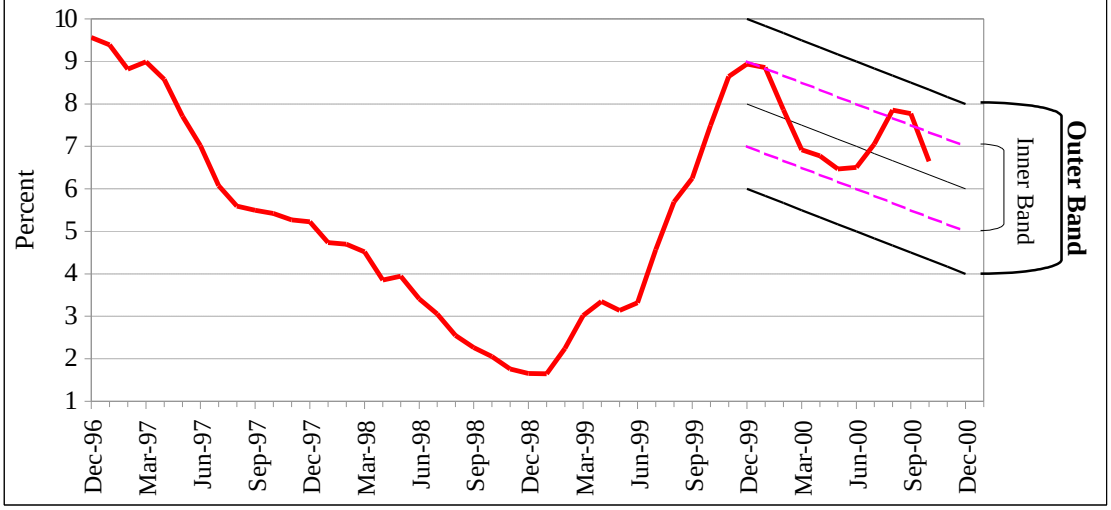
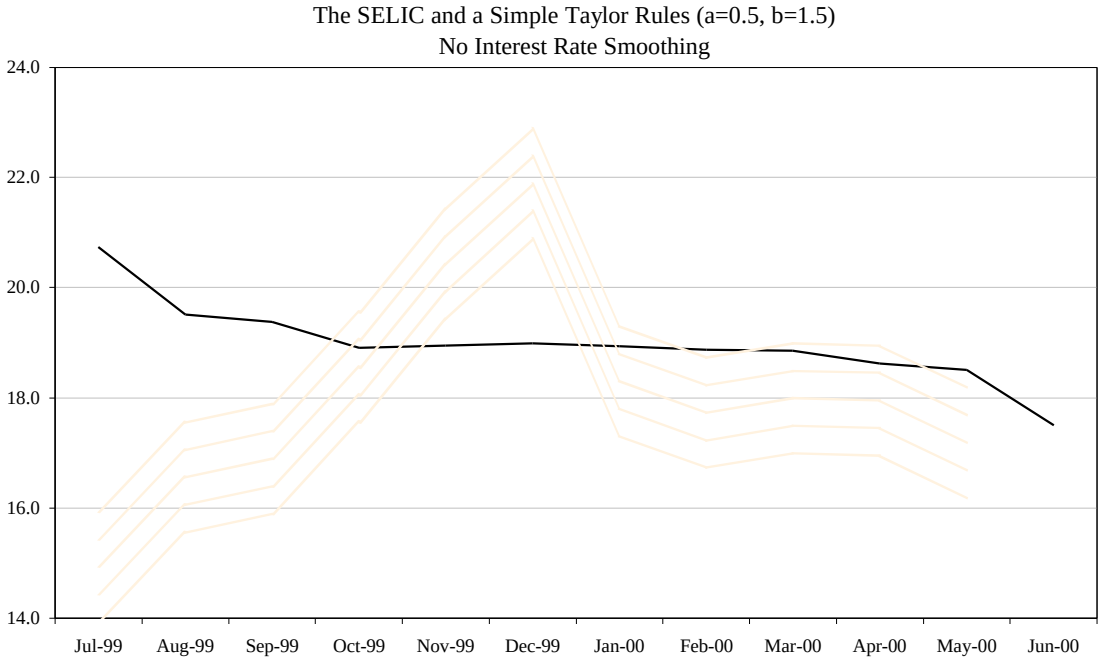
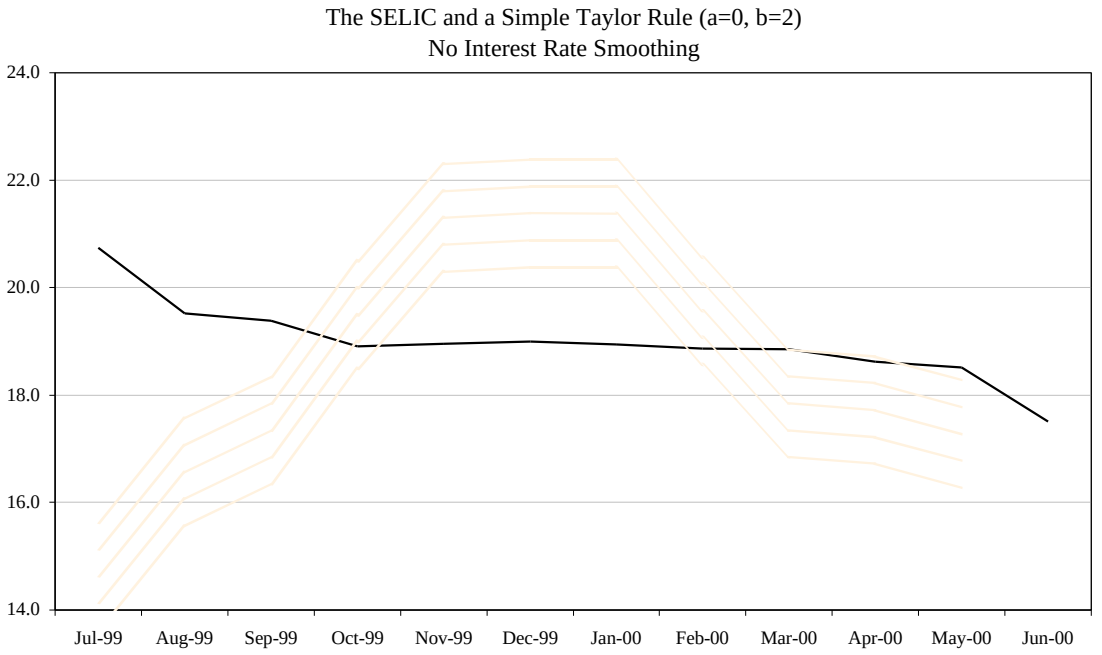


Table 3: Brazil—Overview on Monetary Policy Conditionality under the Standby Arrangement, 1998-2000

	NDA Ceiling	NIR Floor	Inflation Targets
Initial SBA (December 1998)	NDA ceilings were specified on the basis of a specific sterilization rule, with sterilization parameter that became more restrictive as NIR were to continue dropping further and further below the projected baseline path and toward the NIR floor.	Nonbinding performance criterion on NIR consisted of a low floor of US$20 billion.	
First & Second Review (March 1999)	NDA ceilings were retained, and specified using the projected baseline paths for the monetary base and NIR (with a small cushion).	No explicit NIR floor. An implicit NIR floor was specified in the form of maximum monthly intervention limits for the sale of international reserves by the BCB; these intervention limits were only cumulative in part, i.e., to the extent that they were not used in a given month, only a part of the nonused intervention room could be carried over to the next month.	
Third Review (July 1999)	NDA specified on the basis of the NIR floor rather than the NIR baseline, which abandoned the idea of sterilization of NIR losses if actual NIR were to drop below the NIR baseline as long as they are remained above the NIR floor.	The NIR floor was specified with an overall intervention room of about US$3 billion relative to the NIR baseline.	Included a general consultation clause on the implementation of the inflation targeting framework, but without reference to the specific numerical path.
Fourth Review (November 1999)	The NDA ceiling was downgraded from a performance criterion to an indicative target; it continued being specified on the basis of the NIR floor.	The NIR floor was established with an intervention room of about US$2 billion relative to a fairly conservatively estimated NIR baseline.	Included a specific consultation clause on the inflation target, with a quarterly inflation path and a two-tiered consultation mechanism.
Fifth Review (March 2000)	Refrained from establishing NDA ceilings beyond June 2000	The NIR floor was established without strict reference to the estimated NIR baseline, but instead was fixed at a flat monthly level of US$25 billion.	The two-tiered quarterly consultation mechanism on inflation was retained unchanged.

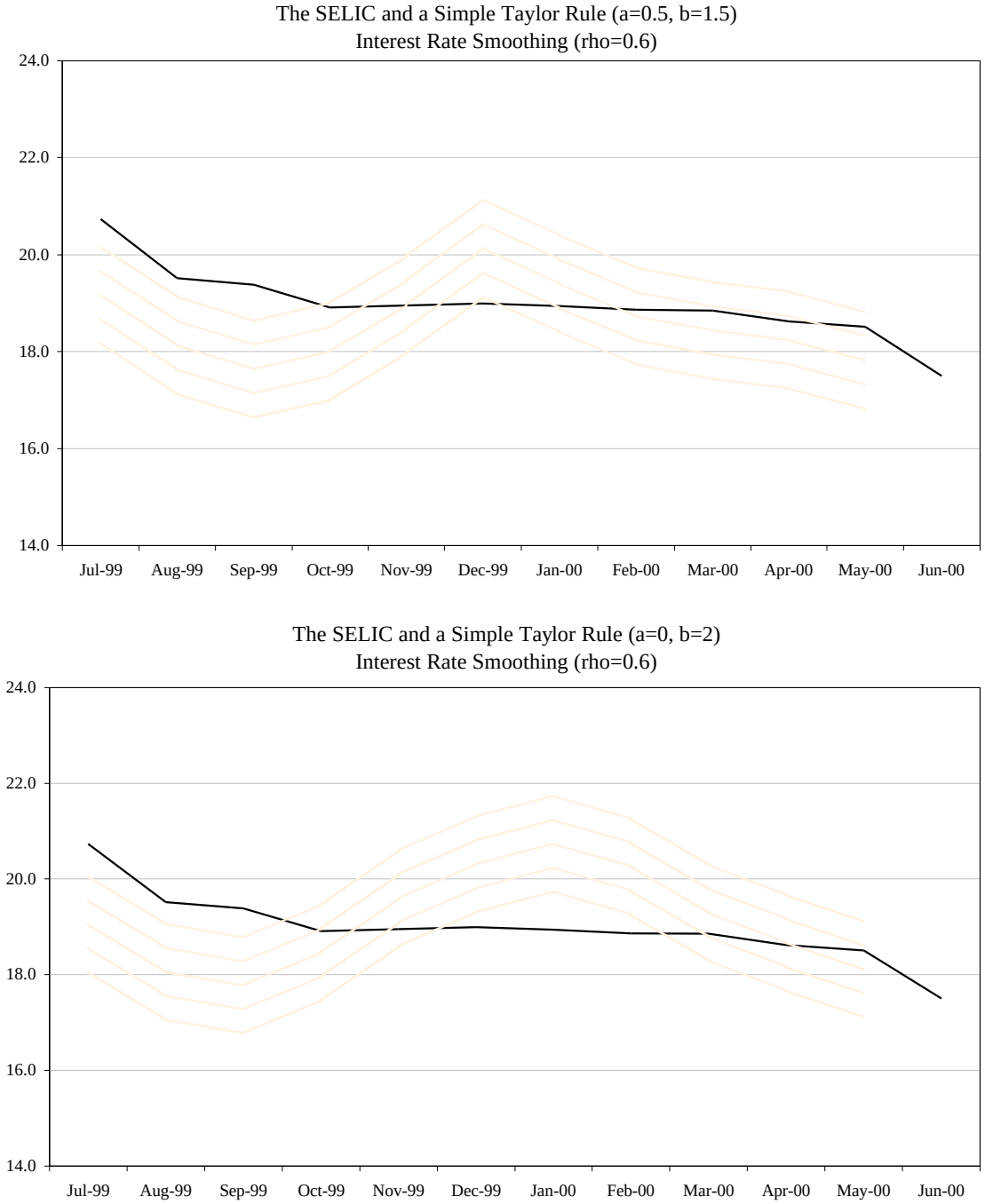
Figure 2. Brazil: Taylor Rules with Current Inflation





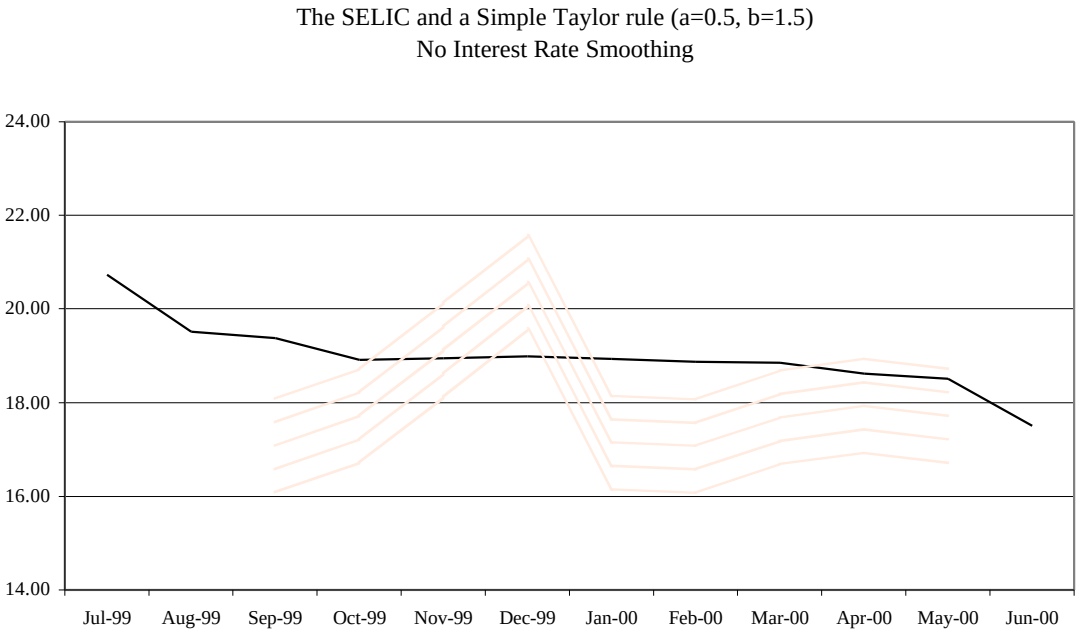
Source:BCB and authors' estimates.

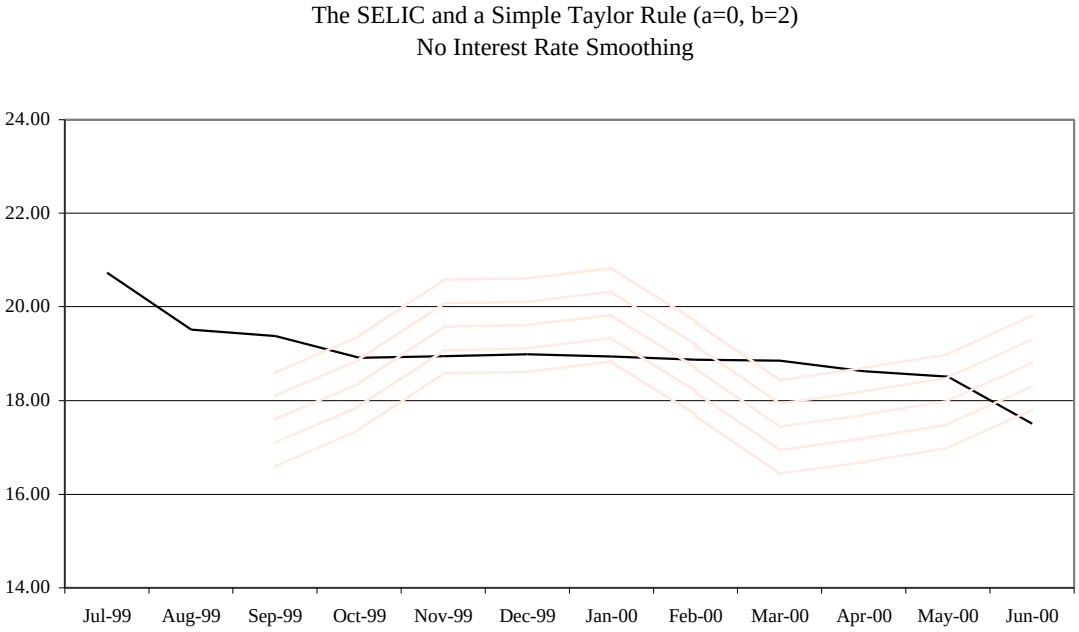
Figure 3. Brazil: Taylor Rules with Current Inflation



Source: BCB and author's estimates.

Figure 4. Brazil: Taylor Rules with Market Expectations of Inflation

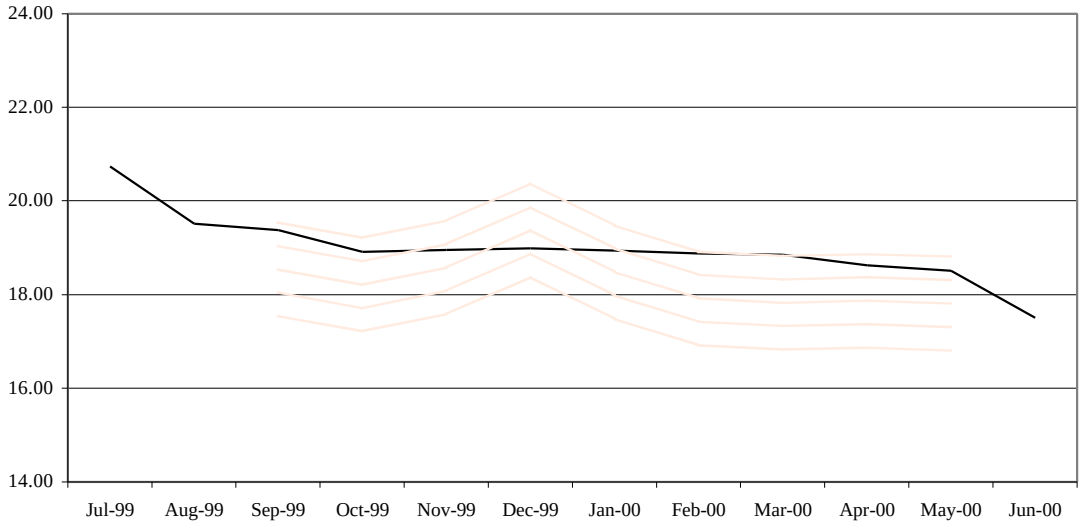




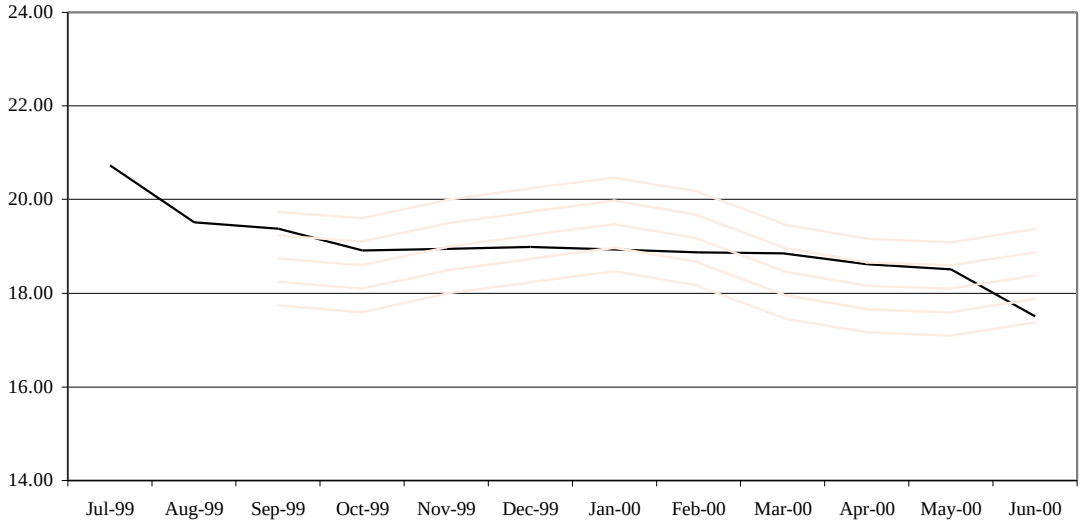
Source: BCB and authors' estimates.

Figure 5. Brazil: Taylor Rules with Market Expectations of Inflation

The SELIC and a Simple Taylor Rule (a=0.5, b=1.5)
Interest Rate Smoothing (rho=0.6)



The SELIC and a Simple Taylor Rule (a=0, b=2)
Interest Rate Smoothing (rho=0.6)



Source: BCB and authors' estimates.

Bibliography

Banco Central do Brasil (1999-2000), *Relatório de Inflação*, various issues since June 1999.

Bogdanski, Joel, Alexandre Antonio Tombini, and Sérgio Ribeiro da Costa Werlang (2000), "Implementing Inflation Targeting in Brazil," draft.

Federal Reserve Bank of St. Louis (1999-2000), *Monthly trends* (various issues).

Gold, Sir Joseph (1979). *Conditionality*. Pamphlet Series No. 31 (Washington: International Monetary Fund).

Goldfajn, Ilan, and Sérgio R. C. Werlang (2000), "The Pass-through from Depreciation to Inflation: A Panel Study," draft.

Guitián, Manuel (1981). *Fund Conditionality: Evolution of Principles and Practices.* IMF Pamphlet Series No. 38 (Washington: International Monetary Fund).

Knight, Malcolm (1999). "IMF Conditionality under Inflation Targeting: Some Comments and Suggestions." Paper delivered at the IMF's Seminar on "Inflation Targeting and Fund Conditionality," October 28, 1999.

Kozicki, Sharon (1999). "How Useful Are Taylor Rules for Monetary Policy?" *Economic Review*, Federal Reserve Bank of Kansas City, second quarter of 1999, pp. 5-33.

Schwartz, Gerd (1999), "Price Developments after the Floating of the Real: The First Six Months" *Brazil—Selected Issues and Statistical Appendix*, IMF Staff Country Report No.99/97 (September), pp.7-35.

Rabanal, Pau, and Gerd Schwartz (2000a), "Testing the Effectiveness of the Overnight Interest Rate as a Monetary Policy Instrument," draft (International Monetary Fund), November.

Rabanal, Pau, and Gerd Schwartz (2000b), "Forecasting Inflation in Brazil: How Useful are Time Series Techniques," draft (International Monetary Fund), November.

Taylor, John B. (1993), "Discretion versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy*, No. 39, pp. 195-214.