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This article argues that in a stable and competitive real exchange-rate (SCRER) macroeconomic regime, the exchange-rate component can drive up inflation through the very mechanisms that stimulate high rates of gross domestic product and employment growth; to offset this pressure, fiscal and monetary policies will have to be used to control aggregate demand. It finds that in an exchange-rate regime of this type, monetary policy has a degree of autonomy that can be exploited to apply active monetary policies. It analyses the degree to which monetary policy can be used to control aggregate demand and concludes that it cannot bear the main responsibility for this, which means that fiscal policy ought to be the main instrument for controlling aggregate demand.

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I

Introduction

This paper examines some characteristics of the stable and competitive real exchange-rate (SCRER) regime. After briefly describing the regime, section II argues that such an exchange rate may create permanent inflationary pressure through the very mechanisms that stimulate high rates of growth in gross domestic product (GDP) and employment. For an SCRER regime to be capable of controlling inflation, this pressure needs to be offset by the use of fiscal and monetary policies to control aggregate

demand. Section III analyses monetary autonomy in an SCRER regime and finds that, generally speaking, there is a considerable degree of autonomy which can be exploited to implement active monetary policies. Section IV studies the scope for using monetary policy as the main instrument for controlling aggregate demand. The conclusion is that the main responsibility for controlling aggregate demand cannot be assigned to monetary policy, but ought to be borne mainly by fiscal policy.

II

The stable and competitive real exchange-rate policy

For some time, and in a number of papers, this author has been arguing that maintaining a stable and competitive real exchange rate (SCRER) is one of the most important contributions macroeconomic policy can make to growth and employment.¹

In the first place, a competitive exchange rate creates an incentive to produce a wide range of internationally tradable products and sell them in the external or domestic market. When the range of potentially profitable products is increased, so is the potential for output and employment growth. Unlike other systems of incentives, this policy of promoting tradable activities (in preference to non-tradable ones) across the board does not give rise to rent-seeking. It can be combined with trade policy or other sector- or activity-specific incentives, but exchange-rate policy has a unique importance in a context of international

agreements that restrict the use of tariffs and subsidies. Via short- and long-term transmission channels that Frenkel (2004b) terms the “macroeconomic channel” and the “development channel”, respectively, a competitive exchange rate provides a powerful stimulus to growth and employment.

In the second place, an SCRER promotes greater labour intensity in both tradable and non-tradable activities. Through this channel, which Frenkel (2004b) calls the “labour intensity channel”, an SCRER provides a special stimulus for job creation on top of the employment effects of rising output.

In the third place, an SCRER plays a preventive role with regard to external and financial crises. Through its effects on the current account of the balance of payments and via the accumulation of international reserves, an SCRER reduces the economy’s vulnerability to negative external shocks, both real and financial, and forestalls unsustainable trends in external borrowing.

What is the best exchange-rate policy for implementing an SCRER? The answer to this question needs to take account of the fact that the stability sought for the real exchange rate is not a short-term attribute. Real exchange-rate stability does not mean mechanically indexing the nominal exchange rate to

□ Earlier versions of this study were presented at the cycle of economic seminars organized by the Central Bank of the Argentine Republic (10 April 2008) and at the first International Encounter of the Brazilian Keynesian Association (Campinas, São Paulo, 18 April 2008). The comments received on those occasions were much appreciated. The author also wishes to thank two anonymous reviewers whose comments have been incorporated in the present version.

¹ Frenkel (2004a, 2004b and 2006), Frenkel and Taylor (2007), Frenkel and Ros (2006), Frenkel and Rapetti (2008).

the difference between domestic and international inflation. The aim is to achieve stability over more extended periods. The main goal here is to reduce uncertainty about the real exchange rate over the time frames that matter for decisions about recruitment and investment in existing or new tradable activities.

Exchange-rate policy needs to combine short-term flexibility with signals of commitment to a stable long-term real exchange rate. Nominal exchange-rate flexibility discourages short-term capital movements and tends to smooth the balance-of-payments capital account. It is good for there to be currency risk in the short term. Flexibility should characterize not just the price behaviour of the international currency, but also the behaviour of the monetary authority in the market. It means that the exchange rate is set in the currency market and that in the short term the monetary authority has no commitments with regard to that price. This type of intervention cannot fall victim to speculative attacks and retains the ability to respond to international market volatility. Managed floating practices² of this kind can be encountered in the recent experience of the region's leading economies and of many emerging markets and seem to be the best form of intervention for implementing an SCRER in today's circumstances.

1. The SCRER macroeconomic regime

There are two aspects of the SCRER policy that this author has been highlighting since it was originally proposed in Frenkel (2004a). The first is that the exchange-rate policy sketched out here needs to be part of a wider framework that includes fiscal and monetary policies consistent with it. For one thing, preserving an SCRER cannot be the sole objective of macroeconomic policies. For another, the latter (exchange-rate, monetary and fiscal policies) are interconnected and have to be designed and implemented consistently. For these reasons, the proposal for a competitive real exchange-rate target needs to be understood as a component of a macroeconomic policy regime capable of pursuing multiple conflicting objectives in a consistent way. This regime needs to pursue growth, employment, activity level and inflation objectives simultaneously. The SCRER is an intermediate goal of the regime, as a given interest rate might be for monetary policy, or a given primary surplus for fiscal policy.

² See Bofinger and Wollmershäuser (2003).

The second aspect is the need to coordinate macroeconomic policies within a governmental authority that has strong powers of analysis and decision-making. It could be argued that coordinated policy management is advantageous under any regime.³ But under the SCRER regime, coordination is indispensable. With this regime, the three types of macroeconomic policy – exchange-rate, monetary and fiscal – are all active and contribute jointly to the attainment of policy goals. Since these goals conflict, there must be a single guiding authority to ensure that policies are mutually complementary.

2. The SCRER as a driver of aggregate demand

A special feature of the SCRER macroeconomic regime is that exchange-rate policy is constantly acting as a powerful driver of aggregate demand and employment. It is precisely in these effects on the demand for locally produced tradable goods, for investment and for labour that much of this regime's ability to stimulate output and employment growth is manifested. For the same reason, its exchange-rate policy component can set up inflationary pressures that do not exist with other exchange-rate regimes.⁴ The degree of inflationary pressure will depend on the structure of the economy and also on the circumstances it is going through. Where structure is concerned, for example, the effects will be different if an economy where a large subsistence sector is continually swelling the labour supply (China, for example) is compared to an economy where this characteristic is absent, such as Argentina. As

³ Although there are some who argue that it is better to segment objectives and give a particular institution exclusive responsibility for each of them, one example being an independent central bank that takes exclusive responsibility for inflation.

⁴ The idea that an SCRER is inflationary is widely held among economists. Two different ideas underlie this belief in mainstream thinking. One is that the real exchange rate necessarily tends towards its long-term equilibrium; if the real exchange rate is depreciated (in relation to its long-term equilibrium) and exchange-rate policy prevents nominal appreciation, it is believed that real exchange-rate equilibrium will tend to be brought about by a rising trend in domestic prices. The other idea is monetary, the belief being that central bank purchases in the currency market to maintain a depreciated exchange rate will expand the quantity of money and induce inflation. There is no notion that fiscal and monetary policies can contain inflation in a context where exchange-rate policy is used to maintain the real exchange rate. By contrast with the two positions just described, the present author argues that inflationary pressure derives from the same mechanisms as stimulate faster growth (and from rapid growth itself) and can be controlled by the fiscal and monetary policies which need to accompany exchange-rate policy.

regards circumstances, inflationary pressures will differ depending on how fully employed the labour force and other resources are; for example, these pressures will be lower coming out of a recession than after several years of growth, since the latter naturally tends to employ installed capacity and come up against bottlenecks.

The boost given to aggregate demand by a competitive exchange rate is hard to pin down and quantify. Among the mechanisms involved are the relative prices it influences. It is very difficult to arrive at an accurate appreciation of the scale and evolution of these effects. To begin with, it is not easy to estimate the complex effects of relative prices on aggregate demand. The difficulty has been even greater in recent economic history because other expansionary forces, deriving from the higher export prices obtained by many developing economies, have operated through the same mechanism.

Again, relative price effects are not the only expansionary mechanism created by this regime. A depreciated real exchange rate and a current-account surplus create expectations of real-term appreciation and lead to portfolio shifts that favour local assets, including real estate and also consumer durables. As with relative prices, these positive financial effects have recently been combined with factors deriving from the international context, as international interest rates have been low for much of the present decade.

Although the scale and evolution of the SCRER effect on aggregate demand may be difficult to pinpoint, we do know that the higher growth experienced by economies which adopt an SCRER⁵ is partly due to this effect, although we cannot judge its relative importance or how this varies from one country to another or over time. It seems reasonable to assume, for example, that the relative impact of the different expansionary effects differs from one country to another and also varies over time in each. Because of the uncertainties mentioned, it is very difficult, if not impossible, to carry out fine-tuning with exchange-rate policy to regulate aggregate demand growth by altering the real exchange rate. There is known to be a positive association between the real exchange rate and growth, but it is not known if this relationship is non-linear, if there are thresholds, or how it differs from one country to

another and over time. The basic knowledge required to carry out fine-tuning with monetary policy is thus not available. Furthermore, experimenting with exchange-rate policy seems wholly inadvisable in the absence of the knowledge needed to implement a fine-tuning exchange-rate policy whereby a new real exchange-rate target could be set from time to time with reasonably accuracy. As already noted, the main objective of an SCRER policy is to reduce uncertainty in agents' investment and employment decisions. Thus, experimental and uncertain changes in the exchange-rate target would have very adverse effects on the main policy objective.

To sum up, the SCRER regime differs from other policy contexts in one crucial aspect: exchange-rate policy in this regime is a permanent driver of demand growth which can give rise to inflationary pressure, and it is unlikely that this stimulus can be regulated by fine-tuning exchange-rate policy. These special characteristics of the regime mean that the policies required to accompany exchange-rate policy must also have special features: the permanent expansionary stimulus that is part and parcel of the regime heightens the importance of the restraining role to be played by fiscal and monetary policy. In general, fiscal and monetary macroeconomic policies are designed to control aggregate demand and may be expansionary or contractionary. This holds true with the SCRER regime, but in that regime the accelerator is permanently pressed down. In principle, therefore, it is fiscal and monetary policy that are responsible for controlling the speed of expansion, i.e., for regulating the rate of aggregate demand growth. Because the accelerator is permanently down, the most important regulatory function of these policies is to know when to press the brake.

These considerations lead macroeconomists, and particularly Keynesian economists, into little-known territory. Monetary policy has been the subject of considerable debate, and there is a long track record of experience in this area, because for many years it has borne the main responsibility for controlling aggregate demand in developed and developing economies. There is also a large body of experience and analysis concerning the expansionary role of fiscal policy. But it is a fact that debate and experience are lacking when it comes to the restraining role of fiscal policy. In the SCRER regime, macroeconomic policy has to find its own way. Conducting it requires creativity and permanent monitoring of economic data and of the consistency of exchange-rate, monetary and fiscal policy.

⁵ A number of recent international comparative studies have presented further evidence on the correlation between growth and the real exchange rate. See, for example, Prasad, Rajan and Subramanian (2006) and Rodrik (2007).

III

Monetary autonomy in the SCRER regime

This section will analyse whether, under an SCRER regime, there is sufficient economic autonomy for monetary policy to be conducted. It finds that there can usually be enough monetary autonomy to make an active monetary policy practicable. The regulatory power of monetary policy is examined further on, in section IV; the conclusion there is that monetary policy cannot be relied upon to carry the main burden of controlling aggregate demand in an SCRER regime, which underscores the importance of fiscal policy.

The main orthodox objection to the competitive exchange-rate policy is that it would entail a loss of monetary autonomy. This criticism is based on the well-known “trilemma” of economies open to capital movements. The “trilemma” asserts that the central bank cannot simultaneously control the exchange rate and the interest rate in a context of free capital movements. As will be seen below, the “trilemma” is false in particular circumstances, and is thus false as a general characterization of open economies.

The condition for combining control of the exchange rate with the preservation of monetary autonomy is the existence of an excess supply of international currency at the exchange rate targeted by the central bank. In these circumstances, the monetary authority can set the exchange rate by purchasing the excess supply in the currency market and can control the interest rate by sterilizing the monetary effects of this intervention, which it does by issuing treasury or central bank bonds in the money market. The central bank has two instruments for achieving its two goals: intervention in the currency market to set the exchange rate and intervention in the money market to determine the interest rate.

An excess supply of international currency, at the exchange rate targeted by the central bank and at the current interest rate, implies an excess demand for local assets. Fully sterilized intervention can be seen as a policy that is implemented in two stages. In the first, central bank intervention in the currency market leads to an increase in the monetary base. As a result there is a larger monetary base, an unaltered stock of local assets and an interest rate lower than it was initially. In the second stage, full sterilization

completely offsets the change in the private-sector portfolio that occurred in the first stage. The central bank absorbs the increase in the monetary base and issues an amount of local assets equivalent to the initial excess demand for these assets (the excess supply of currency), returning the local interest rate to its earlier level.

An excess supply of international currency at the exchange rate targeted by the central bank is what invalidates the “trilemma” and empowers that bank to set the exchange rate and the interest rate. This idea appears to be unfamiliar because studies analysing monetary autonomy and currency regimes and policies rarely address conditions in which there is an excess supply of international currency, mainly concentrating instead on situations of balance-of-payments deficit. But the effects of a competitive exchange-rate policy on the current and capital accounts tend to create the conditions which invalidate the “trilemma” and allow for a degree of monetary autonomy.

Sterilized intervention to purchase currency is possible at any time. But can this policy be applied continuously? Not in every circumstance. The sustainability of the policy depends on the interest rate earned by international reserves, on the local interest rate, on the exchange-rate trend and on the evolution of the variables determining the supply of and demand for base money. The main conclusion of a recent paper by this author (Frenkel, 2007) is that there is a maximum local interest rate above which the policy of sterilization becomes unsustainable. According to that study, under conditions of excess supply of international currency at the targeted exchange rate (which usually obtain in an SCRER regime), the central bank can set the exchange rate and is free to set a local interest rate no higher than that maximum without creating an unsustainable situation.

1. The cost of sterilization and the degree of monetary autonomy

At any point in time, the unit cost of sterilization is $s = I - r - e$, where s is the cost of sterilization, I the local interest rate, r the international interest

rate and $e = dE/E$ ($E = \text{pesos} / \text{US\$}$) the rate of increase in the price of the international currency. The sterilization cost s is nil if $I = r + e$, i.e., if the local interest rate is equal to the sum of the international interest rate and the rate of increase in the exchange rate. Or (what comes to the same thing) if the uncovered interest parity condition is strictly met.

A policy of sterilization is obviously sustainable if the cost of sterilization is nil or negative. If this were the sustainability condition, the policy of sterilization would only be sustainable if $I \leq r + e$, i.e., $r + e$ would be the maximum value of the interest rate needed to keep the policy of sterilization sustainable. Rates higher than this would make the policy unsustainable.⁶

Frenkel (2007) showed that the condition referred to was not necessary for sustainability. It demonstrated that the policy could be sustainable with local interest rates higher than $r + e$ and calculated the maximum rate at which sterilization remained sustainable. This conclusion was arrived at simply by considering the stock of central bank liabilities and taking into account the seigniorage received by the bank. The study cited formulated a simple model which took account of the fact that, in addition to interest-bearing financial assets, the public demands and the central bank issues a monetary base which is not interest-bearing. Note that if the intention were to determine the maximum interest rate at which the cost of sterilization operations was nil or negative, seigniorage could

⁶ It could be argued that the definition of sustainability used here is too restrictive because it focuses exclusively on the central bank's balance sheet and assets. Certainly, the sustainability of a sterilization policy could be analysed with reference to the consolidated balance sheet of the public sector and central bank, so that any deficit that might be incurred by the bank through its sterilization operations was covered by fiscal transfers. With that approach, however, discussion of the sustainability of a sterilization policy becomes a discussion about the sustainability of the consolidated public debt. This latter perspective encompasses numerous issues, among which the sustainability of a sterilization policy would not feature prominently. With the approach used here, on the other hand, a precise answer can be given to the question of whether sterilization is sustainable, and the degree of monetary autonomy can be defined and calculated. If a policy of sterilization is sustainable under this definition of sustainability, then it is also sustainable from the perspective of the consolidated accounts of the public sector and central bank. The restrictiveness of the definition of sustainability employed here derives mainly from the direction given to the controversy: this paper takes issue with those who argue that when an economy is open to capital flows, a policy of sterilization is not sustainable and there can be no monetary autonomy.

not be added. Since what is to be demonstrated, however, is not a nil cost but the sustainability of all central bank monetary and financial operations taken together, the seigniorage total can be included in the calculation, as indeed could other revenue items, such as returns on commercial bank debt and public bonds. The present study takes account of seigniorage alone.

The degree of monetary autonomy is defined here as the difference between the maximum local interest rate at which sterilization is sustainable and $r + e$. Thus, $g = i_{max} - (r + e)$, where i_{max} is this maximum rate and g the degree of monetary autonomy.

Given the international interest rate and the rate of increase in the exchange rate, the higher the local interest rate that can be set without rendering the policy of sterilization unsustainable, the greater the degree of autonomy.

2. The sustainability condition and the permanence of the degree of monetary autonomy

This section briefly presents the model from which the conclusions referred to derive. It is assumed that the central bank has international reserves as its only asset and that it issues two liabilities, base money and sterilization bills, yielding local interest rate i .

$$P = B + L$$

where P is the total stock of central bank liabilities, B the outstanding monetary base and L the stock of interest-bearing liabilities. At interest rate I and exchange rate E there is an excess supply of international currency C in the currency market, which the central bank purchases. R is the central bank's stock of international reserves (in international currency) and RE is the peso value of these reserves. The international reserves yield r , the international interest rate.

Again, with interest rate I determined, the increase in demand for base money is $dB = B\beta(p + y)$, where p is the inflation rate, y the real GDP growth rate and β the nominal GDP-elasticity of monetary demand.

The sustainability condition of the sterilization policy is defined as $dP \leq d(RE)$.

The condition means that the sterilization policy is sustainable if the ratio between total central bank liabilities and the local-currency value of international reserves $P/(RE)$ does not

increase. Frenkel (2007) shows that the sustainability condition is $I \leq (e + r) / l_R$, where $l_R = L/R E$ is the quotient between the stock of interest-bearing central bank liabilities and the local-currency value of international reserves.

If $l_R < I$, the local interest rates required to preserve the sustainability of the sterilization policy can be greater than $e + r$, and the lower the l_R quotient is, the higher they can be. As pointed out earlier, central bank operations determine the local interest rate and exchange rate at every point in time. The sustainability of these operations depends on the local and international rates, on l_R and also on the trajectory of the exchange rate over time.

The maximum local interest rate at which the sterilization policy remains sustainable is $i_{max} = (r + e) / l_R$. Consequently, the degree of monetary autonomy is $g = i_{max} - (r + e) = (r + e) (1 - l_R) / l_R$. The lower l_R is, the higher the degree of monetary autonomy, i.e., the difference between the highest sustainable local rate and $r + e$.

The l_R ratio varies over time, altering the range of sustainable interest rates and the degree of monetary autonomy. If l_R increases over time, the degree of autonomy tends to diminish, and vice versa. This consideration indicates that it would be advisable to analyse the trend of the sustainability condition to establish whether the highest interest rate consistent with a sustainable policy of sterilization tends to rise or fall over time. Or, what comes to the same thing, whether the evolution of the monetary variables and the currency market tends to increase or reduce the degree of monetary autonomy.

Frenkel (2007) defined the permanence condition of the degree of monetary autonomy as:

$$d(L/R E) = dl_R \leq 0$$

If the monetary and currency market variables meet this condition, the highest sustainable interest rate and the degree of autonomy tend to remain stable or increase. If they do not meet it, the degree of autonomy tends to fall, although this does not mean that the sterilization policy rapidly becomes unsustainable.

The study cited showed that the permanence condition of the degree of autonomy could be expressed as a constraint on the local interest rate:

$$I \leq (e + r) + (B/L) \beta (p + y) - (C/R)(1 - l_R) / l_R$$

Local rates equal to or lower than the second member of the expression are required to maintain

the degree of autonomy over time. Higher rates imply that the degree of autonomy is tending to fall, because the ratio between the central bank's stock of interest-bearing liabilities and its reserves is tending to rise. The constraint depends on the ratio between the monetary base and the stock of interest-bearing central bank liabilities (B/L) and on the rate of growth in the demand for base money $\beta (p + y)$. As can be seen in the last term of the expression, the constraint depends negatively on the ratio between the flow of central bank purchases in the currency market and the stock of reserves (C/R) (equivalent to the rate of international reserves growth, net of interest). The insight is clear: the greater the purchases of the central bank in the currency market, the more quickly the stock of sterilization liabilities and their cost will increase.

The above analysis assumes freedom of capital movements. Over and above the theoretical discussion, however, it highlights the functions that can be performed by controls on capital inflows and foreign currency purchases by the government. Capital controls that moderate the scale of central bank purchasing help preserve whatever degree of autonomy is possessed by the economy at a given time. In the same way, fiscal policy can also help preserve autonomy. If there is a fiscal surplus, the government can invest part of that surplus in external assets, thereby reducing the amounts the central bank needs to purchase to keep the exchange rate on target.

In summary, the conclusions arrived at in Frenkel (2007) are as follows. If the conditions $I \leq (e + r) / l_R$ and also $I \leq (e + r) + (B/L) \beta (p + y) - (C/R)(1 - l_R) / l_R$ are met, the policy of sterilization is sustainable and the degree of autonomy is permanent.

Conversely, if $(e + r) + (B/L) \beta (p + y) - (C/R)(1 - l_R) / l_R < I \leq (e + r) / l_R$, the sterilization policy is sustainable but the degree of autonomy tends to diminish.

The study cited presents a number of numerical exercises, involving different inflation and growth scenarios and using plausible data and parameters. The results suggest that sterilization policies are sustainable and that a considerable degree of permanent monetary autonomy exists in contexts that are by no means uncommon in many developing economies. The conclusion must be that exchange-rate policy in an SCRER regime does not usually inhibit the exercise of monetary policy. The orthodox

criticism is not valid. Even with freedom of capital movements (on the obvious assumption that domestic and external assets are not perfect substitutes), this regime is not incompatible with a considerable degree of monetary autonomy.

3. A digression to specify and generalize the foregoing conclusions

The model used earlier to analyse sterilization assumed a greatly simplified financial structure. Agents' investment portfolios include base money, local assets and external assets. There are only two interest rates, the local rate and the international rate.

The foregoing analysis of sterilization is based on the following reasoning. Given a certain configuration of investment portfolios and a certain interest rate structure, it is reasonable to assume an increased preference for local assets, for whatever reason. At the rates in force, this change leads to excess demand for local assets and the corresponding excess supply of external assets. Since the central bank issues the very local asset that is in demand (the only interest-bearing local asset in the model), a monetary policy of maintaining the local interest rate implies full sterilization of the monetary base issued as a result of interventions to purchase currency in the market. With this model, maintaining the interest rate is equivalent to full sterilization or, what comes to the same thing, to keeping the stock of base money unchanged.

How is the analysis affected by the existence of a wider range of local assets? To examine this point, a somewhat more complex model with two interest-bearing local assets is considered here. It is assumed that the range of local assets consists of base money and two interest-bearing assets: short-term assets and long-term assets (bonds or shares, for example). It is also assumed that the central bank operates only in the market for short-term assets. Now let it be assumed that the excess demand for local assets resulting from the change of preferences posited above is distributed in some way between short- and long-term local assets. The first step in the central bank operation (the purchasing of surplus foreign currency to maintain the exchange rate) would result in lower short- and long-term local interest rates than the starting rates. In this case, if the central bank fully sterilized the base money it issued via the placement

of short-term assets, the resulting short-term interest rate would be higher than the starting rate. This is because the long-term rate would be lower than it was to begin with and if the elasticity of substitution between base money and short- and long-term assets were significant, the demand for base money would be higher than at the start. To keep the amount of base money equal to the original amount, the short-term interest rate would have to be higher than its starting level to compensate for the effects of a lower long-term interest rate.

The rise in the short-term interest rate in the above exercise comes about because the central bank, which operates exclusively with short-term assets, carries out full sterilization of its currency market interventions. Conversely, if the central bank wishes to restore the short-term interest rate to its starting level (because this is its monetary policy instrument, for example), it can do so. This will involve conducting a partial rather than full sterilization, allowing the supply of base money to adapt to higher demand via the influence of a long-term rate that is lower than the starting rate.

The example using three local assets illustrates a more general case: a large quantity of local assets, including land and buildings, that are in demand as a counterpart to the excess supply of external assets. Obviously the central bank cannot control the entire interest rate structure, whether in an open or a closed economy. The monetary autonomy exercised through the sterilization policy needs to be understood as the capacity of the monetary authority to control the instrument rate of its monetary policy. The variable targeted by the sterilization policy ought to be the interest rate of the assets with which the central bank operates and not an underlying quantitative variable (or other monetary variable).

There have been cases in practice (and this is often brought up) where sterilization policies have induced higher local interest rates. The foregoing analysis offers a possible explanation for these cases. If the central bank pursues quantitative monetary targets (e.g., for underlying quantitative variables or other monetary variables) and fully sterilizes its currency market purchases to meet them, the interest rate of the asset class with which the bank is operating is likely to rise. In this case the problem lies not in the nature of the sterilization policy but in the goal it is pursuing.

IV

The potential of monetary policy

1. A simplified model for studying demand regulation

To consider the potential for monetary policy to become the main instrument in controlling aggregate demand, a simplified macroeconomic model including only the variables being analysed will now be presented. For example, lagged variables and expectations are excluded from the equation describing the growth rate of the economy and inflationary expectations are excluded from the equation describing the inflation rate. Excluding expectations deprives the model of an important anti-inflation policy mechanism, but this simplification makes it easier to present the arguments without loss of generality. For the same reason, the model is presented in a deterministic fashion.

The economic growth rate y is given by the equation:

$$y = \hat{y} + a_1 ER + a_2 (I - p) + a_3 f \quad (1)$$

where the parameters are $a_1 > 0$; $a_2 < 0$; $a_3 > 0$. ER is the log of the real exchange rate and f represents the fiscal impulse. $ER > 0$ implies a competitive exchange rate that stimulates growth. $F > 0$ implies an expansionary fiscal impulse and $f < 0$ a contractionary impulse.

The inflation rate p is:

$$p = b_1 p_{-1} + b_2 (e + p^*) + b_3 (y - \hat{y}) \quad (2)$$

where the parameters are $b_1 > 0$; $b_2 > 0$; $b_1 + b_2 = 1$; $b_3 > 0$, and where p^* is the international inflation rate.

The functional form of the model makes it necessary to restrict the parameter values. For a rise in the nominal interest rate to be contractionary and deflationary, i.e., $(dy/di) < 0$ and $(dp/di) < 0$, it is necessary for $(1 + b_3 a_2) > 0$.

Note that $y = \hat{y} \rightarrow p = b_1 p_{-1} + b_2 (e + p^*)$. That is, the inflation rate is an average of the past rate and the rate of increase in tradable goods prices. If exchange-rate policy additionally keeps the real

exchange rate stable, $e = p - p^* \rightarrow p = p_{-1}$.

The inflation rate thus remains stable. Consequently, with an exchange-rate policy that keeps the real exchange rate stable, \hat{y} is the rate of growth that neither accelerates nor decelerates inflation. This rate is not assumed to be a constant. The assumption is merely that at each moment in time there will be a certain rate of growth at which the economy tends to keep the inflation rate stable.

2. The SCRER policy and exclusively monetary anti-inflation policy

The model defined will now be used to examine an SCRER policy and an exclusively monetary anti-inflation policy. In other words, it is assumed that $ER > 0$; that the exchange-rate policy applied maintains the stable real exchange rate $e = p - p^*$ and that the fiscal impulse is nil: $f = 0$. Monetary policy is applied using a truncated Taylor rule: $I = \theta p$, with policy parameter $\theta > 1$.

The sustainability of this policy is examined first of all. For the reasons explained above, the sustainability of the sterilization policy requires:

$$i = \theta p \leq (e + r) / l_R = (p - p^* + r) / l_R, \\ \text{whence } \theta \leq [1 + (r - p^*)/p] / l_R$$

In other words, the parameter θ must not be greater than the second member of the expression. Note that with $l_R < 1$ and plausible values for the real international interest rate and for the inflation rate, θ can sustainably take values significantly higher than 1.

The anti-inflationary goal of monetary policy will now be considered. If inflation is not to accelerate, it is necessary for $y = \hat{y}$, whence, because of equation (1), it follows that $a_1 ER + a_2 (I - p) = 0$.

When interest rate I is replaced in this expression by the policy rule, the result is that $\theta = 1 - a_1 ER / a_2 p$ (with $a_2 < 0$).

As can be seen, the ability of monetary policy to control inflation depends on the size of a_2 , the interest rate elasticity of aggregate demand. If

elasticity a_2 were low, the interest rate needed to control inflation (and the θ parameter) would have to be higher. In this case, it is possible that

$$\theta = 1 - a_1 ER / a_2 p > [1 + (r - p^*)/p] / l_R$$

In other words, the monetary policy needed to control inflation would not be sustainable. If this were the case, the interest rate policy of the SCRER regime should be to keep within the sustainable maximum (which would be insufficient to prevent inflation accelerating via this route) and aggregate demand should be controlled mainly by fiscal impulse f .⁷

3. The interest rate elasticity of aggregate demand

Consideration will now be given to some empirical evidence on the magnitude of the interest rate elasticity of aggregate demand in Latin American economies. Empirical analyses of recent experience with inflation targeting policies in Brazil and Mexico will be reviewed, the basis for this being two studies on Brazil (Barbosa-Filho, 2006 and 2008), one on Mexico (Galindo and Ros, 2008) and one covering a number of Latin American economies (Chang, 2007).

The studies on the Brazilian and Mexican economies cited above do not contain direct estimates of the interest rate elasticity of aggregate demand. What they do contain, however, are analyses (based on different methodologies) of the transmission mechanisms of the interest rate policy involved in inflation targeting systems. Their conclusions indicate that the interest rate elasticity of aggregate demand is low.

The analysis of Mexico covers the 1995-2004 period and that of Brazil the 1999-2006 period. In both cases there was an initial phase of devaluation and accelerating inflation and a second phase of systematically slowing inflation associated with inflation targeting. In both cases, exchange-rate appreciation took place at the same time. What is of particular interest for the purposes of this study

⁷ There are theoretical precedents for this conclusion. The Keynesian approach recognizes the possibility that aggregate demand may have low interest rate elasticity, the result being a weakening of monetary policy and a stronger role for fiscal policy. But this does seem a good time to revisit and highlight the issue, given the primacy acquired by inflation targeting policies in Latin America and many developed countries.

is the phase of slowing inflation, which began in 1998 in Mexico and 2003 in Brazil.

The second phase in these two cases can be summarized by describing the stylized facts they have in common. In both, there was a progressive deceleration of inflation, a tendency towards exchange-rate appreciation and low economic growth rates. These stylized facts were the main focus of the studies referred to, which tried to explain them, in a disaggregated form, as the effects of the policies applied through interest rates.

In accounting for the slowing of inflation, the academics from the two countries highlighted exchange-rate appreciation (the pass-through⁸ mechanism) as the leading factor. For both countries, emphasis was laid on the negative relationship between interest rate I and the exchange-rate trend e . The anti-inflation policy of high interest rates resulted in a supply of international currency that created an appreciating trend in the exchange rate. Although the Mexican and Brazilian central banks intervened to purchase currency in the periods analysed, these interventions did not alter the direction of the market trend. The exchange rate tended to strengthen, and this was the most significant factor in the slowdown of inflation. It was the exchange rate, and not the rate of aggregate demand growth, that acted as the main transmission mechanism linking interest rates to inflation rates.

Again, the Mexico study attributed the low economic growth rate to the influence of real exchange-rate appreciation. This factor was also mentioned in the case of Brazil, although no empirical evidence was presented for this. The Brazil study left open the possibility that low growth rates might also be associated with the high real interest rates of the period.

The conclusions of these studies can be expressed in terms of the model shown earlier, the results being interpreted as estimates of the significance and magnitude of the model coefficients.

Regarding the inflation rate, expressed in equation (2), both countries' studies highlighted the significance of coefficient b_2 , which relates the inflation rate to the nominal exchange-rate trend. There is no evidence concerning the significance of

⁸ The term "pass-through" refers to the effect of exchange-rate fluctuations on the general price level, whatever the channels of transmission.

coefficient b_3 , which relates the inflation rate to the growth rate. Regarding the growth rate, expressed in equation (1), the Mexico study particularly emphasized the significance of coefficient a_1 , which relates that rate to the level of the real exchange rate. None of the studies presented empirical evidence on the significance of coefficient a_2 , which relates the real interest rate to the growth rate. As already indicated, however, there is the possibility that the coefficient may have been significant, albeit small, in the case of Brazil, to judge by the high real interest rates observed in the Brazilian economy.

In summary, the analyses of transmission

mechanisms in recent Brazilian and Mexican experience with inflation targeting policies find that the interest rate elasticity of aggregate demand is low. This characteristic in the economies of Brazil and Mexico is probably shared with other economies that have similar levels of financial intermediation. The conclusions given reinforce the idea that in an SCRER regime, or more generally in contexts where preventing exchange-rate appreciation is a goal, it cannot be incumbent upon monetary policy alone to control aggregate demand, which means that fiscal policy has to bear the greater part of the burden.

(Original: Spanish)

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