

Brazil's new currency: origin, development and perspectives of the Real*

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Summary: 1. Introduction; 2. Brazil's economic performance before the new programme; 3. The search for a new theory of inflation; 4. The Real Plan; 5. Preliminary results of the Real Plan; 6. Main results and limits of the plan; 7. Conclusions.

Key words: stabilization; inflation; Real Plan.

This paper focuses on the Brazilian new stabilization programme, its development and perspectives. The Brazilian inflationary process is reviewed and the contribution of Brazilian economists to this analysis is revisited. The implicit contribution of Mario Henrique Simonsen to the design of the new paradigm is highlighted. The association of the Real Plan to Larida's proposal is noted. The plan's main heterodox elements are analysed. Finally, the evolution of the main economic indicators during and after the implementation of the plan is focused upon. Our analysis suggests that one of the main limitations of the programme is related to the exchange rate policy and the lack of sound fiscal adjustment.

Este artigo enfoca o novo programa brasileiro de estabilização, seu desenvolvimento e perspectivas. O processo inflacionário brasileiro é revisto e a contribuição de economistas brasileiros para a sua análise é revisitada. As idéias de Mario Henrique Simonsen para o desenho do novo paradigma são enfatizadas. A relação entre o Plano Real e a proposta Larida é examinada, bem como os principais elementos heterodoxos do plano. Finalmente, é ressaltada a evolução dos indicadores econômicos durante e após a implementação do plano. A análise sugere que uma das limitações fundamentais do programa está relacionada à política cambial e à falta de um ajustamento fiscal adequado.

1. Introduction

This paper focuses on the Brazilian new stabilization programme, its development and perspectives. The Brazilian inflationary process is reviewed and the contribution of Brazilian economists to its analysis is revisited. In our opinion, the succession of failures of previous stabilization programmes helped to design improved strategies but did not change their fundamentally heterodox view of inflation. The implicit contribution of Mario Henrique Simonsen to the design of the new paradigm is highlighted.¹

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¹ Mario Henrique Simonsen, one of the Brazilian leading economists, is responsible for the formation of a whole generation of economists since the 1960s. He was the founder of a prestigious graduate school of economics — EPGE at Fundação Getúlio Vargas/Rio de Janeiro.

The association of the Real Plan to Larida's proposal is noted.² The plan's main heterodox elements are analyzed. Finally, the evolution of the main economic indicators during and after the implementation of the plan is focused upon.

Our analysis suggests that one of the main limitations of the programme is related to the exchange rate policy and its dual, the rate of interest. Overvalued exchange rate explains the decline in competitiveness of the export sector and the bad performance of the trade account. High interest rates inhibited investments and the economic activity level.

The other serious obstacle to be overcome is the lack of sound fiscal adjustment. The remarkable surplus of 1994 was followed by a substantial operational deficit in 1995.

Relying on volatile foreign savings, which are of a short-run and speculative nature, the Real Plan may suffer from long run lack of credibility, therefore of sustainability.

2. Brazil's economic performance before the new programme

The Real Plan, introduced on July 1, 1994, has been considered by several analysts as the most successful stabilization programme in Brazil's history. As Malan (1995) puts it: "previous attempts were overtaken by events within a few months of their implementation and failed to reach even a first anniversary". The main goal of the recent stabilization programmes has been the achievement of price stability. Price stability fosters economic development and improves income distribution — poor income distribution being one of the country's major problem.

At the end of the first half of 1994 inflation had achieved the astonishing annual rate of 7,000%, and a monthly average rate of around 43%.

The real Gross Domestic Product (GDP), in 1994, reached an amount equivalent to US\$528 billion, corresponding to a yearly per capita income around US\$3,500. The annual real GDP growth rate in 1993 had been 4.2%, and rose in 1994 to 5.7%. These growth rates are reasonable when compared to international averages, considering that since 1980 the cumulative growth rate, in 14 years, was of 26.2%. However, for the Brazilian population, taking into consideration that the economy had experienced, in the 1970s, an average annual growth rate around 7%, these figures are disappointing.³

Figure 1 gives an idea of the Brazilian monthly inflation trend, and the effect of a succession of stabilization plans between 1985 and 1995.

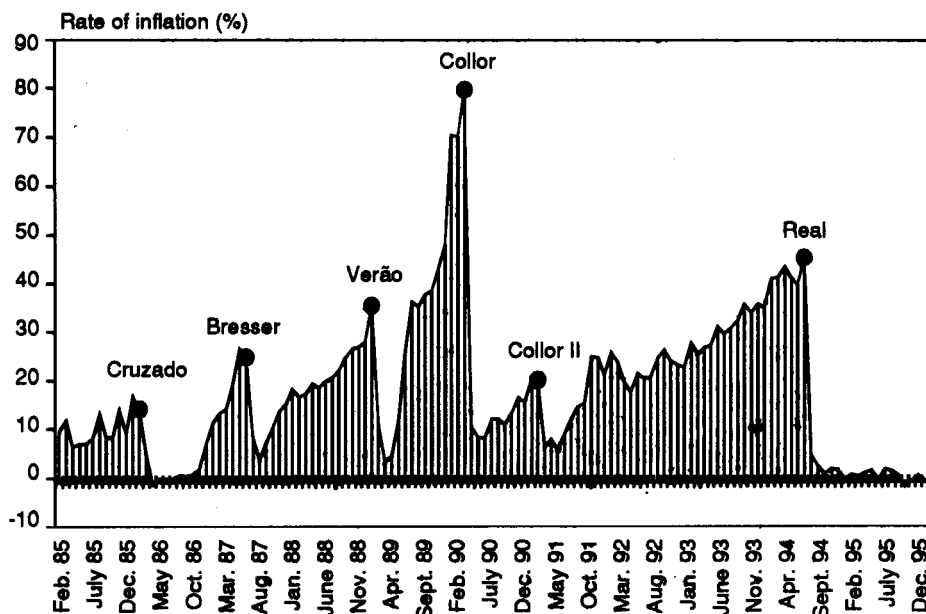
Some characteristics of the inflationary process and stabilization programmes can be summarized as follows:

- two digit monthly inflation seems to trigger stabilization programmes;
- most of these programmes were non-orthodox, in the sense that they did not rely on fiscal and monetary policies, but rather on price and wage controls;
- the plans were very successful in the very short run but high inflation returned within one year;

² Larida is the nickname of a proposal attributed to André Lara Resende and Pêrsio Arida.

³ See Bastos & Silva (1995) and *Conjuntura Econômica* (FGV, several issues) for data on Brazil's real gross domestic product evolution.

Figure 1
Brazil's monthly inflation and recent stabilization programmes
(1985-95)



Source: Authors' calculations based on data published by *Conjuntura Econômica* (FGV, several issues).

- inflation tends to climb to a higher threshold after each unsuccessful plan.

Inflation, in some Latin American countries, and especially in Brazil, is remarkable in several ways:

- it reaches very high rates (in one instance 80% in a month — figure 1) but never explodes;
- it looks relatively harmless to society, since no social convulsion or political crisis results from a three, four or five digit yearly inflation rate. To give an idea of magnitude, the cumulative Brazilian inflation rate between 1980 and 1990 reached the astonishing figure of 205, 104, 148% in just one decade (Bastos & Silva, 1995:120);
- no president has been overthrown due to high rates of inflation. Nevertheless, several Central Bank presidents and Finance ministers have been frozen and blamed for incapacity to control inflation. As a matter of fact, the turnover of Central Bank presidents was expressive during this period. From 1985 to 1995, there has been 14 different Central Bank presidents.⁴

⁴ The turnover of the staff in charge of the economic policy of a particular country has been used as an indicator of credibility of stabilization programmes in Latin America and elsewhere (King, 1995:3).

Brazilian inflation surprises even Brazilian economists. The image constantly used is of "stability of high fever". This is partly explained by formal indexation mechanisms developed in Brazil.

Inflationary processes lead to severe shifts of prices and real incomes. The market creates its own defence mechanisms. Prices and wages change according to the power the agents have to correct their relative incomes. From this follows that, despite corrective measures, inflation processes are never neutral. They embody distributive and real effects. There are always winners and losers. The process is very painful and it clearly tends to instability. Each agent tries to increase its nominal income to at least preserve his/her relative position, and, most of the time, to obtain a better position. Tobin referred to this situation with that felicitous example of the football game where everybody starts standing up to reach a better position but, when everyone has stood up, they all realize that they have ended up at the same original position. Our disagreement with the football game metaphor is that there is no guarantee that the relative positions of the agents will be maintained.

That gives rationality to the development of the institution of formal indexation. Indexation comes as a stabilizing mechanism that guarantees that nobody will lose much, or at least everybody has some knowledge of where they are going to. Wages and government bonds started to be formally indexed in Brazil in the mid-1960s. The irony is that if these institutions, on one hand, helped to reduce the real effects of inflation, on the other hand they ended up leading the economy into a trap which is much harder to get out of. It was first developed in our country the perverse system of "monetary correction" of contracts (including wages), which ensued the phenomenon referred as "inertial inflation" in the literature.⁵

Indexation is unable to maintain either the real or the relative incomes of the agents. Differences in the periodicity of nominal income adjustments of different contracts lead to real shifts of income distribution. In general, the capacity of the agents to keep their relative position depends on their market power. Organized labour will push up the periodicity of their wage adjustment through their unions, for example.

But the most obvious and perverse channel of transference of income that takes place during an inflationary process is the inflationary tax. Certainly, it affects mostly the lower income classes as long as they are the ones that do not have equal access to indexed financial instruments.

The total extent of the effects of chronic high inflation on the distribution of income is not known. It is clear, however, that it does exist and it may have contributed to the steady process of personal income concentration from the 1960s to the 1990s, when the Gini coefficient climbed to 0.639, the second highest in the world, according to World Bank statistics reported by Bastos and Silva (1995:99-110).

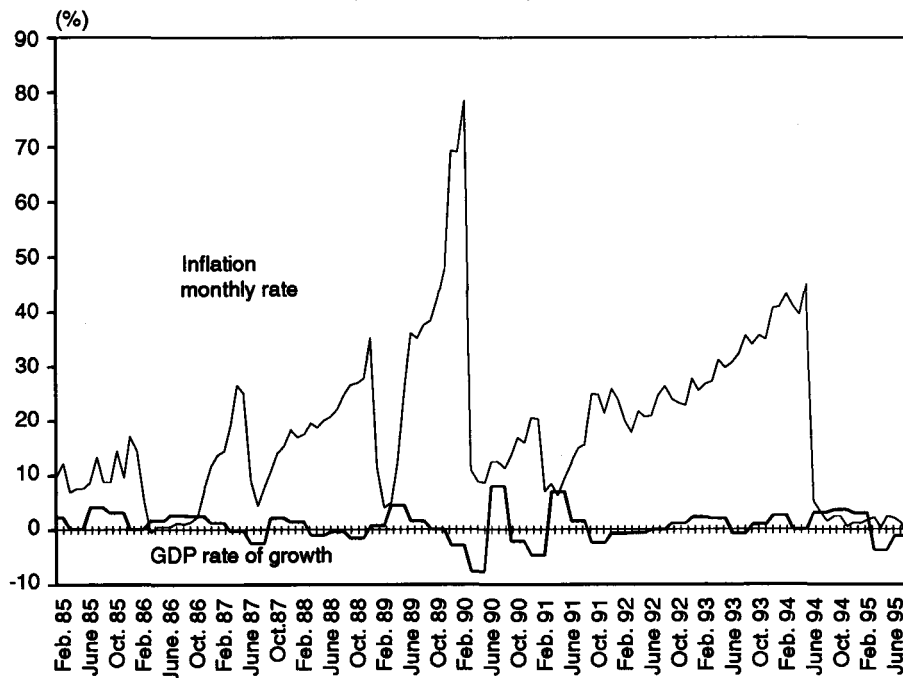
The effects of inflation upon growth in Brazil are very controversial. As economists know the relationship between inflation and growth is not unambiguous in the theoretical literature.⁶ Several empirical studies have examined the relationship between inflation and growth, using mostly cross-section analyses between economies around the world. In general, the evidence supports an inverse relationship between growth and inflation. One recent study by Fischer (1993) confirms these results.

⁵ Further in this paper, we will explain what is here referred to as *inertial inflation*.

⁶ See Orphanides & Solow (1990) and, more recently, Chari, Jones & Manuelli (1995).

The behaviour of inflation and growth in Brazil is displayed in figure 2. It suggests, during the recent period — 1985 to 1995 —, a negative relationship between the two series. In fact, the series of inflation monthly rates is the *mirror image* of the series of quarterly real GDP growth rates.

Figure 2
Inflation versus growth
(Brazil: 1985-95)



Source: IBGE.

According to the monetarist diagnosis the fundamentals of the Brazilian economy were all wrong during the 1980s: growing external debt, budget deficit leading to growing internal debt, and absolute monetary accommodation. Even if we accept that their arguments are correct, they are not sufficient to explain either the persistence or the strong discontinuities upwards verified in the 1960s and 1970s. It is well-known that the reaction to the oil shocks in terms of growth and not of recession, permitted by the excess of foreign liquidity created by the petrodollars and the world recession, led the way to a growing public and private external debt. As a consequence of that, and of the progressive transfer of private external debt to the government, the latter accumulated an even greater internal debt that led to a fiscal debt extremely sensitive to the external and internal rates of interest. Growing inflation and interest rates had an immediate effect on public finance, and the authorities, to a great extent, lost control over monetary policy.

Inflationary tax as a mechanism of public deficit financing, associated to Cagan's 1956 model, became the monetarist explanation to high rates of inflation.⁷

⁷ For a detailed description of inflationary tax in Cagan's model, see Simonsen and Cysne (1990, ch. X).

On the other hand, it is widely accepted that the inflationary process in Brazil cannot be explained by demand shocks alone. There is enough econometric evidence to support that the three big jumps that occurred in the chronic inflation rate in Brazil were due to supply shocks. The first jump occurred in 1973/74, due to the first oil shock, when the rate of inflation rose from 20 to 40%. The second jump, in 1979, was due to the second oil shock and increase in the periodicity of wage adjustments from once a year to twice a year, leading to a rise of inflation rate to an yearly average of 100%. The third jump happened after the maxi-devaluation of the exchange rate in February 1983, when inflation rate reached a higher average, around 200%.

3. The search for a new theory of inflation

Structuralist background

It is important to trace back the strong local paradigms of inflation that we have had in Latin America, and, particularly, in Brazil. Inflation was viewed by the structuralist school as the result of imbalances on the supply side of the economy. In general, the low elasticity of supply of the agricultural sector was conceived the main cause driving the inflationary process. Therefore, to reduce inflation it was necessary to grow more, and not to grow less. This view can be traced to the works of Prebisch (1949) and Furtado (1970).

A very simple model of inflation, embodying the structuralist background, for instance, could be presented as a two-sector model where the wage goods present limited supply and the exporting goods have a high elasticity of supply. The rise of demand associated with income rise would produce inflation as long as the price of wage goods would go up, pushing the real wage down. This could be understood as a supply shock: it is not inflation that pushes growth, but growth that pushes inflation. In other words, this process can be interpreted as a Phillips curve type of model, in which price rises are caused by supply rigidities. This constitutes the core of the structuralist approach to inflation.

While in the academic environment the structuralist theoretical view was well accepted, even during the 1960s, policy makers at that time had a strong preference for the orthodox explanations and prescriptions: high inflation and balance-of-payments deficits were viewed as reflecting excessive money growth, driven by large fiscal deficits. The cure was associated with fiscal austerity, correction of relative prices, usually by devaluating the domestic currency, and tight monetary policy. There was however, a well disseminated theory advocated by several economists, some of them considered to be orthodox, called *bipolar model* by Simonsen (1989).⁸ The central hypothesis of this theory was that inflation would be determined by the maximum of two rates: one determined by supply conditions (peak/average wage), and

⁸ According to Simonsen (1989), the identification of who invented the theory of inflation based on the relationship between the peak and the average wages is a challenge to the researchers of history of economic thought. Simonsen recalls, however, that this theory had good transit in the economic department of the National Industry Association (Confederação Nacional da Indústria) in the end of the 1950s. The idea, nevertheless, is that this theory was an addition to the quantitative equation, in the sense that the effective rate of inflation would be determined by the greater of two variables: inflation determined by the peak/average of wage and inflation determined by the rate of growth of money supply. For a presentation of the peak/average theory of inflation, see equation (6) (Simonsen, 1989:12).

the other defined by demand conditions. Later this theory would be formalized in a model with a kind of *L* shaped supply curve. Inflation depended on the cost of production up to a point, after which prices became flexible. The rigidity of prices was explained by mark-up practices together with indexation. There was already a conception of inertia, but, in a sense, inertial inflation would constitute a lower bound to inflation. It is very interesting that this crude theory of inflation was applied in the first and only successful experiment of inflation stabilization in Brazil, implemented by two orthodox economists, Bulhões and Campos, in the design of Paeg, "Programa de Ação Econômica do Governo", in 1964. The Paeg used basically two instruments: reduction of wage indexation and tight monetary policy.⁹ There was then a recognition that monetary policy would not be sufficient to bring inflation down unless the resistance of workers to maintain the real value of wages was previously broken. This theory was in perfect agreement with the neo-classical presumption that the labour markets do not work when wages are rigid downwards.

Inertial inflation

Brazil's chronic inflation developed its own perpetuation mechanisms. Wages started to be adjusted in line with previous inflation. The government indexed its bonds, and quickly the practice spread over the economy to most financial transactions.

Obviously, the indexation hides substantial shifts of income during the inflation process between sectors and mainly from the lower income classes to the middle and upper classes. The question is not only the size and frequency of adjustment as established in contracts, but the access to assets that hold purchasing power of money through indexation. In that sense, the workers are double losers: first, because their wages are not frequently adjusted; second, because they do not have access to financial instruments.

Brazilian inflation is taken to be inertial, what means that inflation is an autoregressive process. In that sense, either we assume adaptive expectation with all its limitations, or rational expectation, with autoregressivity of monetary policy and/or staggering contracts. The idea is not to deny the logic of the system in creating this autoregressive process, but to emphasize the role of the institutions in this process.

Econometric controversy on the shape of the Phillips curve

The controversy between the economists who believed that tight monetary policy was needed to stabilize the economy and the ones that did not share the same view was followed by an empirical debate on the shape of the Phillips curve. The conventional model did not seem robust to changes of the sample period as shown by Lopes (1982). The relevant data for the debate could be summarized in table 1, which presents some estimates of the traditional Phillips curve and reproduces the main econometric statistics:

⁹ It is noteworthy that the heterodox economists took a long time to recognize the heterodoxy of the Bulhões-Campos experiment. See Lara Resende (1982).

Table 1
Econometrics of the Phillips curve in Brazil

| | Period | GAP | \hat{P}_{-1} | R ² | D.W. | σ |
|---|---------|------------------|-----------------|----------------|------|----------|
| A | 1953-73 | -0.905 (1.94) | 0.951 (6.73) | 0.72 | 1.65 | 0.115 |
| D | 1952-64 | 1.837 (1.21) | 0.889 (3.68) | 0.75 | 2.25 | 0.124 |
| E | 1965-81 | -1.205 (2.6) | 1.053 (6.84) | 0.77 | 1.46 | 0.148 |

Source: Lopes (1982).

where the explanatory variables are the GAP — potential output to realized output — and \hat{P}_{-1} — the last period inflation rate. The terms in parenthesis are *t*-statistics.

The results of equation A are typical of the orthodox front (Lemgruber, 1974), and the equations D and E represent the experiments of Lopes (1982). It is clear from the econometric results that the GAP coefficient was too large and at some times it presented the wrong sign. The incongruity of the results was due mainly to the specification of the model. Once the shocks of wages and exchange rates were taken into account, the results showed that the GAP variable became insignificant.

Lara Resende and Lopes developed a model of this process that can be stylized as follows:

$$\hat{P} = \hat{m} + \phi \hat{w} + (1 - \phi) \hat{z}$$

$$\hat{w} = \alpha \hat{w}_a + (1 - \alpha) \hat{w}_b$$

$$\hat{w}_a = \beta \text{GAP} + \gamma \hat{P}_{-1}$$

$$\hat{w}_b = \hat{w}_{\min}$$

where the hats above the variables represent rates of growth, *z*, external shocks, and *m* stands for the coefficient of mark-up. The increase in nominal wages — \hat{w} — was defined as an average between the increase in wages paid in the competitive market (*a*), and the increase in wages regulated by the government through the wage-indexation policy (*b*). The latter was approximated by the increase in the minimum wage — \hat{w}_{\min} . The reduced form for inflation that results from the above model, considering the mark-up constant, is:

$$\hat{P} = \phi \alpha \beta \text{GAP} + \phi \alpha \gamma \hat{P}_{-1} + \phi (1 - \alpha) \hat{w}_{\min} + (1 - \phi) \hat{z}$$

The main econometric statistics of this model are displayed below. As we can see, the variable GAP became not significant, and presented the wrong sign. On the other hand the indexation policy and the external shocks became highly significant.

Table 2
Econometrics of Phillips curve in Brazil
(1960-78)

| | \hat{Z} | \hat{w}_{\min} | \hat{P}_{-1} | GAP | R ² | D.W. | σ |
|---|-----------------|------------------|-----------------|------------------|----------------|------|----------|
| 1 | 0.277 (2.58) | 0.603 (2.68) | 0.351 (1.44) | 0.0738 (0.33) | 0.97 | 2.30 | 0.04 |
| 2 | 0.38 (4.98) | 0.42 (3.78) | 0.55 (5.95) | | 0.97 | 1.59 | 0.03 |

Source: Lara Resende and Lopes (1981), table 1, p. 603.

The results point to the importance of supply shocks and wage indexation in explaining the inflationary dynamics. The discrepancy of the results bring the problem of identification to the forefront.

Modiano (1985) extended the original Lara Resende and Lopes model to an economy with two sectors: Industry (*I*) and Agriculture (*A*). The model employed was from the same vintage, with the additional assumption of a pro-cyclical wage and anti-cyclical coefficient of mark-up.¹⁰ Differently from the other experiments, that used only the reduced form, Modiano estimated the parameters of the structural model using two stage least squares.

It is interesting to note that capacity utilization may affect inflationary process through wage formation, food sector prices and mark-up of the industrial sector, as follows:

$\hat{w} = \theta_w \text{GAP}$; $\hat{m}_I = \theta_I \text{GAP}$; $\hat{P}_F = \theta_F \text{GAP}$ where \hat{m}_I is the change in the mark-up of the industry and \hat{P}_F is the change in the prices of the food sector.

The results are noteworthy. As table 3 shows, the effect of the GAP is very significant to explain wages and agricultural prices. On the other hand, if the anti-cyclical effect of GAP, in the fluctuations of the mark-up is considered, the net effect of GAP in price formation becomes very small.

Table 3
Estimates of the coefficients of the GAP
(1966-82)

| Independent variable | Dependent variable | | |
|----------------------|--------------------|-------------------|-----------------|
| | \hat{w} | \hat{P}_A | \hat{P}_I |
| GAP | -0.261 (-3.82) | -0.336 (-2.53) | 0.291 (3.32) |

Source: Modiano (1985, table 2, p. 12 and table 4, p. 17).

The results of Modiano (1985) confirm the relevance of model specification. Its main point is that the importance of the demand conditions may be dampened by the anti-cyclical character of the mark-up in the industrial sector.¹¹

¹⁰ Much debate arised on the cyclical character of the mark-up. See Camargo & Landau (1982).

¹¹ Much debate arised on the cyclical behaviour of the mark-up. See Camargo & Landau (1982).

Despite the almost hegemonic character of these empirical findings, that reinforced the view that inflation was mainly due to past inflation, some studies sustained the opposite. As a matter of fact, Barbosa (1985) was able to show that the empirical data did not confirm that inflation was a hundred per cent inertial. It is easy to show that an inertial inflation implies time series generated by ARIMA (p, d, q) stochastic processes with $d \geq 1$. These processes can be explained by the absence of the effect of demand components, or by the auto-regressive behaviour of the demand components, for instance, monetary policy. The new wave of empirical studies led by Barbosa (1985) took this alternative strategy following the recent trends of the econometrics of time series. Barbosa and Pereira (1989), using a variable parameter technique, were able to show, for the period 1976:1—1985:4, that demand factors significantly affect the rate of change in nominal wages in a model of error correction mechanism type. On the other hand, the analysis of the monetary policy showed that it did not follow an auto-regressive process during the period and, consequently, it was not consistent with inertial inflation.

Recently, Perron et alii (1995), examining the series of price and interest rate for the period 1974:1 — 1996:4, and correcting for the large temporary shifts,¹² due to the sequence of stabilization plans, concluded that the shocks to inflation were highly persistent, being consistent to the view of inertial inflation.

Development of the inertial framework with backward-looking expectations

The modelling of inertial inflation started back in the 1960s, with the notion of a feedback component developed by Simonsen. His argument was that inflation could not be entirely explained by disequilibrium in the fundamentals, and one of the major noises could be associated with inflation itself. In fact, the view of inflation as an autoregressive model was already developed at that time (Simonsen, 1975).

The discussion in the 1980s, by the new generation of Brazilian economists, followed a somewhat different path. The emphasis was put on the supply conditions, where inflation was understood as an equilibrating process of the profit margins, and corresponded to the common trend of costs of inputs and price of output (Lopes, 1980). Lara Resende (1982) brought the distributive issue to the debate. He developed a model of inflation based on distributive conflict.¹³ The idea was very simple, the rate of accumulation would induce an income distribution adequate to provide the right amount of savings. Since most of savings comes from profits, larger growth would imply a rise in the share of profits. These ideas, in fact, were related to the earlier literature on inflation that advocated that in order to grow it was important to save. However, since not enough saving was supplied by the market, the price system would provide forced savings through inflation. The problem with these models rested on the assumption of full capacity utilization. It is important to mention the contribution of Bacha (1982). His textbook was very important to set limits to the debate.

As we mentioned above, the vintage of inflation models of the 1980's emphasized supply conditions and its dual distributive conditions. Secondly, they explicitly recognized the

¹² Perron et alii (1995) demonstrated that the sequence of stabilization plans represented "inliers" that biased the results of the standard unit root tests to its rejection and in favour of concluding that the series are stationary. Curiously enough they do not refer to Barbosa & Pereira (1989).

¹³ His model was based on the work of Rowthorn (1977).

backward looking expectation process involved in the mechanism of indexation. Thirdly, they developed the concept that the trade-off between unemployment and inflation, known as the Phillips curve, was very small and not significant for economies with high inflation rates with staggered-backward-looking contracts.

Let us review these ideas through a model that relates inertial inflation to distributive conflicts abandoning the hypothesis of full employment and comment on its results and limits (Simonsen, 1989; Bacha, 1988).

In this case, assume a very simple economy with only one good, no intermediate inputs, and labour productivity equal to 1.

Prices are determined according to the following mark-up rule:

$$P = mw \quad (1)$$

Wages are formed as follows:

$$w = \tilde{\omega}P_{-1} \quad (2)$$

Here we assume that $\tilde{\omega}$ is the peak wage, received at the date of the re-adjustment. Substituting (2) in (1) we have:

$$P = m\tilde{\omega}P_{-1} \quad (3)$$

$$\hat{P} = m\tilde{\omega} - 1 \quad (4)$$

It follows that inflation will converge to $F = m\tilde{\omega} - 1$.

In other words, inflation will be stable and $\hat{P} = \hat{P}_{-1} = \hat{P}_{-2} = \dots$. This means that inflation depends only on its past values. This highly stylized model captures a pattern of inflation that relies upon the supply and not the demand conditions of the economy. In that sense, it reminds us of the classical tradition.

Another interesting feature of this simple model is that it illustrates the distributive conflict between workers and capitalists embodied in the inflation process. If you normalize equation (1) by the price level, it follows that:

$$1 = m \left(\frac{w}{P} \right) = m\bar{\omega} \quad (5)$$

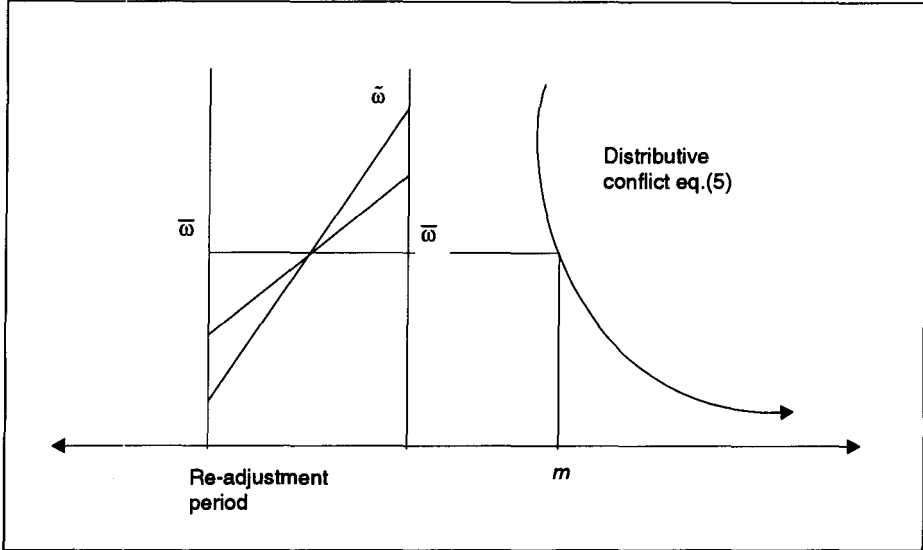
Solving for m in equation (4) and substituting in (5) we get the peak/average theory equation:

$$P = \frac{\tilde{\omega}}{\bar{\omega}} - 1 \quad (6)$$

What this expression says is that inflation will be greater than zero as long as the peak is larger than the average wage. Alternatively, we can say that F , that expresses the distributive conflict, is greater than one.

The relationship between the peak/average wage inflation model and the distributive conflict is summarized in figure 3. It becomes clear that, for a given average real wage, there is a family of inflation rates corresponding to different peak/average wages.

Figure 3
Peak average/wage



Taking expressions (5) and (6), it is shown that the greater the peak wage the higher will be the inflation rate to bring the wage into line with the mark-up rate determined by the capitalists. Although this model is very simple, it is useful to highlight some of the propositions of the inertial school. There is an inverse relation between the average wage and the inflation rate, and a positive relation between the inflation and the peak wage. On the other hand, the economy has an equilibrium wage that could be called *feasible wage*, defined by expression (5). With these two equations, given the value of m and the value of the peak wage, the rate of inflation is determined. The higher the value of the peak wage the higher will be inflation in order to bring down the real wage back to its equilibrium value.

Following Simonsen (1989), the model can be extended to contemplate the more realistic case where the workers are evenly divided in n classes following staggered contracts according to the n periods that the wages will take to be adjusted. In this case, equation (1) is still valid:

$$P = mw \quad (1')$$

while equation (2) has to be changed to take into account the n different wages, according to the n different classes, such that:

$$w = \frac{\tilde{w}}{n} (P_{-1} + P_{-2} + P_{-3} + P_{-n+1}) \quad (2')$$

Substituting (2') into (1') we obtain (3'), an extension of equation (3):

$$P = \frac{m\tilde{\omega}}{n} (P_{-1} + P_{-2} + P_{-3} + \dots + P_{-n+1}) \quad (3')$$

If $m\tilde{\omega} > 1$, it can be shown that the inflation rate converges according to the following expression:

$$\frac{1 - (1 + \hat{P})^{-n}}{\hat{P}} = \frac{n}{m\tilde{\omega}} \quad (4')$$

$$\text{It becomes clear that: } \hat{P} = \psi \left(\overset{+}{m\tilde{\omega}}, \overset{-}{n} \right) = \psi \left(\overset{+}{\frac{\tilde{\omega}}{\omega}}, \overset{-}{n} \right) \quad (5')$$

The signs above the variables correspond to the signs of the partial derivatives.

It can be shown that $\hat{P} = 0$ when $m\tilde{\omega} = \frac{\tilde{\omega}}{\omega} = 1$ and that $\lim_{n \rightarrow 0} \hat{P} = \infty$.

One of the weak spots of these models is, as it has already been remarked before, that the mark-up and the peak wage, as well as the frequency of adjustments, are considered exogenous. Also, this model certainly excludes completely the demand conditions of the economy. As is well-known, aggregate demand conditions may not reduce inflation but they may affect the final equilibrium of the system.

Demand conditions can be brought in to the model through the effect of cyclical factors on the dynamics of the exogenous parameters mentioned above: mark-up, peak wage and frequency of adjustments.¹⁴

Another type of model, designed by Taylor (1991) and Amadeo & Camargo (1992), incorporates the cyclical factors through their effects on the conflict between workers and capitalists. Following Amadeo and Camargo, we suggest the following formulation:

$$\hat{P} = \hat{w} + \xi \quad (7)$$

$$\hat{w} = \hat{P}_{-1} + g(\omega, GAP) \quad (8)$$

$$\hat{P} = \hat{P}_{-1} + g(\omega, GAP) + \xi \quad (9)$$

The interesting feature of the model above is the function $g(\cdot)$, which expresses the degree of conflict of the workers *vis-à-vis* the capitalists for the target real wage. The $g(\cdot)$ function measures the capacity that workers have to raise their wages above the limits set by indexation. We will assume that it is greater the closer the economy is from its planned capacity utilization and the lower is the real wage. Therefore:

$$\frac{\partial g}{\partial \omega} < 0 \quad \text{and} \quad \frac{\partial g}{\partial GAP} < 0$$

¹⁴ For further developments, see Modiano (1985), Amadeo & Camargo (1992), and Taylor (1991).

Considering that the capitalists pass over to prices all increases in wages, inflation accelerates whenever the “degree of conflict” of the workers is positive. Therefore, to have inertial inflation it is necessary that the conflict function takes the value of zero. The pairs of ω and GAP that end the conflict or makes $g = 0$ constitute a decreasing locus on the plane (ω, GAP) . Linearizing the function $g(\cdot)$, we have:

$$\hat{P} = \hat{P}_{-1} + g_{\omega} (\omega) + g_{\text{GAP}} (\text{GAP}) + \xi$$

This approach is very similar to the usual Phillips curve with the difference that past inflation is used as the expected inflation and a low value is assumed for g_{GAP} .

Monetarist revival

Despite the consensus about the importance of the indexation trap to explain the downward rigidity of inflation, there was a growing dissatisfaction with the absence of demand components in the inertial model displayed above. The failure of the stabilization programmes implemented before the end of the 1980s was taken as a strong evidence against the one-sided view of inflation. The lack of any fiscal adjustment from the Cruzado to the Bresser plans was viewed as the main responsible for their failures.

The typical model used in this period was Cagan’s adaptive expectation model. The presumption was that the inflationary tax was needed to finance the growing public debt. Being on the wrong side of the Laffer curve, the equilibrium would be unstable and produce a very high rate of inflation for a given public deficit. The fact that not all the deficit is financed by money creation and the lack of unambiguous findings on the causality between money growth and inflation pointed to the limits of this interpretation.

An alternative explanation comes from the use of rational expectations. The argument was that the anticipation of future higher inflationary taxes implied substitution of goods for money, explaining the rise of inflation in the present independently of money growth.

One last interpretation of the role of the public deficit on the sustainability of the inflationary process comes from the view that most of the nominal deficit is financed with liquid and indexed assets. This process is clearly unstable: inflation increases nominal deficit, which changes liquidity and pushes inflation up. The main flaw of this argument is the presumption that potential liquidity affects prices.

Summing up

The important point that should be raised is the growing convergence of opinions among orthodox and heterodox economists around the interpretation of the inflationary process in Brazil. Barbosa (1989), a leading monetarist economist, gave an interesting explanation to the tension of excess of government expenditures. His view was that inflation was due to distributive conflicts between the different groups of interest that benefited from the government transfers. The refusal to curtail the expenditures could be solved by inflation. In a different way but sharing a similar idea, is Bacha’s (1994) analysis of the role of inflation in reducing the fiscal deficit. The budget in Brazil, though approved as a law, is merely an authorization to spend; it is not mandatory. In that sense it could be understood as a *potential deficit*. The

difficult political engineering of reducing expenditures through the approved budget is substituted by the budget execution mechanism which, being under the control of the Executive power, determines the effective budget (Franco, 1996). Inflation reduces the deficit through its effect on the nominal expenditures, given the indexation of the revenues. This mechanism solves the conflict between the supply of funds by the Ministry of Finance and the needs of the other ministries. The idea is very similar to Barbosa (1989) being the new point the addition of the distributive conflict that is hidden in the potential deficit. Hélas monetarists incorporate to their analysis the idea of the distributive conflict thesis and structuralists recognize the role of the fiscal stance for explaining the inflationary process in Brazil!

Brazilian inflation was interpreted as the result of supply and demand shocks. In that sense it did not differ from most world-wide inflation processes. The distinction, if there was any, was reduced to the degree of formal indexation mechanisms. The latter explains the severe downward rigidity of inflation rates. The inertialists were wrong in trying to forget the demand side but they raised a quite important point: the social costs for stabilizing inflations in Brazil could be unbearable if the orthodox remedies were applied.

Orthodox versus heterodox plans

The understanding of heterodox plans hinges upon the understanding of the microfoundations of indexation. A seminal contribution in this area, that views indexation as a rational response to the inflation game, is Simonsen's (1989) usually associated to the orthodox stabilization plans.

According to him, Brazilian inflation could be understood within a framework of a non co-operative game with limited information and where uncertainty on the behaviour of the other agents is very high. In this setting, indexation makes a lot of sense. Stabilization policies must not only be credible, but they must also play the role of a Walrasian auctioneer, in the sense of providing the information that will make the behaviour of the agents towards price stability coherent.¹⁵ This framework strongly justifies the heterodox stabilization programmes that rely on some sort of price and income controls.

It is interesting to note that the microfoundations of inertial inflation have been developed before the Brazilian inertialist movement by Stanley Fischer (1977) and John Taylor (1979), in the so called time-dependent price models. In these models, price viscosity, or inertia, prevails with rational expectations. The time dependence hinges upon the existence of staggered contracts. These models represent a serious critique to the neutrality proposition of Lucas (1973), and Sargent and Wallace (1976). Recognized by Brazilian economists, these models, however, did not succeed as the main building blocks of heterodox stabilization programmes.¹⁶

The orthodox policies assume that stabilization consists in correcting the fundamentals — fiscal and monetary policies — consistent with price stability. The market should correct the relative prices. This could lead to very high rates of unemployment, and the transition would be very painful. On the contrary, heterodox plans not only are supposed to correct the fundamentals but also to design the equilibrium price vector. In that sense, the heterodox sta-

¹⁵ See Simonsen (1989) in this regard.

¹⁶ Lopes (1982) presents the inertialist implication of Taylor's model. Simonsen (1989) develops Taylor's model and shows that its inertia is weak in the sense that an adequate gradualist monetary rule could be consistent with a painless stabilization contrary to the strong inertia proposed by Brazilian economists.

bilization plans look for very short transition periods. It is as if the market could be substituted by the Walrasian auctioneer. In a way heterodox plans would emulate Sargent's painless adjustment, in the presence of price rigidity, by the intervention of the State.¹⁷ The strategies employed for that matter vary. For some plans, the definition of the price vector is followed by price freeze. Brazilian's last stabilization programme, the Real Plan, implemented in July 1994, differed from the others by the fact that there was no complete price freeze. Some prices were frozen, and others were left to the market. The prices that were frozen behaved as nominal anchors. The idea is that once you have the correct fundamentals the relative prices become constant, and so does the price level. We illustrate in the appendix the difficulties faced by policy makers when trying to establish the right vector of prices consistent with an equilibrium of zero inflation.

4. The Real Plan

Antecedents: deterioration of money

The steadily growing inflation of the last 30 years gradually destroyed the monetary standard unit. In the beginning it lost its store of value function. If one looks at the data in early 1994 (table 4) it is notorious the low values of the monetary base and M1. In its place different financial instruments appeared, from savings to time deposits with immediate liquidity that hedged against inflation. These instruments only enhanced the endogenous character of the quasi-money. Secondly, money started to lose its role of unit of account. Its place was taken by indexed government bonds. It is interesting that the dollar did not play this role as was the case in other high inflationary economies, which may be attributed to the character of the Brazilian indexation process.

Table 4
Monetary aggregates as percentage of GDP
(1993-95)

| Month | Base | M1 | M2 | M3 | M4 |
|----------|------|------|-------|-------|-------|
| Jan. 94 | 0.70 | 1.30 | 13.10 | 19.10 | 28.00 |
| Mar. 94 | 0.70 | 1.20 | 12.10 | 17.90 | 26.70 |
| May 94 | 0.70 | 1.30 | 13.20 | 19.30 | 28.70 |
| July 94 | 1.50 | 2.20 | 14.50 | 22.70 | 31.30 |
| Sept. 94 | 2.50 | 3.10 | 13.80 | 21.90 | 31.30 |
| Nov. 94 | 2.50 | 3.40 | 13.40 | 21.40 | 32.10 |
| Jan. 95 | 3.00 | 3.40 | 12.50 | 20.80 | 33.20 |
| Mar. 95 | 2.70 | 3.00 | 11.80 | 19.90 | 32.50 |
| May 95 | 2.30 | 2.70 | 11.60 | 20.30 | 32.00 |
| July 95 | 2.40 | 2.90 | 12.90 | 22.00 | 33.40 |
| Sept. 95 | 2.10 | 3.10 | 14.50 | 23.70 | 36.20 |
| Nov. 95 | 2.40 | 3.40 | 14.20 | 23.50 | 36.30 |

Source: Banco Central do Brasil.

¹⁷ We are referring to Sargent (1983).

Larida's Plan: indexed money unit

Once it became clear that inflation was inertial, and that orthodox policies would be very harmful in terms of employment and output, economists started looking for alternatives. The obvious alternative of freezing wages and prices would be very difficult to implement, given the dispersion of incomes and prices from their average values.

Most prices and contracts were measured in ORTN units.¹⁸ In fact, as mentioned before, money lost its store value function and its unit of account function as well. Actually, almost the only price that was not measured in ORTN was the wages.

The idea of an indexed money unit came naturally to this economy, where all contracts and most prices were already expressed in an indexed money unit, the ORTN. The use of this unit as a money standard was formally proposed in a paper by Arida¹⁹ and Lara Resende (1985) entitled "Inertial inflation and monetary reform: Brazil" and published by the Institute for International Economics. Their proposal came to be known as the *Larida Plan*, regardless of having never been implemented.

The proposal was basically to extend the measure of ORTN to the wages and to create a new monetary unit that had the same value of the ORTN but also could be used as a means of payment and store of value. The new currency could be demanded voluntarily by the agents, and in a way it would expel the bad currency — Gresham's law *au reverse*.

It is interesting to note that this proposal reminds ideas which appeared in Alfred Marshall's writings. The instability of the value of money was for Marshall the main source of instability of the economy. What, in fact, Marshall was suggesting was a perfect indexation of the economy to stabilize the income transfers due to the instability of the value of money. The instability of the value of money, in Marshall, produced economic instability because there was no indexation. In Brazil, the instability of the value of money produced inflation, in the sense that every agent would try to reconstitute his/her income. The idea of indexation was not unknown for Jevons, as well.

It should be also pointed out that several economies tried this system before: Germany in 1923 and Hungary in 1946, but in both cases it was a disaster since inflation accelerated during the transition.²⁰

The dollar could have also been suggested as a new currency, but the dollar was not very much used as a unit of account.

Collor's Plan: fiscal stance

Collor's Plan (1990) was different from the previous stabilization programmes because its main focus was on the public debt and its effects on the liquidity of the economy. Most of the nominal deficit was financed by short-run bonds with floating interest rates that were quasi-money. Around 80% of M4 was sequestered and became temporarily unavailable (18 months) to their owners.

¹⁸ An ORTN (Adjustable Treasury Bill) had its face value adjusted monthly. For shorter intervals, the market would *prorate* the expected variation in ORTN value.

¹⁹ Arida happened to become the first Central Bank President of the F.H. Cardoso government.

²⁰ See Franco (1991) for a detailed analysis.

Despite the failure of this plan, several measures were taken enhancing in the fiscal stance a significant adjustment (table 6).²¹

Regardless of the "heterodox" mechanism used to limit the liquidity of the economy, Collor's Plan can be understood as an orthodox detour on the succession of heterodox stabilization programmes. The idea of fiscal adjustment became dominant among policy makers.

Simonsen's Plan: agenda for the Real

The Real Plan is basically the Larida's proposal as improved by Simonsen. Simonsen (1984) raised a fundamental point. He argued that the "equilibrium values" of prices and wages should be done before the introduction of the new currency, otherwise inflation would accelerate, and the new money unit would be corrupted from its beginning. He suggested, therefore, that the first step to be taken should be the correction of the fundamentals: fiscal adjustment; the second step, the conversion of incomes and contracts; and the third, the introduction of the new currency. As we will see, those were exactly the steps followed by the Real stabilization programme.²²

Pre-conditions: attempts to achieve equilibrium in the fundamentals

• Balance of payments and external debt:

(a) substantial accumulation of reserves during the 1990s, particularly from 1992 on, took place as the result of the good performance of the current account, due to trade in goods and large inflows of foreign capital (figure 4). Reserves rose steadily from US\$9.4 billion in 1991 to US\$23.7 billion in 1992, reaching US\$32.72 billion in 1993 and US\$38.8 billion at the end of 1994. The increasing inflow of voluntary external capital occurred due to large reduction in world interest rate and the improving prospects in the private sector.²³

In 1988 the total net inflow of capital amounted to US\$1,250 million. In 1990, a net outflow of US\$4,480 million occurred and in 1993 the net total inflow of foreign capital had risen to US\$9,127 million, as displayed in table 5. This inflow of international capital from 1992 on played an important role in the process of building up a large stock of foreign reserves that later would be used to back issues of the new currency — the *Real*.

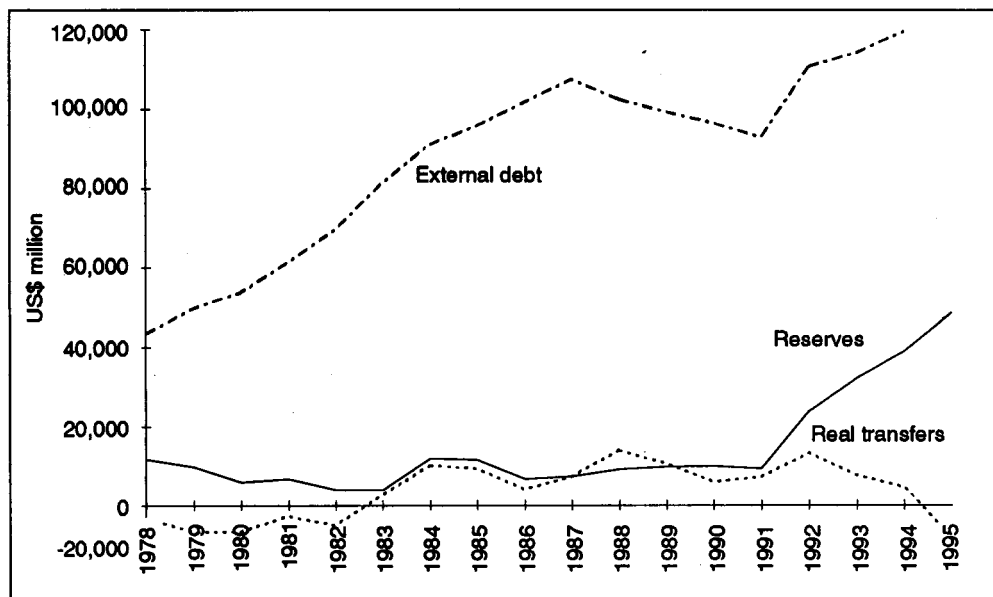
But the data presented below, showing the trends in voluntary capital flows suggests that direct investment has been relatively small compared with the net inflow of portfolio foreign capital (one fourth). As Calvo et al. (1993) have pointed out, the world-wide flow of capital towards emerging markets was an important cause of rising capital inflows, as private borrowing and equity financing began to replace government borrowing in the capital markets;

²¹ For a detailed analysis of Collor's Plan, see De Faro (1990). The real extension of the fiscal adjustment is questionable. Most of the measures were temporary.

²² That was an irony, as long as Simonsen was considered, by many, the typical and sharpest orthodox economist with strong links with the Chicago School.

²³ The same phenomenon was observed in several Latin American countries, especially Mexico, Argentina, and, to a smaller extent, in Chile and Colombia.

Figure 4
External debt, real transfers and reserves, Brazil: 1978-95
(US\$ million)



Source: Banco Central/IBGE.

Table 5
Net inflow of foreign capital, Brazil, 1988-94
(US\$ million)

| Year | Portfolio | Direct | Total |
|------|-----------|--------|--------|
| 1988 | 189 | -28 | 1,250 |
| 1989 | -58 | -340 | -2,801 |
| 1990 | 104 | 280 | -4,480 |
| 1991 | 578 | 505 | -1,538 |
| 1992 | 1,704 | 1,156 | 5,308 |
| 1993 | 6,650 | 374 | 9,127 |
| 1994 | 7,280 | 1,738 | 9,936 |

Source: Banco Central.

(b) significant trade liberalization, with a reform on the tariff structure that reduced the average tariff rate from 34% in 1990 to 14% in 1993, with a tendency to further reductions and elimination of tariffs on a great number of tradable goods;

(c) successful agreements for foreign debt refinancing with the Paris Club and with private banks, especially, after the Brady Plan in 1990.

• Budget correction and privatization:

(a) the evolution of borrowing requirements of the public sector, measured by the primary and operational deficits, showed a significant improvement after Collor's Plan, as shown in table 6.

Table 6
Public sector borrowing requirements
(% of GDP)

| | 1985-89 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1st quarter 1996 |
|-------------|---------|-------|-------|-------|-------|-------|-------|---------------------|
| Nominal | -41.6 | -29.6 | -24.5 | -44.3 | -58.4 | -44.4 | -7.45 | -4.72 |
| Operational | -5.1 | 1.3 | 1.2 | -2.2 | 0.2 | 1.7 | -5.05 | -2.59 |
| Primary | 0.6 | 4.5 | 3 | 2.3 | 2.6 | 5.2 | 0.37 | 2.12 |

Source: SPE/Minifaz.

Note: (-) is a deficit.

(b) budget consolidation was considered a central part of the Brazilian stabilization plan but the government had serious problems with the implementation of needed reforms. 1994 was an election year, and the minister of Finance was the official candidate running for the presidency. Fiscal reforms are very unpopular, especially when they involve cuts in government spending, increases in taxes and privatization of state-owned enterprises. It is true that in the 1990s the budget had presented a primary surplus substantially higher than the average of the previous years, as a proportion of GDP; however, it did not have very solid basis;

(c) privatization had not been very successful and only a few firms had been privatized with strong reaction of the workers employed in these firms and public demonstrations against privatization of state-owned enterprises;²⁴

(d) negotiations with the states to pay the debt of their state banks progressed very slowly.

Stages of the plan

First Stage: fiscal adjustment (three months)

Creation of an Emergency Fund, for two years, whose main objective was to enhance the control over the budget expenditures, reducing the transfers to the states. The estimated value was US\$15 billion, to be constituted from the following sources: 20% of the total receipts of the central government, including the contributions to the states and counties, plus a share of the direct tax due by financial institutions and indirect tax over financial transactions. Finally,

²⁴ Privatization is a very controversial issue in Brazil. The first phase of the Brazilian privatization programme began in 1981 and was characterized by the re-privatization of companies that had been absorbed because of their bad financial situation. Between 1981 and 1989, 108 companies were included in the programme, but since they were small enterprises, the political impact and economic significance were modest. The second phase of the programme started in 1990, and from 1990 to 1992, 32 state-owned industrial companies and 32 minority participations were included in the privatization programme. In this second phase, efforts were concentrated on selling the state-owned steel, petrochemical and fertilizer companies, and it lasted until the end of 1995. The difficult phases are, actually, the ones to come, since the federal government still owns around 100 companies belonging to the Telebrás, Petrobras and Eletrobrás Systems. These sectors pose challenges such as national security, regulation, competition etc. However, privatization is not the topic of this paper (see Malan, 1995, for details on the Brazilian privatization programme).

part of the fund would be formed by the increase of the income tax. The catch was: to the extent that these revenues were funnelled to the fund, they would not be shared with state and local governments as the case with most general resources of the federal government.

Second Stage (three months)

New measure of value and realignment of incomes

- A new standard of value was created: the URV (*Unidade de Referência de Valor*). Its value corresponded to an average of the three main price indices, calculated by different institutions: two consumer price indices — the IPC-R (IBGE) and the IPC (Fipe) — and a general price index, the IGP-M, interpolated daily.
- Wages, public contracts, public tariffs and exchange rates were converted into a new unit of account. The public tariffs were converted gradually with a real increase of 6%. Wages were converted according to the average of the last four months.
- Debts and non-financial contracts at the time were converted by agreement between the parts. New wages would be set in URV with indexation clauses effective only after twelve months.
- Financial contracts were converted to URV slowly. First, the future markets and bills of exchange. Secondly, long-run deposits with fixed rate of return.
- Short-run government bonds, denominated in URV were issued (NTN-V).

Realignment of prices

- Prices of goods and services were converted to URV by the market forces and by negotiation among producers and workers sponsored by the government. To avoid price explosion there was a further reduction of import tariffs and for some goods it reached such small rates as 2% and even 0%.
- An anti-trust law was approved by the Congress, giving more power to citizens and the government to limit excessive price hikes.

The conversion of prices to URV was the most innovative part of the plan and it was surprisingly successful. The acceleration of prices reached a 6% rate of inflation in URV.

Income policy

- The definition of incomes was left to the market: determination of normal incomes by negotiations between agents and between the agents and the government.²⁵

²⁵ In the previous plans the "normal" values of incomes corresponded to the *status quo* income distribution computed, in general, by the technocrats.

- Wages were fixed in URV, that is, URV became the unit of account, but not the mean of payments. The prices were not fixed in URV, only wages. That was an ingenious idea that reduced the acceleration of inflation, since a wage anchor was in fact established. During the transition prices could be adjusted instantaneously, and the wage only monthly (on pay-day).
- Government contracts were also denominated in URV.

Third Stage: issue of the new currency — the real

- All prices and contracts were converted at the rate of: 2,750 units of the old currency = R\$1 = 1 URV = US\$1, to prevail from July 1, 1994 on. This value was calculated so that one unit of the new currency would be equivalent to one dollar. Some sort of *dollarization* was finally implemented in the Brazilian economy.

The situation at that time did not seem very clear. Were we about to experience a process where the exchange rate, between the real and the dollar, would remain fixed at a parity of one to one, an exchange rate anchor *à la* Argentina, or were we about to implement a regime of target zone where the exchange rate would be free to move within a narrow band?

The commitment of the government was the maintenance of an upper limit to the exchange rate of one to one parity with the dollar. The lower limit, the public perceived as .85, based on Central Banks interventions in the foreign-exchange market. The other rule adopted, as far as monetary policy is concerned, was that issues of the new currency should be kept on line with the change in dollar reserves. In other words, since the new additions to the money supply should be backed by the additions of dollars to our reserves, the dollar would serve as an *anchor* to monetary creation.

Fourth Stage: desindexation

- Elimination of all forms of indexation in all sectors, including the financial sector.

5. Preliminary results of the Real Plan

*The economy in 1994*²⁶

According to Reis (1995) report (Link Meeting, March 1995, New York), and the data that we have already presented, the Brazilian economy had a 'shiny' 1994. The performance of the real — the new currency introduced on July 1994, as the third phase of the price stabilization programme — was, as he puts it, "glorious":

²⁶ It is important to recall that 1994 was election year and the former Minister of Finance was running for the Presidency.

- Monthly inflation dropped from 46.6% in June to 0.6% in December of 1994 (figure 1).
- Real GDP growth increased from 4.2% in 1993 to 5.7% in 1994.
- Led by investment and durable consumer expenditures, aggregate demand increased, creating a consumption *bubble*; production of durable consumption goods increased by 15.5% and of capital goods by 18.6%, on a yearly basis; in contrast the output of non-durable consumer goods grew only 1.9%.
- Capacity utilization reached record high levels in most industrial sectors.
- Average unemployment rates were 5.1% in 1994 compared to 5.3% in 1993.
- Industrial wages increased 5.5% in real terms.
- Finally, the foreign exchange bonanza caused the import boom that reduced the trade balance surplus from 13.3 billion dollars in 1993, to 10.4 billion dollars in 1994 (figures 9 and 10).

The steady decline of inflation was the result of:

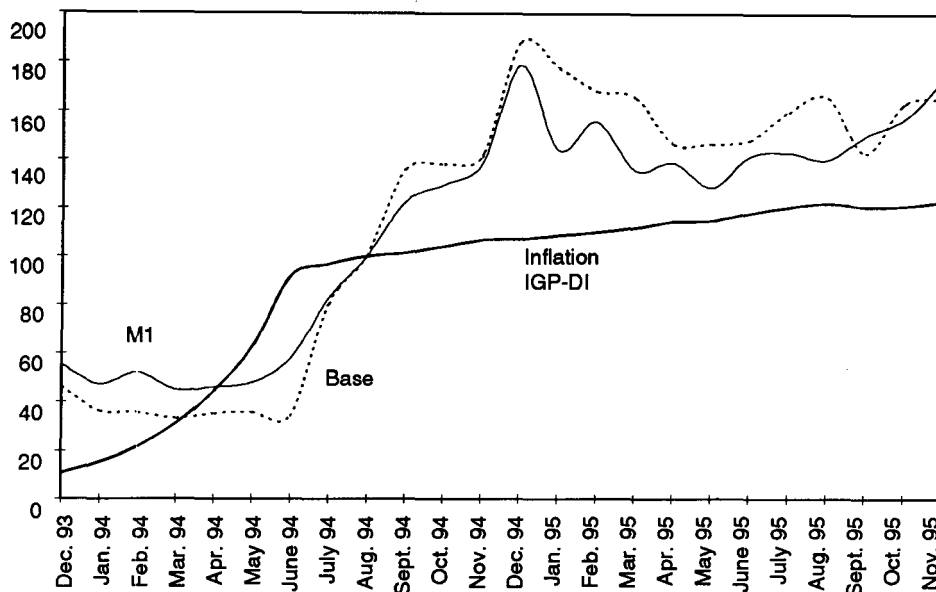
- The effects of appreciation — the nominal anchor was the exchange rate, which was allowed to float only below the parity of US\$1 = R\$1. From July to December 1994 it showed a nominal appreciation against the dollar of 16%, equivalent to a real exchange rate appreciation situated around 24.3% (Reis, 1995).
- The effects of an exceptional crop (agricultural growth in 1994 amounted to 7.5%) with a sharp decrease on agricultural prices made a significant contribution to lower inflation, reflecting the effects of the exceptional crop.

Tight monetary policy was adopted as an essential support of the nominal anchor. Real overnight rate, in the second half of 1994, reached 35% yearly. Nevertheless, M1 expanded 216% during the same period without affecting the inflation rate low trend, as can be observed in figure 5.

The high real interest rate was not sufficient to prevent the strong monetization process and credit expansion was usually associated with drastic declines of inflation. Higher rate would exacerbate the financial situation of small private banks (12 of them were liquidated in the second half of 1994, since the implementation of the reforms in July) and of official banks as well, already squeezed by the shrinkage of inflationary revenues.

“Stabilization had a weak fiscal basis. In 1994, fiscal balance was achieved by emergency taxes and other temporary measures. Compared to 1993, the growth of fiscal receipts was 16%, in real terms, but at least 54% of it was due to the IPMF, a provisional tax on financial transactions, revoked on December 31” (Reis, 1995). Despite the booming economy, tax receipts other than the IPMF decreased 6.5%, in real terms, and fiscal expenditures increased 14%, while the government payroll increased more than 20% (Reis, 1995).

Figure 5
Brazil: inflation, monetary base and money supply
(1993-95)



Source: Banco Central.

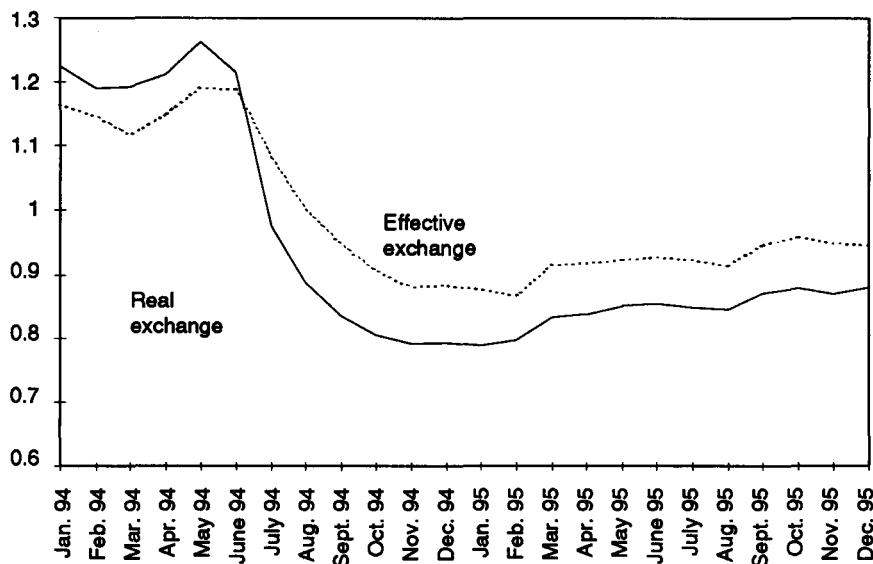
By the end of 1994, the overheated economy coupled with the exchange rate overvaluation²⁷ brought a reversal on trade performance: the trade surplus on visible goods of US\$1.4 billion, in September, dropped to a deficit of US\$800 million in December representing, in 1994, a fall of US\$2.8 billion relative to 1993 trade performance. The spillover of the Mexican crisis affected capital flows, as well (figure 8).

Regardless of the swing in the balance of payments principal items, with trade and current account balances clearly deteriorating, the foreign exchange market remained calm (figure 6). The stock market, however, plunged down -50% in the last quarter of the year (Reis, 1995).

Still backed by the huge amount of reserves, the government resisted the need to devalue the exchange rate, arguing that "after all, Brazilians do not speak Spanish". The emerging trade deficit was fought, instead, with subsidies to exports, as if there were no problems on the import side, or on the capital account.

²⁷ Whether an overvaluation exists is a controversial issue, especially when the domestic currency has undergone a strong devaluation before the stabilization programme officially started. When a country borrows to invest, real appreciation accompanies the high level of resource absorption, more so if the opportunities to invest in the country, due to a substantial difference in the real interest rates are taken into consideration. Real appreciation does not signify overvaluation. However if the real exchange appreciation evolves to an overvaluation of the domestic currency, the consequences can be harmful to the economy: exports fall, import penetration increases, current account deteriorates (See Dornbusch & Werner, 1994). Those were some of the experiences that the Brazilian economy was about to experiment.

Figure 6
Brazil: real exchange rate, 1985-95
(August 1994 = 100)



Source: Banco Central.

Note: Real exchange rate: WPI, USA and WPI, Brazil.

Effective rate: Macrometrica and WPI, Brazil.

6. Main results and limits of the Plan

Inflation

There is no doubt that the inflationary trend has been extremely positive since the introduction of the Real Plan. It becomes obvious when you compare it with the earlier stabilization programmes of the last decade. The monthly inflation averages of the several attempts to stabilize inflation are displayed in table 7.

Table 7
Brazil consumer price index (IPC/Fipe)
Post-stabilization plans
(monthly average, %)

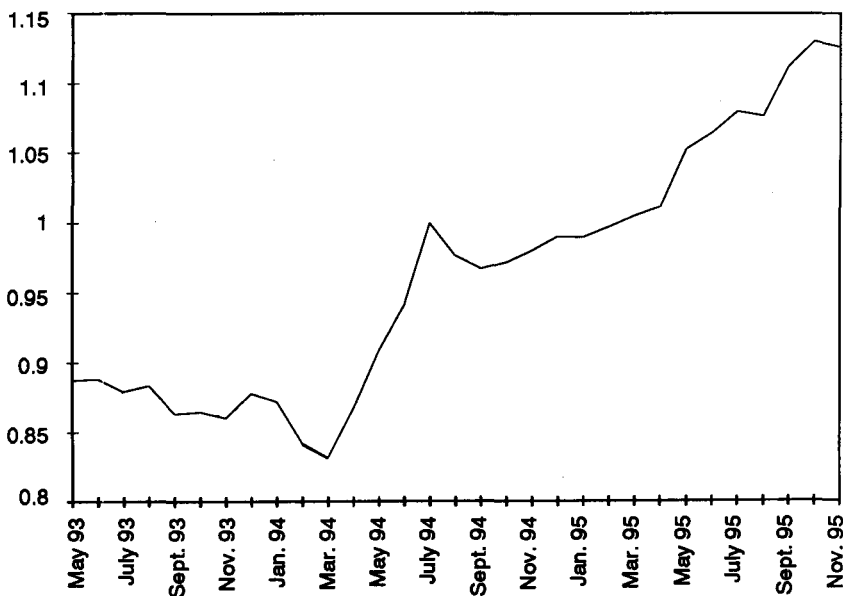
| | Cruzado (Mar. 1986) | Bresser (July 1987) | Verão (Jan. 1989) | Collor I (Apr. 1990) | Real (July 1994) |
|------------------|------------------------|------------------------|----------------------|-------------------------|---------------------|
| Beginning | | | | | |
| 1st-3rd month | 2.02 | 6.81 | 10.16 | 13.47 | 3.24 |
| 4th-6th month | 1.30 | 13.16 | 23.31 | 12.09 | 2.48 |
| 7th-9th month | 2.98 | 15.58 | 34.69 | 16.81 | 1.35 |
| 10th-12th month | 11.78 | 21.10 | 56.44 | 16.35 | 2.42 |
| 1st year average | 4.44 | 19.11 | 30.07 | 14.66 | 2.36 |

Source: Malan (1995:13, table1).

Although the numbers speak for themselves, and even though Brazil still presents a double-digit annual inflation rate, which is high by international standards, a fall of an average monthly inflation around 43%, as it was in the first half of 1994, to a rate that oscillates around an average of 2.55% in the first year of the Real Plan is remarkable. According to Fundação Getulio Vargas (FGV) calculations, the cumulative inflation for 1995 averaged 15%, the smaller rate the country has experienced in the last 38 years. Monthly inflation average forecasts for 1996 suggests that the consumer prices index monthly rate will oscillate around 1% (BNDES, 1995).

It has been argued that wholesale prices undergo less variation than do consumer prices. This argument is confirmed by the comparison between the IPA (an aggregated price index) and the IPC (a consumer price index). The results reported in figure 7 confirm this point. This is also an indication that a large proportion of the inflation during the first two years of the Real Plan originates in the nontradable sectors, since the amount of nontradable goods represents a larger proportion in the basket of the goods that form the IPC. Tradable good prices were anchored on the exchange-rate policy which prevented them from rising in the same proportion as the nontradable goods.

Figure 7
Relative price index: IPC/IPA



Source: Fundação Getulio Vargas.

Exchange rate

The pressures for depreciation of the currency were very strong. "Beginning in October 1994, the Central Bank began to intervene in order to avoid wide swings in the ex-

change rate. It should be noted that the bank intervened both to buy and to sell in order to keep the rate within a band, but did not announce the upper and lower limits of the band" (Malan, 1995:24). At the same time measures were designed to stimulate the demand for dollars and reduce the supply of dollars (Malan, 1995:24-5). Although the government resisted against maxi-devaluations, the domestic currency was devalued in relation to the US\$ dollar in 5%, in March 1995. We cannot forget that the spillover effects of the Mexican crisis of November 1994 were not negligible. Between January and March 1995 there was a net capital outflow of US\$2,052 million. A system of "expressly stated" bands, but subject to periodical revisions to avoid a misalignment of the exchange rate, was implemented. But the uncertainty created by the change in policy induced agents to increase capital flight.²⁸ At the same time, the government backward on trade liberalization measures, reintroducing subsidies to export, and a rise on the average tariff rate on imports of consumer durable goods and automobiles, varying from 20 to 70%, created more uncertainty among the economic agents.²⁹ Credibility was challenged, with all the consequences that the recent literature has been predicting about this important issue. Some economists have pointed out how perverse the effects of stabilization-liberalization programmes can be when they are not fully credible. They suggest that a trade-liberalization programme that individuals think may be abandoned in the future, as future tariffs could rise, induce individuals to buy more imports now than they would if full credibility was the rule. This intertemporal substitution — which in practice shows up most notably in durable goods — may be socially costly because it is based on an intertemporal distortion — imperfect credibility. Thus, imperfect credibility could give rise to a socially costly consumption boom. Furthermore, if the abandonment of the reform is expected to be accompanied by a resurgence of inflation, or any other form of debt repudiation, interest rate differentials may simultaneously rise. This analysis, we believe, is very appropriate to characterize the kind of risk that the Brazilian stabilization programme is subject to.

A recent research by Brandão and Martini (1996) attempted to measure the evolution of the relative prices of tradables (t) and nontradables (nt) after the implementation of the Real Plan. They splited the basket of goods, embodied in the consumer price index (IPC), into two components expressing it as $IPC = IPC_t + IPC_{nt}$.³⁰ The evolution of the prices of these two sets of goods is shown in their work (Brandão & Martini, 1996:22, table 2).

The variation of this quotient suggests an appreciation of the real exchange rate. The quotient decreased from 1.03 in June 1994 to 0.72 in December 1995, which implies an appreciation of the currency around 30% during the period. However, this is not surprising since being the nominal exchange rate almost fixed, behaving as it did as a nominal anchor, it could not prevent nontradable prices from rising, as they were not tied to the

²⁸ According to Bacha (1996:3-4), the pressure upon the international reserves diminished only after becoming clear that the Central Bank was going to define a system of "large bands", and within that band the government was ready to practice daily interventions in the foreign exchange market. We can visualize the new system as if inside the large band you had minibands that would be realigned, within a month, in days and magnitudes not previously announced. Bacha calls the new system a "sliding band" and suggests that the Central Bank, from September 1995 on, has sistematically engaged in intervention practices that resulted in monthly devaluations around 0.5 and 0.6 percent.

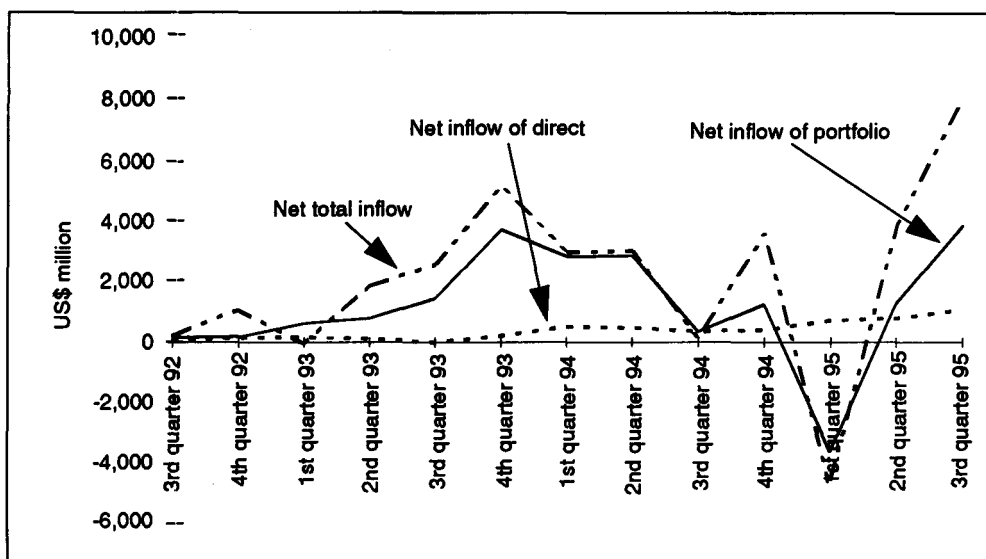
²⁹ Imports had risen 100% in the first three months of 1995.

³⁰ The Consumer Price Index (IPC) was selected instead of the Wholesale Price Index (IPA) since in the former the weight of the nontradables is very small. If one compares the trend of these two price indices during the period 1993-95, one cannot fail to notice how the dispersion has increased.

exchange rate. On the other hand, the increase in aggregate demand that followed the introduction of the stabilization programme exacerbated the pressures upon home-goods prices — we are referring to the consumption *bubble*, associated with drastic declines of inflation.

As far as the spillover of the Mexican crisis is concerned, it did not last long, which surprised most analysts. Figure 8, presenting recent quarterly data on net foreign capital inflow to Brazil, shows that during the second quarter of 1995 a more favourable picture developed on the international scene, and the country was able to attract huge amounts of foreign capital, compensating for the increasing deficits on the trade and current account balances (figures 9 and 10). International reserves reached an amount much higher than they were prior to the Mexican crisis. By the end of 1995, they corresponded to US\$51 billion (excluding gold & SDRs). However, it is well known that there is a cost for building up reserves.³¹

Figure 8
Brazil: Net inflow of capital, 1992-95
(Quarterly data)



Source: Banco Central.

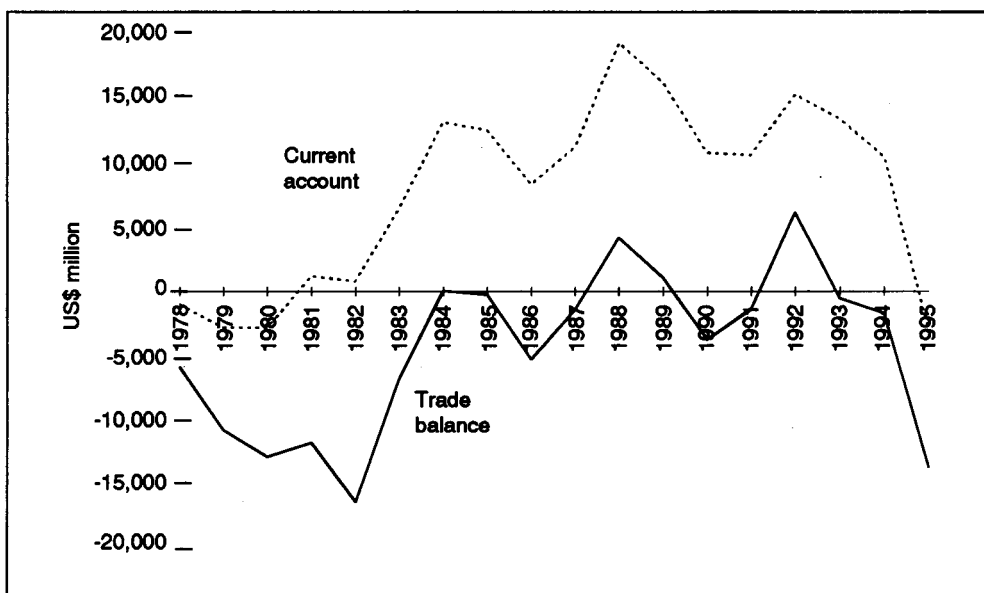
Figure 8 also suggests the nature of the foreign capital inflows, with the net inflow of portfolio capital being much higher than direct investments. It turns also very clear the volatility of portfolio capital: the impact of the Mexican crisis can be depicted since the third quarter of 1994 until the first quarter of 1995. The net inflow of direct investment is much

³¹ Quoting Brazil's Minister of Finance: "There is a cost for building up reserves, but we wanted to make clear that a crisis such as Mexico's peso collapse was not going to happen in Brazil... We don't envision the need to continue the reserve build up from now on" (*Business Week*, Feb. 26, 1996).

more stable.³² Bacha (1993:7-8) emphasizes that: "In fact, Latin American history is full of episodes where lack of credibility and short term financial bubbles were associated with large inflows of 'hot money' from abroad. Moreover, portfolio debt flows, especially short term deposits, are more volatile than long term commercial bank loans and trade financing. Likewise, portfolio equity flows in emerging markets can be taken out fast at low cost. The risk of such reversal is heightened by the volatility of international interest rate".³³

There would have to happen fundamental changes in the Brazilian economy to warrant the sustained large inflows. The government seems to be aware of this problem³⁴ but the changes that are needed are not easy to pursue: budget discipline, privatization, structural changes in the production sectors are not minor changes and the measures needed to implement these reforms go far beyond short-run policy actions.

Figure 9
Brazil: trade and current balances, 1978-95



Source: Banco Central.

The evolution of the nominal exchange rate, since the year of implementation of the Real Plan is displayed in table 8:

³² For a more complete analysis on the causes and consequences of the return of private capital flows to Latin America since the late 1980s, see Bacha (1993).

³³ It is well known that the significant drop in US interest rate since 1989 provided a powerful incentive for the repatriation of Latin American capital flight held in the US financial system. See Bacha (1993) for some of these figures.

³⁴ The actual Brazilian Minister of Finance, in an interview to *Business Week* (26 Feb. 1996), replied to the question "How will you manage the influx of 'hot money'?", saying that "when the credibility and confidence are there, what seems to be shorter-term capital may stay longer".

Table 8
Brazil: nominal exchange rate monthly evolution
Means and standard deviation, R\$/US\$, 1994-96

| Period | Mean | Standard deviation |
|-------------------|-------|--------------------|
| 1st semester 1994 | 0.395 | 0.260519 |
| 2nd semester 1994 | 0.89 | 0.038297 |
| 1st semester 1995 | 0.894 | 0.03105 |
| 2nd semester 1995 | 0.957 | 0.016315 |
| 1st quarter 1996 | 0.983 | 0.010017 |

Source: *Conjuntura Econômica*, Feb. 1996, p. 5 of the *Conjuntura Estatística*. The data for 1996 refers to Banco do Brasil's selling rate (*Folha de S. Paulo*, Mar. 24, 1996).

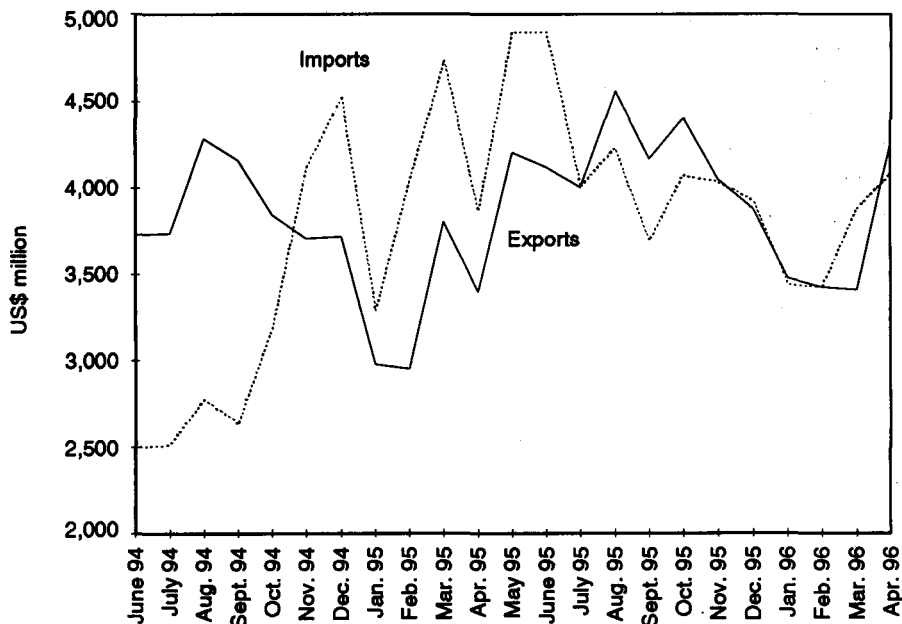
The stability of the nominal exchange rate is notorious from July 1994 on. After the review of the exchange rate policy in March 1995, the nominal exchange rate suffered a gradual devaluation. This devaluation was not enough, however, to reverse the overvaluation of the real exchange rate. Figure 6 presents two estimates of the real exchange rate: one corresponds to the real/dollar exchange rate and uses Wholesale Price Index in US and Brazil as deflators; the other, the effective real exchange rate, uses a basket of exports and the same Brazilian deflator. The latter indicates a gradual real devaluation.³⁵

Another measure of the competitiveness of domestic goods can be expressed by the behaviour of the wages measured in US dollars. Surprisingly enough, the average nominal wage of the industrial sector increased during the implementation of the Real Plan. Adding to that, the overvaluation of the exchange rate resulted in a substantial increase of the average dollar wage rate. If we take into account the index of productivity, normalizing the wage measured in US dollars by this index, we obtain an index of wage unit cost, or efficiency wage. This is a good indicator of cost for the industry. Despite the increase in productivity, which is procyclical, the wage measured in efficiency units and in dollars presents a substantial increase suggesting a decline in competitiveness of the Brazilian industry. Figure 11 shows the extent of the lack of competitiveness of our industry. The obvious result is the bad performance of the trade balance (figures 9 and 10) for most of the period. Nonetheless, it is possible to note a tendency towards improvement of the trade performance since mid-1995. The alteration of the exchange rate and trade policy and the deceleration of economic activity may account for that.³⁶

³⁵ Carneiro (1995) and Bacha (1996) employ a different basket of exports and deflators. According to them, the real rate of exchange reached in May 1996 the same level of January 1994.

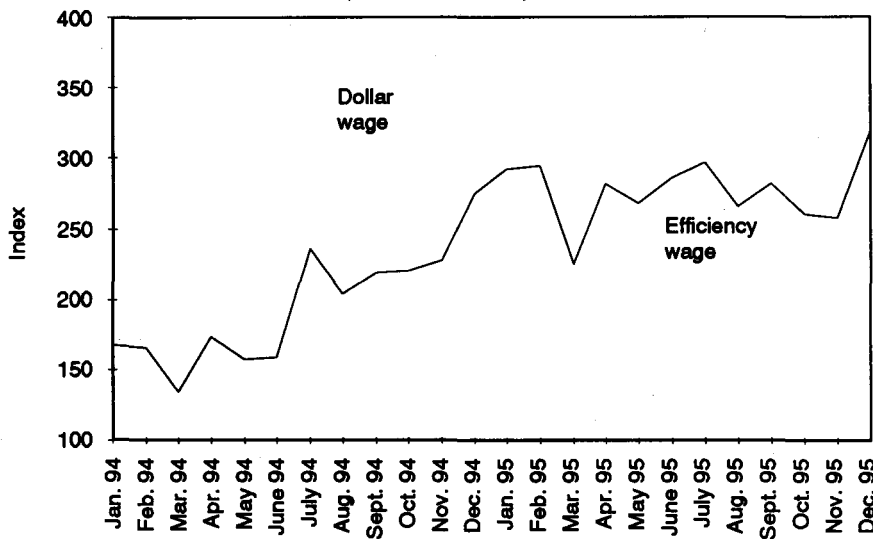
³⁶ Not only minidevaluations but also a package of credit subsidies for exports and higher tariffs for some imports helped to reduce the trade imbalances.

Figure 10
Brazil: imports and exports
(June 1994 — Apr. 1996)



Source: Banco Central.

Figure 11
Dollar wage and efficiency wage, Brazil: 1985-95
(Jan. 1985 = 100)



Source: Fundação Getulio Vargas and Fiesp.

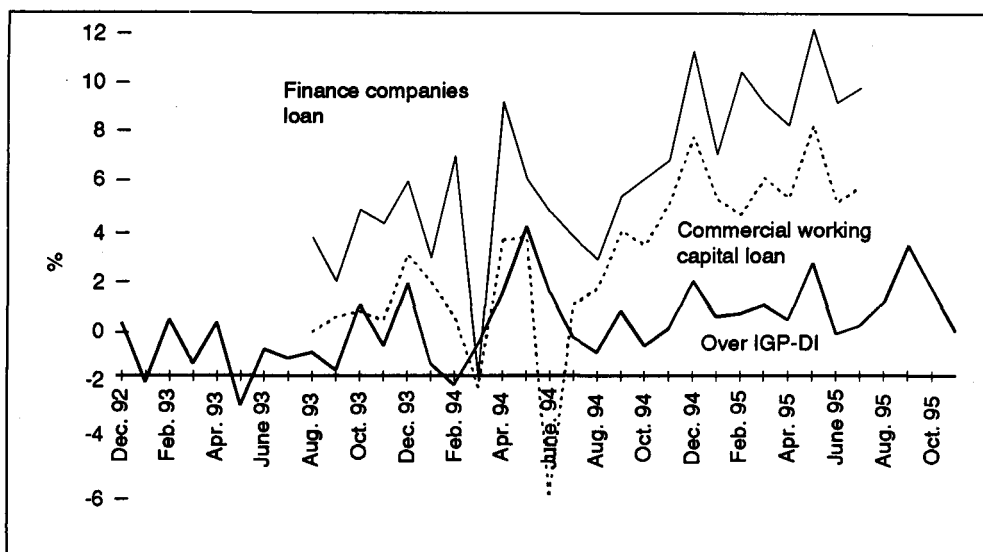
Notes: Efficiency wage = dollar wage/productivity.

Productivity index comes from Fiesp and corresponds to the ratio of sales to employed labour.

The interest rate

Since the beginning of the Real Plan, the government has implemented restrictive monetary measures centered on high interest rate policy and high reserves requirements imposed upon the banking system. These measures were designed, according to the government point of view, to stimulate savings and to restrain consumer credit (Malan, 1995:30). The high real interest rate has been under much criticism among economists on the basis of: its effects upon domestic investments, due to the high cost associated to financing working capital; increase in public debt due to interest payments; internal financial market crisis, and the risk of speculative attacks on the new domestic currency related to expectations of devaluation etc. For the evolution of real interest rates in Brazil during the recent period, see figure 12. For a diagrammatic presentation of the limits imposed by the high interest rate on policies see figure 13.

Figure 12
Brazil: interest rates, 1993-95



Source: Banco Central — Sisbacen.

As a result of tight monetary policy, credit restrictions, and reduction of trade balance, the accelerated growth of 1994 slowed down during 1995, achieving a rate around 4.25%, compared to 5.75% in the previous year. The quarterly growth rates of GDP reached negative values for the 2nd and 3rd quarters of 1995, respectively (-)3.97% and (-)1.27%, and practically no growth has occurred in the first quarter of 1996.³⁷ The recession, however, may be transitory, since firms are adjusting to the new forward-looking real exchange rate and relative prices.

³⁷ IBGE/DPE/Decna.

The public deficit

The impressive result obtained in 1994 was reverted in 1995. The revenues had a substantial increase and the tax ratio was the higher of the recent past, reaching 30.1%. A reversal of the "Tanzi effect" seems to account for part of this effect. Nevertheless, the revenues were not sufficient to satisfy the amount of expenditures. The main factors responsible for the increase of expenditures were wages and social security benefits. The decline of the primary superavit and the increase of the flow of interest produced a substantial operational deficit. The perspectives for 1996 point towards an improvement, given the increase in the activity level and the reduction of interest rates.

This does not mean that the potential deficit has been eliminated. The effort to reduce expenditures has been done through some artefacts like the creation of the Social Emergency Fund and transitory taxes, and the main item that has been sacrificed was capital expenditures affecting the quality and quantity of public services.

The favourable expectations should be handled with caution given that one important instrument to repress expenditures — the Social Emergency Fund — has ended.

It can be suggested that the growth of the internal debt outside the Central Bank (table 9) has been aggravated by the high interest rate policy and the sterilization operations of the monetary authority to sustain the tight monetary policy.

Table 9
Internal debt outside the Central Bank
(US\$ billion)

| Year | Internal debt (US\$ million) | Internal debt (% GNP) |
|------|---------------------------------|--------------------------|
| 1991 | 11,562 | 3.2 |
| 1992 | 36,403 | 9.2 |
| 1993 | 42,061 | 9.2 |
| 1994 | 71,392 | 11.2 |
| 1995 | 109,686 | 15.8 |

Source: Banco Central.

7. Conclusions

The view of inflationary process in Brazil has its roots, fundamentally, on the structuralist paradigm. In this line, mark-up pricing and distributive conflicts were substituted for supply rigidities. Inertial inflation became the basic framework of inflation, and price freeze cum income policies the main ingredients of the heterodox stabilization programmes. The succession of failures of the stabilization programmes, however, showed the limits of the simple inertial inflation models. The heterodox model sketched in the appendix illustrates the difficulties embodied in heterodox stabilization programmes. The Real Plan has to be understood under this new framework. The demand factors, particularly the fiscal stance, had to be considered.

Despite the success of the Real Plan it is too early to wipe out the inflation *ghost*.

The picture that comes out of the data presented points towards a disequilibrium in the fundamentals. The rate of interest has been too high, and/or the exchange rate has been too

low. The real "dual" so to speak of these nominal disequilibria were public deficit, negative trade balance and growing unemployment, in other words, low internal savings and recession.

The year of 1995 was crucial for the sustainability of the Real. The resistance to the *tequilla effect* was an important test for the credibility of the plan. On the other hand, it led to a review of the exchange rate policy. The path of the real exchange rate points towards a gradual real devaluation. The inflow of capital and the substantial accumulation of reserves gives more freedom for the monetary policy, reducing the risk of speculative attacks.

Fiscal adjustment seems to remain the main obstacle to be surpassed. It may be possible to repress the fiscal deficit through repression of expenditures as it has been largely done in the past. The problem with this solution is the repression of capital expenditures that have medium run implications.

There is no doubt that the treatment of these imbalances requires important changes in the Constitution and maybe a new *social pact*.

On the other hand, the increase of internal savings, and, in particular, of public savings implies a new definition of the nature and size of the public sector. The slow process of privatization of public enterprises, for example, illustrates the battles to be fought.

The financial system in Brazil, supposedly one of the most efficient in the world, is going through important changes in its structure and management practices. As we know, an immediate result of stabilization is the substantial reduction in its income, originated from the inflation tax on deposits. As a result of that and due to the tight monetary policy characterized by high compulsory reserve requirements for sight deposits, time deposits, savings accounts, and other forms of savings at, and loans by the banking system, plus the high interest rate policy, several banks and their clients as well became insolvent. To avoid the *domino effect* upon the financial system, the government supplied important loans to the system, aggravating still more its passive.

As it becomes clear, there are strong forces in the system that would resist to any of the important reforms needed. In this case inflation may return as a result of the imbalances of the system. Credibility crisis and capital flight would set the scenario for a maxi-devaluation. Public deficit would push money supply. The vicious circle of inflation, money accommodation, could be re-established. We hope that this will not be the case.

The diagram presented on figure 13 summarizes our main concerns presented above.

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Appendix

*Sketch of an heterodox model as a benchmark to evaluate the Real Plan*³⁸

Let us try to move further in the concept of the equilibrium vector of relative prices. The heterodox view believes that it is possible to find the right prices that would be consistent with stability. To examine the problems that follows this procedure we make use of a very simple model described by the following assumptions:

A.1 Factor price frontier

Assume that the price level of non-tradables is determined by mark-up, and that labour is the only input. This implies a negative relationship between real wage and real exchange rate.

$$\omega = \omega(e) \frac{\partial \omega}{\partial e} < 0 \quad (1)$$

where ω is real wage and e is real exchange rate. This can be considered the *price frontier* of the economy.

A.2 Aggregate demand on domestic goods

The aggregate demand on domestic goods depends on the real exchange rate (e) on the fiscal deficit (f) and on the real monetary aggregate (m).

$$Y = Y(e, f, m) \quad (2)$$

As usual, assume that Marshall Lerner condition holds and that f and m have a positive effect on Y .³⁹ The operational deficit has a positive effect on aggregate demand as long as it represents net public expenditures and also wealth. We are considering that the Barro-Ricardo Substitution Theorem does not hold.

By assumption, aggregate supply adjusts instantaneously to aggregate demand for domestic goods.

It is important to note the dynamic behavior of the operational deficit. The assumption is that the deficit is entirely financed by bonds. In this case the debt will increase by the amount of the deficit. If the primary deficit is considered constant, the operational deficit will grow by the rate of interest.⁴⁰ For a constant product, the only sustainable operational deficit will be zero.

³⁸ This model follows closely Franco (1991) and Cirne de Toledo (1992).

³⁹ To make things simpler, we are assuming that f is independent of Y .

⁴⁰ Consider that $f_t = f^p_t + i D_{t-1}$, where f is operational deficit and f^p is the primary deficit. Move backwards one period and take the difference. By assumption $D_{t-1} = f_{t-1} + D_{t-2}$ and $f^p_t = f^p_{t-1}$. It follows that $f_t - f_{t-1} = i f_{t-1}$.

A.3 Balance of payments

The balance of payments (*BP*) would depend on the real exchange rate, on the level of economic activity, and on the interest rate differential. Its equilibrium is such that:

$$BP = BT(e, Y) + BK(i - i') = 0 \quad (3)$$

where *i* and *i'* represent the domestic and foreign interest rates, respectively, and *BT* stands for trade balance and *BK* for capital balance.

We assume perfect capital mobility. In that case the balance of payments will be always in equilibrium.

A.4 Inflation

Assuming that the change in prices follows the model presented in section 2, equation 9, and substituting *Y* for *GAP*, the inflation equation becomes:

$$\hat{P} = \hat{P}_{-1} + g(\omega, Y) + \xi \quad (4)$$

Using *e* instead of ω by A.1 we will define the equilibrium distributive conflict as the pairs of (*e*, *Y*) for which the value of *g* equals zero.

$$g(e, Y) = 0 \leftrightarrow \hat{P} = \hat{P}_{-1} \quad (5)$$

By assumption, the locus $g(\cdot) = 0$ will be increasing in the plane (ω, Y), and decreasing in the plane (*e*, *Y*). The space to the right of this locus presents inflationary tensions, while, to the left, deflationary tensions. The locus presents the pairs of (*e*, *Y*) consistent with inertial inflation.

The problem to be solved is to find the values of *Y* and *e* consistent with the fundamentals, and that satisfy the inertial inflation. In other words, the stabilization plan should solve the model *à la* Walrasian auctioneer, and find out the prices that satisfy the external and internal equilibria and price stability. Once that is met, the economy is ready for the new monetary unit that will erase from the memory of the agents the previous inflation, and will be able to re-establish the functions of money that had been destroyed.

The system could be visualised, in figure 1, as follows:

Equation (2) constitutes the demand locus *DD*. This locus shows the level of activity as related to the level of real exchange rate. The hypothesis is that the level of activity will be always along this locus.

Equation (5) represents the locus of inertial inflation, *OO*. Along this locus inflation is neutral. Any position outside the locus will present inflationary or deflationary pressures. This locus represents the supply conditions.

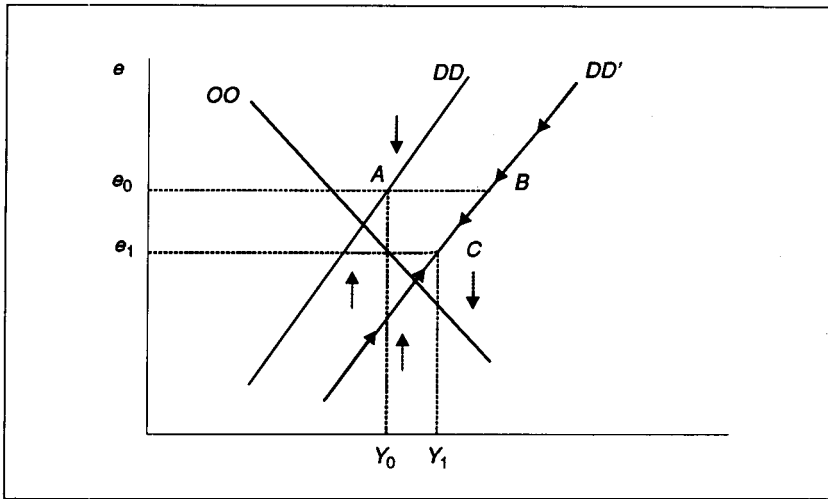
Equation (3) defines the external equilibrium. Since it does not impose any constraint, it will not appear in the diagram.

The engineering of the heterodox plan should attend the following steps:

- (a) Correct the fundamentals: fiscal adjustment towards zero public deficit; set $f = 0$;
- (b) Choose the right price vector — real exchange rate — consistent with inertial inflation; find (e, Y) such that satisfies the locus OO and therefore $\hat{P} = \hat{P}_{-1}$;
- (c) Eliminate all indexation mechanisms; set $\hat{P}_{-1} = 0$;
- (d) Fix one price, for instance nominal exchange rate; set $\hat{E} = 0$.

The planning exercise can be explained with the help of the following chart:

Figure A1
Programme's consistency



The real exchange rate must be chosen so that it satisfies the supply and demand locus. Monetary policy will not matter since money supply becomes endogenous.

Once the policy makers find the “correct” real exchange rate, e^* , that, by definition, is equal to $E \frac{P'}{P}$, being consistent with inertial inflation, they peg the correspondent nominal exchange rate, and make $\hat{E} = 0$. Since inflation becomes zero, by assumption, real exchange rate will be constant too if the world prices do not change. That means that $\hat{P} = 0$ implies $\hat{e} = 0$, that is, $\hat{P} = 0$ implies $\hat{e} = 0$. On the other hand, if the choice is wrong, the real exchange rate will move through time in the opposite direction of the price level, that is $\hat{P} > 0$ implies $\hat{e} < 0$.

This is represented in the diagram through arrows below and above the OO locus. Since by assumption the economy will be always in the DD locus, the disequilibrium will be represented through arrows along this locus.

Two difficulties may be illustrated by the model. One is the short run equilibrium. The policy makers may choose the wrong real exchange rate. In that case the stabilization will not be successful and inflation will come back. If the slope of the demand locus is positive and

the slope of the supply locus is negative, the system will be stable and inflation will lead the system back to equilibrium of zero inflation.

The other difficulty lies in the medium run and it depends on the "fiscal fundamentals".

Assume for instance that the short run equilibrium is obtained, in the sense of satisfying the demand locus and the supply locus in point *A*, and the nominal exchange rate is fixed. Suppose however that the "fiscal fundamentals" are not quite right and a public deficit occurs. If there is an operational deficit in the first period, we know that it will become greater in the next period by A.2. Consequently the demand locus will shift to the right — *DD'*. The economy moves from point *A* to point *B* in the diagram. Even if the price vector (real exchange rate) is correct in the first moment, it will become wrong in the next, and inflation will be re-established. Policy makers were right in the short run and inflation could be stopped quickly (point *A*). Inflationary tension will, however, start to appear in the following period due to imbalances in the public budget. Inflation, nevertheless, will lead the system to a new equilibrium (point *C*) in the absence of indexation (understood as the regime of pegging the real exchange rate). However, the system is not sustainable, since deficit will keep growing.

Summarizing: in the above chart, the process we have described is represented by the shift of the demand locus to the right — *DD'*. The initial equilibrium *A* is substituted by a disequilibrium *B*. Inflation rate leads the economy to point *C*. The economy moves from *A* to *B* and slides along the *DD'* locus to the new equilibrium *C*. This new equilibrium however is not sustainable in the medium run.

Two special cases of instability could be added. One has to do with indexation: if the real exchange rate is maintained fixed by regular minidevaluations, for instance, the self-equilibrating mechanism will be eliminated and the economy will become unstable even if the fundamentals are right. The other case happens when the increase of real wage due to the appreciation of the exchange rate stimulates consumption, "à la Kalecki", more than inhibits foreign demand. The demand locus will present a negative slope.⁴¹ If this is the case and the demand slope is smaller in absolute value than the slope of the supply locus, the system will lack stability. Any mistake will trigger a permanent inflationary or deflationary process.

Finally it should be mentioned that credibility on the exchange rate regime could be introduced in this setting. In that case it is possible to suggest a negative relationship between nominal exchange rate and interest rate by A.4, due to arbitrage. It is easy to show that it aggravates the lack of stability of the system.

⁴¹ In that case the demand for domestic goods becomes:

$$Y = Y(\omega, e, f, m)$$

Making use of (1) it follows that:

$$Y = Y(\omega(e), e, f, m) = Y(e, f, m)$$