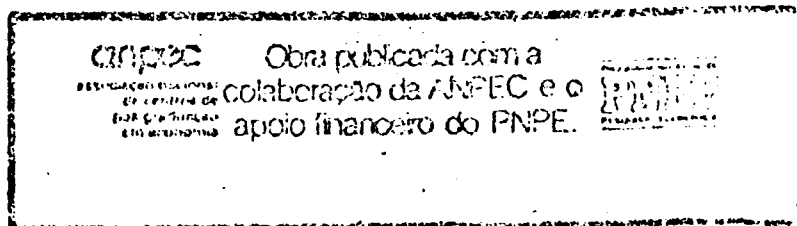Nọ 129

FINANCIAL DEEPENING IN BRAZIL

CAPÍTULO ·III

INCOME AND DEMAND POLICIES IN BRAZIL

Rubens Penha Cysne

Setembro de 1988

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Rubens Penha Cysne*

September, 1988

* Getulio Vargas Foundation Graduate School of Economics

CHAPTER III

INCOME AND DEMAND POLICIES IN BRAZIL

Introduction

This chapter is divided into four sections. In the first, are presented three different ways to correct the continuous loss of purchasing power of wages in an inflationary environment . We concentrate our attention on the two mechanisms that have been used in Brazil: The "peak adjustment" and the "average adjustment". In the former case, wages are corrected taking into consideration only past inflation . In the latter, future inflation must be forecasted to permit the calculation of the nominal wage adjustment necessary to keep its purchasing power at the previous prevailing value. These different methodologies lead to completely different situations with respect to combating inflation, and are a key step in understand in the inflationary process in Brazil. The "peak adjustment" is generally referred to in the literature as lagged(backward looking) indexation . The "average adjustment" is better defined as an income policy than as a method to index wages. It is also sometimes referred to as " forward looking indexation".

The "average adjustment", which presents an additional degree of freedom for policy-makers trying to combat inflation, was the basic tool used to bring yearly inflation down from 91,9% to 24,9% in the period 1964 to 1967 (under the PAEG Plan). This was the only successful attempt to combat high rates of inflation (for brazilian standards, high rates should be defined as above 40% a year) in Brazil. The extent to which inflation was reduced finds no parallel in the economic history of the country. A second attempt to use the "average adjustment" methodology, this time in order to

stabilize the 226% average inflation rates prevailing between 1983 and 1985, was given by the Cruzado Plan, launched on February, 28, 1986. However the lack of adequate demand controls led to a complete disaster. Section 2 is dedicated to the description and comparison of these two attempts towards price stabilization (PAEG and Cruzado Plans).

Section 3 concentrates on the complicated institutional relationships between the Federal Treasury, Central Bank of Brazil and Banco do Brasil, which has led to the existence of two different budgets: the monetary budget and the fiscal budget. The former is related to the forecasted and approved (by the National Monetary Council) operating targets of the Central Bank and Banco do Brasil . Monetary (M_1) expansion is pre-determined, and the assets and liabilities of these institutions are carefully analysed, in order to make the High Powered Money expansion compatible with the forecasted evolution of the banking multiplier and the previously determined expansion rate of M_1 (currency plus demand deposits) . The fiscal budget is the official one, and the only one subjected to approval of the Congress. It has not been representative of the government budgetary disequilibrium , though, since many of the expenses of the Federal Government are carried out by Banco do Brasil or the Central Bank, and directly financed by money supply.

Finally, section 4 concentrates on the consequences over money demand arising from the continuous process of financial innovations. The econometric estimates presented allow us to evaluate the magnitude of the autonomous decline in the demand for real cash balance, which was around 6% a year since 1964. Particularly, if the purpose is to evaluate the role of monetary policy in affecting aggregate demand, this instability of money demand makes it necessary to analyze the changes in other broader monetary aggregates.

2) Income Policies

Roughly speaking, there are three main ways to correct the continuous loss of purchasing power of wages due to inflation. The first, instantaneous indexing, is more easily described by textbooks than applied in practice. Here, wages are corrected continuously, and their real value is kept constant over time. Its approximation in the real world is given by the trigger point methodology: when accumulated inflation since the last readjustment reaches a certain limit, say x%, wages are automatically multiplied by $1 + x/100$. The lower the value of x stipulated in the wage agreements , the lower will be the variation of real wages.

The main disadvantage of this process, which has been used already in Italy and Belgien, relies on the fact that the average purchasing power of labor remuneration in an economy is not to be considered an exogenous constant. Indeed, in periods of adverse supply shocks, like real exchange rate devaluations, losses of crops, increase of indirect taxes, decreases of subsidies or deterioration in the terms of trade, full employment real wages are naturally supposed to decline. The same thing would happen in the case of sharp increases of real interest or capital remuneration. If the given escalator mechanism does not recognize this fact, as it would be the case under the trigger point mechanism with low values of inflation to determine the nominal correction of wages, the economy becomes subjected to high unemployment rates.

The technical solution to this problem would be the use of inflation indexes which expurgates large and unexpected price level shifts

solely due to supply shocks. But this is not an easy task to achieve. First, spillover effects make it technically complicated to evaluate the effect of supply shocks on the price index. For example, is hard to say to what extent a loss of production in the orange crop has affected the price of apples. Second, it is not easy for an employee to see his wage being adjusted at a rate below the inflation rate, because of something the economists refer to as "supply shocks". They do have some reason, since positive supply shocks generally do not lead to wage corrections higher than inflation rates.

All of these problems explain why this methodology was put aside on the aforementioned countries. Overall results were not positive.

We turn now to the second, and by far the most popular instrument used in Brazil to replace purchasing power of wages over time, the so called "peak adjustment" method . The difference between this method and the previously mentioned ("trigger point") one relies on the timing of adjustment. In the " peak adjustment" case, these dates are determined exogenously and settled ex-ante. The timing is set arbitrarily. For instance, every six month or every twelve months may be the intervals at which wages are revised. In the case of the trigger point methodology, these dates are not previously agreed upon, but endogenously determined by the prevailing rate of inflation. If it was stipulated that wages were to be adjusted each time the price level increases, for instance, by 10%, the adjustment will be quarterly if quarterly inflation is 10%, or yearly, if yearly inflation is 10%.

An important difference derives from this fact. Under the trigger point methodology, if W_p stands for the real wage just after the adjustment date (which we call the "peak wage"), the

lowest value the wages can reach before the next adjustment   is given by $W_p/(1+\pi)$, where π represents the rate of inflation which triggers the new nominal wage revision. If it was previously settled that wages   would be revised each time inflation reached 10%,   the lowest value of real wages (valley wage, W_v) would   represent   a fraction 10/11 of the peak value. With a uniform rate of inflation, the average wage would be around 95,4% of the value existing just after the last adjustment.

Under the "peak adjustment" methodology, average and valley real wages are a decreasing function of the rate of inflation occurring between the two pre-settled dates of adjustment. As in the previous case the valley real wage (W_v) is a fraction $1/(1+\pi)$ of the peak real wage. But now the inflation rate in the denominator is indeterminate, not of a fixed value. It can be one, one hundred or a thousand percent, depending   upon   the   price index   path   between the two adjustment dates. The following graph, which presents the evolution of real wages over time, helps to understand this issue:

Graph 3.1
Real Wage Evolution in an Inflationary Environment
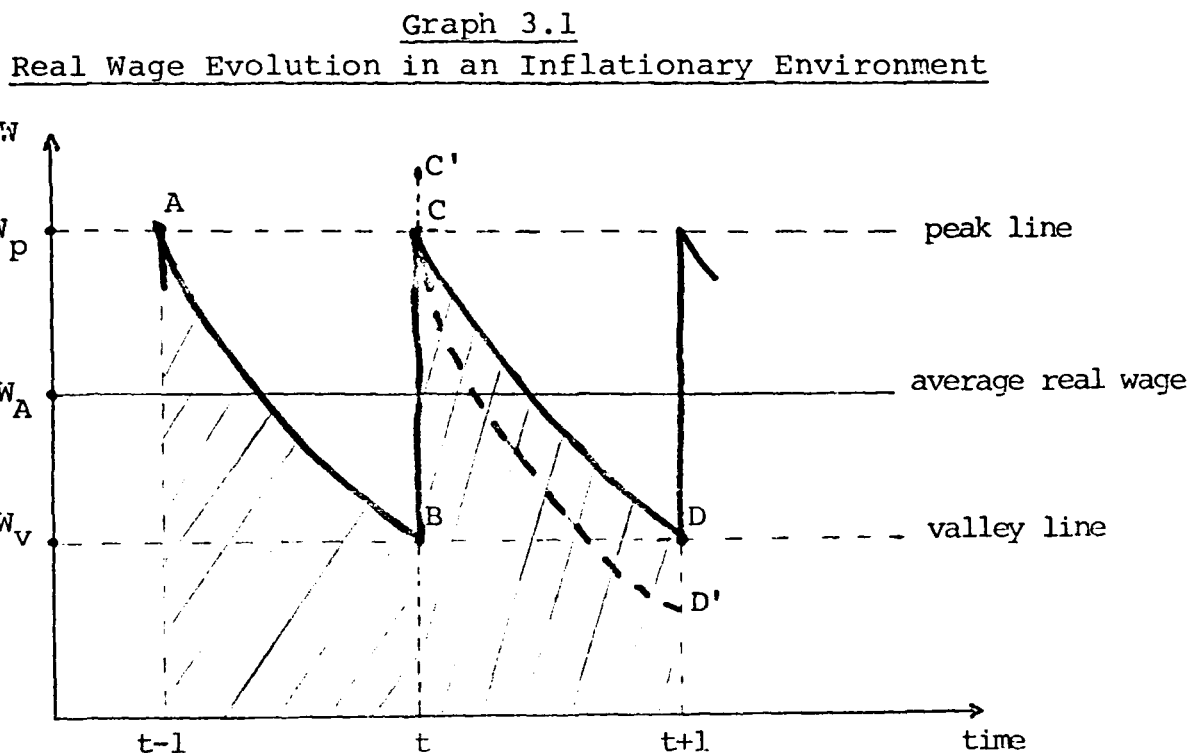
At date t - 1, real wages were brought to the peak. As time goes on, nominal wages are held constant (up to time t), but prices are continuously rising. This leads to a fall of the purchasing power of wages over time, translated by the line AB. At time t, real wages reach their lowest value (W_v), but are subsequently adjusted to the peak (point C in the graph). This adjustment is made by multiplying the nominal wages by $(1 + \pi)$, where π is the inflation rate which occurred between dates t - 1 and t.

The average purchasing power of wages between dates t - 1 and t is proportional to the dashed area below line AB. We show in the appendix that, if the rate of inflation is constant over the time period considered, the average real wage (W_A) will be related to the value (W_p) by the formula:

$$W_A = W_p \cdot \frac{\pi}{(1+\pi)\ln(1+\pi)} \qquad (3.1)$$

where π stands for the inflation which occurred between the dates of wage negotiations. Thus, if wages are adjusted once per year and yearly inflation is 40%, their average purchasing power will be around 85% of that existing at the day when they were adjusted.

Expression (3.1) leads to the following conclusions regarding the characteristics of the peak adjustment:

a) The higher the inflation rate, the lower will be the average-peak ratio (APR) W_A/W_p;

b) Given the inflation rate and the term of wage negotiations (and, consequently, APR), the higher we bring peak real wages on the adjustment date the higher will be their average purchasing power.

c) Given a certain rate of prices increase, the shorter the period of time between wage adjustments, the higher will be APR.

Equation (1) represents a simple tautology, which, under certain hipotheses, defines the average value of real wages. We will see in the next section how this formula had its status changed in some economic analyses in Brazil, from a tautology to a theory of inflation, leading to the disastrous cruzado stabilization Plan, in 1986.

All these three facts can be easily understood by examining graph 3.1 between periods t and t + 1. Line CD presents a similar evolution of real wages as existed between periods t - 1 and t. It would be the actual one, should the time scheduling of wage adjustments, the inflation rate, and the peak wage repeat those of the previcus period. Line CD' shows what would happen to real wages if inflation were somewhat higher than that existing between periods t - 1 and t. Real wages would fall more quickly and their valley value would be lower. Also the average real wage would decline relative to the last period.

Point C' illustrates a possible adjustment above the peak value. It becomes clear that, given the rate of inflation, the average real wage would be higher in this case than if the adjustment had established as a target the peak value W_p.

Finally, we make use of a similar graph to display the third property of the "peak adjustment" methodology: Given the rate of inflation, the average peak ratio (APR) is a decreasing function of the wage indexing term.

Graph 3.2

Reduction of Wage Indexing Term and Increase of Average Real Wage
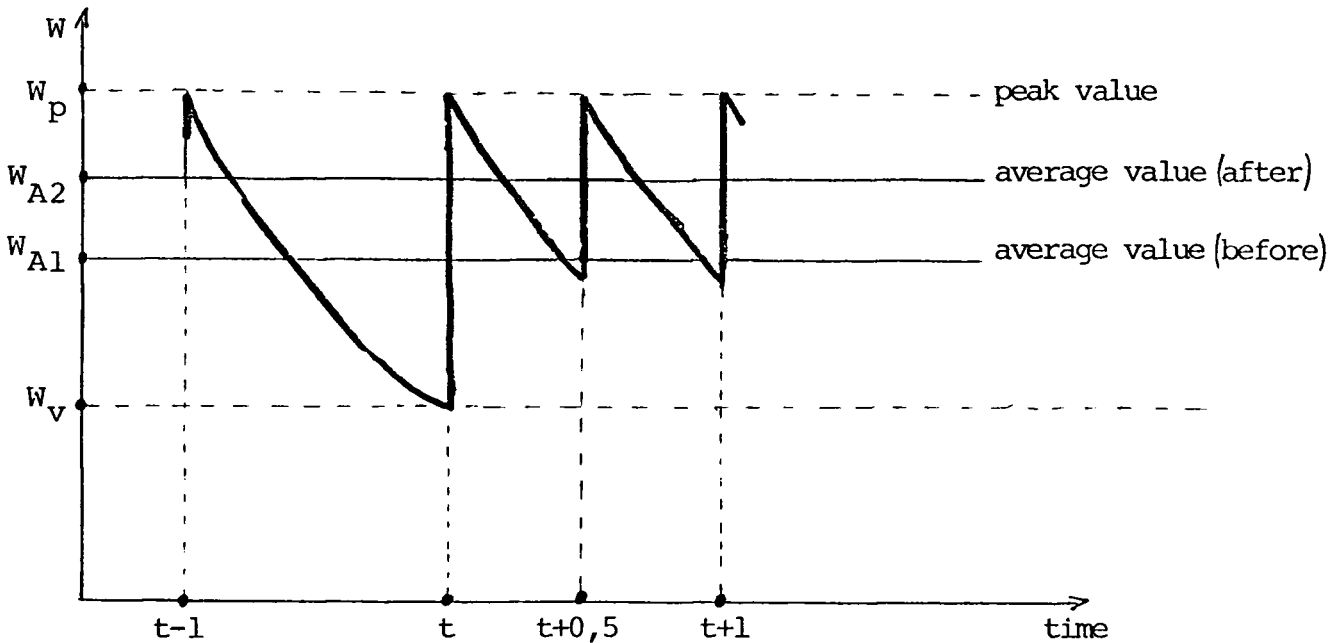
With a yearly inflation rate of 40%, for instance, average real wages will correspond to 84,9% of the peak value if the indexing term is annual, but 90,7% of the peak value if the indexing term is half-yearly[1].

As can be seen, the "peak adjustment" methodology operates as a severe barrier to any sudden stabilization of inflation. Let us take the brazilian case, for instance, in 1985. The annual inflation rate was 235,1% and wage negotiations were half-yearly. This is to say that average wages represented about 75% of the peak value. Consequently, a sudden drop of inflation rate to zero would mean that after all wages had been adjusted according to the previous peak, there would be a 33% increase of real wages. This is clearly impossible in the short run, and means that there is no possibility for

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(1) If yearly inflation is 40% and uniform, half-yearly inflation will be 18,3%. Entering this number in (1) results $W_A = 0,907 W_p$.

such a stabilization measure to be effective without a change of income policy.

The solution to this problem, which we call the "average-peak dilemma", is given by the use of the third method of wage adjustments we are going to present here: the adjustment by the average ("average adjustment"). The main difference is that the correction of nominal wages is not directed towards the recomposition of its peak purchasing power, but carried out in order to keep unchanged its prevailing average real value in the next period[1] Graph 3.3 illustrates this methodology.

Graph 3.3

The "Average Adjustment" Methodology
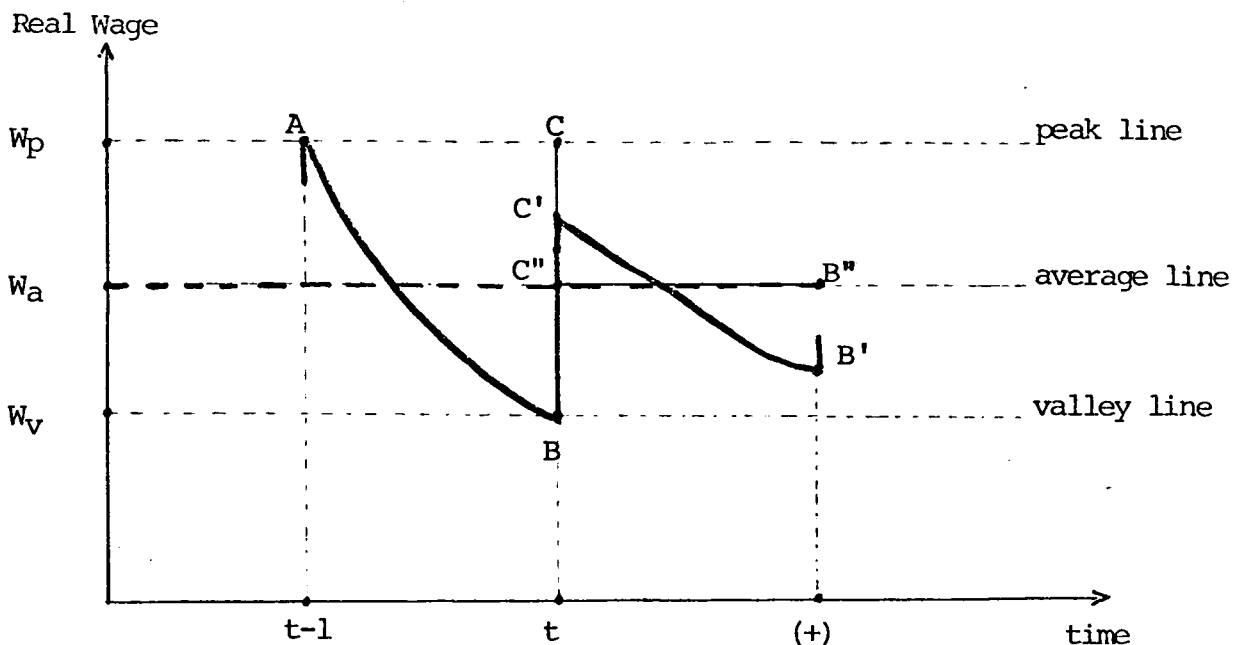
Following the peak methodology approach, as we have previously seen, real wages would be brought to point C at time t. This would also be the adjustment following the "average methodology", if the inflation expected to happen between time t and t + 1 were equal

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(1) A productivity gain can also be added to the prior average, as it was, for example, the case in Brazil between 1965 and 1967, when this additional was fixed by the government.

to that between time t - 1 and time t. Indeed, this would make the expected average value of real wage between dates t and t + 1 equal to the previous actual level.

But if the objective is to initiate a stabilization plan, expected inflation for period $t(\pi_t^e)$ will surely be lower than the previous inflation(π_{t-1}). Consequently, real wages should be brought to a point below C, which we illustrate in the graph by C'. If the actual inflation really declines as forecasted, average real wages will remain the same. In the case when expected inflation for the next period is zero, nominal adjustments must bring real wages to point C''. Their trajectory in this case would be given by line C'' - B'', which repeats the average real wage of period t - 1. These points are formalized in the appendix. Equation (1) is taken as the basis for formal explanations.

Although it represents a solution to the APR dilemma, the above described methodology presents a technical challenge: the forecast of future inflation. If actual inflation prevailing as of time t is higher than the predicted one (used to correct wages), average real wages will turn out to be lower than in the previous period. A possible way to surpass this difficulty is to base the wage adjustment to be carried out at date t + 1 on the average value that would have prevailed had inflation been correctly forecasted, and not on the one actually existing. This was done in Brazil between 1968 and 1979.

2) Two tentatives Towards Stabilization

The solution of the average-peak dilemma by means of an income policy centered on the "average adjustment" methodology was introduced on two occasions in Brazil. In the first, during the "Plano de Estabilização do Governo Castello Branco" (PAEG), it was also accompanied by demand restrictions, and led to a great sucess in terms of stabilizing inflation. This happened between 1964 and 1966, when inflation fell from 91,9 to 38,2 percent a year. However, the second attempt was a complete disaster. It happened in 1986, with the so called "Cruzado Plan". The income policy was correct, but as we shall see further in this section, the easy monetary-fiscal policy destroyed all possibilities of achieving any sucess. Only a few months after the beginning of the Plan, all the efforts toward stabilization had been irreversibly lost.

The following table presents some statistics related to the PAEG plan:

Table 3.1

Economic Statistics Related to the PAEG Plan

	1964	1965	1966
Public Deficit as a Percentage of GDP(%)	4,0	1,6	1,1
Monetary(M_1) Expansion(%)	84,6	76,5	15,8
Inflation(%) (IGP-DI)	91,9	34,5	38,2
GDP Growth(%)	2,6	2,1	5,4
Agricultural Sector Growth (%)	- 1,3	20,1	- 14,6

Sources: Conjuntura Econômica, November, 1972.
Zerkowsky and Velloso, for the national account statistics.

As can be observed from the data, in 1964-66 both monetary and fiscal policy were relatively tight. The discrepancy between the inflation rate and monetary policy in 1965 can be explained by the decrease of income velocity of money which accompanies such stabilization programs. Inflation in the first quarter of 1964 reached 25%, which means by extrapolation, a 144% yearly rate. From this point of view, the 91,9% rate of inflation at the end of 1964 demonstrated that the plan introduced after March was in the correct direction.

Two important facts which helped to tame inflation in 1965 were the excellent agricultural crop and use of the "average adjustment" mechanism to correct minimum wages in February. Had the peak adjustment methodology been used, minimum wages would have been multiplied by 2,09. With the adjustment aimed at keeping the average real purchasing power equal to the preceding period, minimum wages were increased by only 57%. In July, 1965, forward looking indexation was extended to all wage negotiations carried out under federal government influence.

The most common criticism made about the PAEG plan was that stabilization was achieved due to the decline of real wages. Projected inflation, which was used to correct nominal wages, was systematically set below actual inflation, leading to a continuous (in 1965, 1966 and 1967) decline of average purchasing power of labor remuneration. The situation persisted up to 1968, when the wage adjustment law was modified.

This criticism applies, not because of the fall of real wages, but because of the fall of labor income as a percentage of GDP (measured by Langoni, 1970, p. 163). Indeed, as we have already mentioned and formally display in the appendix, the decline

of real wages was to be expected as a natural consequence of the real exchange rate devaluation, reduction of subsidies, and correc tion of the prices of public utilities which took place at this time.

However, this was not to imply a decrease of the labor share in GDP. This decline shows that the burden of stabilization was really biased against employees. An active policy of increased taxation on capital revenues and decreased taxation on labor income should have been used to achieve a better sharing of the burdens of adjustment between the two factors of production.

We should not analyze the PAEG plan only as an anti-inflationary oriented program. After having inherited a very undesirable economic stuation, economy policy as of the second semester of 1964 actually layed down the basis for the period of high economic growth rates commencing in 1968.

In the period just prior to the introduction of the PAEG plan the economic situation was chaotic. Inflation rates, besides being high, were repressed by the many price controls then in operation. The fiscal system was technically inconsistent. This added to the problem of many distortions caused by inflation, such as illusory profits taxation, underesti- mation of depreciation values and deliberate delays is making payments by tax payers. Taxation, sometimes, instead of being applied over value added, fell upon the final value of the product (as it was the case of the "Imposto de Ven- das e Consignações"). The balance of payments situation was also not very comfortable. An over-valued exchange rate coupled with the absence of external credit let to systematic deficits. The financial market obviously could not survive in an environment where nominal interest rates were restricted to 12%, with inflation over 90% a year. The consequence was a narrowing

process of financial intermediation, where only previleged investors could get loans (highly subsidized) from official institutions.

Included among the important achievements attained between 1964 and 1967 can be mentioned the following (see Simonsen and Campos, 1974):

a) The development of the monetary correction mechanism, which, as we saw in Chapter 2, became an indispensable tool to foster private saving and correct various distortions arising from inflation;

b) The improvement of the external accounts, represented by the current account surpluses in 1964, 1965 and 1966, as well as by renewal of the country's ready access to funds borrowed in the international financial markets;

c) The improvement of the fiscal system. The "Imposto Sobre Vendas e Consignações", which fell on the final value of production, was replaced by the "Imposto de Circulação de Mercadorias", which was based on value added. Moreover, illusory profits taxation was abolished and monetarily corrected values of the firm's physical assets began to be used in the determination of depreciation values. Fiscal debts postponed by taxpayers now were being monetarily corrected and some non-functional taxes (as the "imposto do selo") were abolished;

d) The creation of the "Fundo de Garantia de Tempo de Serviço" (FGTS),a labor indemnification system managed by the recently created "Banco Nacional da Habitação" (BNH). Besides fostering private savings, this mechanism injected a new dynamisn into the labor force. It provided revenues equal to 8% of the labor expenses of the firms and could be withdrawn in case workers lost their job;

e) The creation of the "Sistema Financeiro da Habitação"

(SFH), whose main institution was the BNH. Its main purpose was to finance the development of the housing sector. Assets and liabilities of all institutions affiliated in the SFH were subjected to monetary correction. FGTS reserves were included among the SFH's liabilities;

f) The creation of the Bancos de Investimento and FINAME, the former making available long term credit to investors and the latter dedica ted to finance the purchasing of national capital goods.

The other attempt towards stabilization of inflation based on the "average adjustment" as a solution to the "average-peak dilemma" was the Cruzado Plan, initiated on February 28, 1986. Contrary to the monetary-fiscal discipline observed between 1964 and 1967, the Cruzado Plan was followed by an easy demand policy, which undermined any possibility of success. Moreover, real wages were not brought to the average (which should have been the case, since expected inflation was equal to zero), but subjected to an increase of 8% (and 15% in the case of minimum wages).

This lack of attention on the demand side was due to technical errors as well as political reasons. On the technical side, the accounts related to public expenditures were not clear enough to allow the necessary estimates of disequilibrium in the public finances. As ex-Planning Minister Delfim Netto once mentioned, "the current annualized public deficit was zero at the first moment, under calculation one month later, less than two percent of GDP after three months, and more than five percent of GDP when it could not be hidden anymore". Furthermore, the increase of real tax receipts due to the fall of inflation (Oliveira - Tanzi effect) was overestimated. The fiscal reform carried out three months before the Plan was introduced reduced the lags between the generating factors and effective tax receipts by the government, at least in the case of

household income tax.

Besides the lack of reliable public deficit estimates, which really made it difficult to manage aggregate demand, there seems to have been a real bias in the overall conception of the Plan. The difficulties associated with the supply side of inflation were overemphasized, and the demand side was relegated to second place. With the continuous failure to tame inflation by means of monetary fiscal policy (between 1979 and 1986), it was somewhat out-of--fashion, among the brazilian economists who were just going to become policy--markers, to present orthodox solutions for the problem of inflation. What the administrators of economic policy seem to to have forgotten was that, although this concentration towards eliminating inflationary inertia was justifiable before the beginning of the Plan, when the economy was wholly indexed, it became dangerously misleading after indexation came to a halt. As a brazilian economist once said; there is "nothing better than a team of monetarists in the government to make unorthodox proposals reasonable, and nothing more appropriate than a team of unorthodox economists in the government to justify orthodox recommendations".

A measure of this bias can be observed in the theory of "innertial inflation", the term the parents of the Cruzado Plan referred to in describing brazilian inflation prevailing at the end of 1985[1]. Inertial inflation is a term that was in fashion during 1986 among brazilian economists. By this definition, inflation of period t was wholly explained by inflation of period t-1. This would be a result of independent actions of economic agents, who would try to protect their relative shares of income by increasing prices and wages, till the point they reached their maximum prior purchasing power. Formally, the theory of inertial inflation can be interpreted as change of status of expression (3.1), which is changed from a simple tautology into a theory of inflation, by means of the three following hypotheses:

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(1) See for instance Lopes(1986).

H1: Wages are always readjusted to the maximum purchasing power previously reached.

H2: The average-peak ratio W_A/W_P is a constant.

H3: The period of time between nominal adjustments can be controlled by the government and is kept constant.

Given these three hypotheses, it follows directly from (3.1) since $APR_t = APR_{t-1}$, that $\pi_t = \pi_{t-1}$.[1] This means that inflation repeats itself as a consequence of the average-peak dillemma. Of course the main problem of such a theory of inflation relies in the assumption that wages are always adjusted to the peak (H1), which eliminates the mechanism by means of which controls over aggregate demand play an important role in the process. We will come back to this point.

In the context here presented, inertial inflation can be defined as the rate of inflation which, in an economy where revenues are readjusted in distinct and pre-established dates aiming at the highest purchasing power previously reached, keeps constant the average-peak ratio. In other words, it is the inflation rate that brings real wages to their previous average value.

Before carefully analyzing the validity of the three hypotheses behind this "theory of inflation", it is of interest to explore this apparatus, given by (3.1) and H1, H2, H3. First of all, the inflation rate will cease to repeat itself each period if anyone of the three hypotheses H1, H2, H3 fails to apply. To begin with, let us take an economy with yearly revenues adjustments and a 40% annual

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(1) Remember that APR is a strictly decreasing function of π.

inflation rate. From(1), we get APR = 0,85. If nothing occurs, that is, if H1, H2 and H3 remain valid in the next period, this inflation rate will repeat itself to keep APR = 0,85. Let us develop some variations around the theme . First, in item a, we will admit both H1 and H2 to hold, but not H3. The period of time between wage adjustments is supposed to change from one year to a half year. Second, in item b, we admit H1 and H3 to hold, nut not H2. The average/ peak ratio is admitted to decline due to supply shocks. Both examples lead to different values of the (endogenously determined) inflation rate, which can be compatibilized with the brazilian case.

a) The adjustment term is reduced from twelve(yearly) to six months.With this change, since the inflation rate π in (3.1) represents the rate of change of prices between the adjustment it follows, if H1 and H2 are true, that annual inflation will turn out to be half-yearly. This means that yearly inflation will rise from 40% to 96%($((1,4)^2-1)$x100%). This example fits well with the evolution of brazilian inflation in the eighties. Between 1974 and 1979, inflation was around 40% a year, having jumped to 101,4% between 1980 and 1982. In November, 1979 , incidentally, wage adjustments turned from annual to half-yearly , which means that the increase of inflation rates was exactly the one necessary to keep unchanged the average-peak ratio. This fact corroborates hypotheses H1 and H2 (H1 was enforced by the backward looking indexation).

b) Due to supply shocks (exchange rate devaluations, indirect tax increases, loss of crops, etc.), the average-peak ratio changes from 0,84 to 0,76, with half-yearly adjustments. Making APR = 0,76 in(3.1), we get π = 80% per semester or, equivalently, 223% per year. Again and on purpose, we used in the example some numbers that make equation(3.1) able to get along with the evolution of brazilian inflation. After three years (1980 to 1982) with

a rate around 100% per year, inflation jumped to average 223% between 1983 and 1986. Two important factors in this process were the agricultural shock in 1982 and the real exchange rate devaluation of 1983. Referring to the model we are dealing with, the rise of inflation would be explained as necessary to allow the fall of real wages resulting from the adverse supply shocks. Since APR turned from 0,84 to 0,76, the ex-post explanation of inflation is that real wages had to fall about 9,5 percentage points. Inflation in this case would be a consequence of supply shocks, coupled with a lagged indexation system. Of course, money supply is implicitly considered to be passive[1].

These two examples show that a theory of inflation based on equation (3.1) and on a flexible version of hypotheses H1, H2 and H3 can be useful as a complementary tool to understand inflation in an economy : subjected to lagged indexation and an accomodative monetary-fiscal policy. However, as a theory which predicts that inflation of period t will exactly repeat inflation of period t - 1 (inertial inflation), it is extremely poor. The derivation of this proposition from (1) demands that hypotheses H1, H2 and H3 are entirely and always verified, obviously an overstatement.

The main problem of the "inertial inflation" theory is that it relies on the assumption that nominal adjustments are always made

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(1) Actually, both upward shifts in inflation described in items (a) and (b) were preceded by an increase in the rate of monetary expansion in the previous half-year. In the 1979/80 turn, the wage policy change in November 1979 only ratified the new annual 100% inflation already operating since August (making it impossible to return to the old 40% a year level). In the 1982/83 period, monetary expansion in the second semester of 1982 (due to the elections) must also be included, besides the supply shocks in a lagged indexed economy, among the relevant determinants of the new 220% annual level of inflation prevailing up to 1986.

in order to bring real wages to the previous peak of   purchasing power.   This supposition eliminates the channels by means of which demand controls affect the path of inflation.   Indeed,   if   the economy is subjected to a huge   recession and future monetary policy is supposed to continue tight, it is meaningless to expect   that real wages will always and indistinctly be brought to the previous peak. Even in an economy subjected to lagged indexation, the   amplitude of this mechanism is not total.   A part of the economy   (including new contracts) is always free to translate moderated   expectations and unemployment into lower demands for nominal remunerations.

Lagged indexation mechanisms surely give more support to the "peak adjustment" hypotheses (H1), which, as we saw, constitutes an essential condition for the theory of inertial inflation. Lopes (1986) argued   that   indexation   was   not   necessary for   H1 to hold.   He used   Tobin's (1986) criticism of rational expectations models, later formalized by Simonsen(1987), to present an alternative theoretical background for the "peak adjustment" hypotheses. Tobin's criticism was based on the disassociation between   each economic agent's rationality and overall rationality.   Following this argument, Lopes argued that each economic agent could act in a manner disassociated from others, increasing their nominal income (the role of demand was not discussed adequately   in   the   process) in order to replace the previous peak of purchasing power.   The reasoning for this attitude would be the equivalent behaviour he would expect   others to follow.

Lopes (1983) explicitly recognized that demand policy could affect the path of inflation.   However, following his Phillips curve estimates, the product gap cost to be paid made this option inadvisable.   What was not sufficiently taken into consideration   in   the Cruzado strategy, though, is that after   the   beginning   of   the Plan and

the end of indexation, the sensitility of the economy to demand management was much higher than before.

Contrary to the necessary emphasis on the monetary-fiscal policy side, the period during the Cruzado Plan was characterized by comprehensive and obligatory price controls. The main objective was not to combat inflation through its symptoms, but to provide the economy with a centralized signaling of what would be the behaviour of other economic agents with respect to price setting. Prices were to be controlled for a short period of time (around three months). However, things hasppened differently. After the four initial months, it was not possible to achieve a market equilibrium with the frozen price level and higher income, and a system of price-premia and black markets appeared. The initial objective of using a price freeze as a way to avoid the disassociation between individual and general behaviour had given place to a desperate attempt to hide the near collapse of the Cruzado Plan strategy.

The price freeze turned out to be an unfortunate device during the Cruzado Plan. First, because its signaling function did not work. It was useless to announce that prices would remain frozen and, at the same time, make an easy fiscal and monetary policy. Inconsistency is not compatible with credibility. And credibility is a necessary condition for acting as an orchestra conductor. Second, the price freeze led to a disastrous disregard of demand controls. Inflation seemed to be under control and there was no political background, in the six months after February, 28, 1986, to lay off government employees or cut off other public expenditures. A price freeze was conceived to avoid the hard process of learning by doing which characterizes most stabilization plans. Had

the Cruzado Plan changed the emphasis on this mechanism to demand controls, things could have happened in a completely different way. A short recession could have led, as it happened between 1964 and 1966, to a future period of relative price stability and growth. "Who everything wants, everything loses".

Tables 3.1 and 3.2 present the statistics related to the monetary-fiscal policy during the Plan. Due to the changes of income velocity of M_1 resulting from the fall and rise of inflation in the period 1985-87, as well as the continuous autonomons shift of the money demand function due to financial innovations (see section 3.4), we work with the broader monetary concept M_4. It is equal to M_1 plus saving accounts, certificates of deposits and outstanding government debt. To a certain extent, it gives a measure of the total credit provided by the private financial system of the economy.

Tabel 3.1

Evolution of M_4 - Percent   Rate of Change

03/86	04/86	05/86	06/86	07/86	08/86	09/86	10/86
12,2	1,1	2,8	3,3	0,3	5,2	5,5	3,4

11/86	12/86	01/87	02/87	Accumulated Feb 86/Feb87
2,0	5,0	5,3	16,3	82,2%

Central Bank of Brazil - "Brazil Economic Program".

Real Public deficit figures were calculated from equation 2.13a (of chapter 2):

$$D_{grj} = P_j \left(\frac{F_1}{P_1} - \frac{F_0}{P_0}\right) + E_j (K_1 - K_0) - E_j \bar{K} \pi^* \qquad \text{(equation 2.13a)}$$

where: $DI = P_j \left(\frac{F_1}{P_1} - \frac{F_0}{P_0}\right)$ represents the part of the real deficit financed by private savings, and

$$DE = E_j (K_1 - K_0) - E_j \bar{K} \pi^* \quad \text{the remaining part financed} \quad \text{by}$$
non-residents.

As we show in chapter two, this formula allows the calculation of the public deficit with real interest, including the inflationary tax as a real current account receipt of the public sector (since the Central Bank is consolidated to the government, and the monetary base is included in the consolidated domestic debt $F^{(1)}$). Consequently, to allow comparisons with the operational deficit figures provided by the Central Bank (D_{g0} - Bacen) we must add the inflationary tax (I.I) to the real deficit given by equation 2.13a. We denote the numbers calculated under this methodology by D_{g0} (operational public deficit). $\bar{K}$ was approximated by the simple arithmetic average of K at the beginning and at the end of the period.

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(1) See chapter two.

Table 3.2

Real and Operational Public Deficit

	1984	1985	1986	1987
(1) DI/GDP	3,9	2,6	0,5	2,73
(2) DE/GDP	0,44	2,32	5,29	1,57
(3) DE/DI+DE)	0,11	0,47	0,90	0,36
(4) D_{gr}/GDP(%)	4,34	4,92	5,79	4,30
(5) IT/GDP(%)	2,23	2,11	1,17	3,53
(6) D_{g0}/GDP(%)	6,57	7,03	6,96	7,83
(7) D_{g0}-BACEN/GDP	2,7	4,3	3,6	5,5

Observations: (1) Original Source of Data: Getulio Vargas Foundation - Revista
Conjuntura Econômica
IBGE - Contas Nacionais do Brasil
mimeo, June 21,/1988
Central Bank - "Brazil Economic
Program".
(2) Inflationary Tax values were obtained from chapter two.
(3) Besides the fact that Central Bank calculations do not
differentiate between nominal and real interest on the exter
nal government's deficit the two other reasons which make
our estimates sharply differ from Central Bank's are presen-
ted in chapter 2.
(4) World Bank(1987) and Toledo(1986) are other examples of the
operational public deficit estimates considerably higher than
the official numbers presented by Central Bank presented in
line (7).

Beginning with Table 3.1, it can be noticed that the expansion of M_4 was basically incompatible with the zero inflation target assumed by architects of the Cruzado Plan. The long run stability of M_4 velocity (see Table 3.3) pointed out a high correlation between this aggregate and the nominal national product[1]. In accordance with this empirical observation, the rate of expansion of M_4 should have been kept very close to zero, through the control of the consolidated Treasury's and Central Bank's liabilities.

Table 3.3

M_4 Velocity

Period	M_4 Velocity
1980	4.4
1981	4.2
1982	3.7
1983	4.0
1984	3.9
1985	3.4
1986 - Jan/Mar	3.4
- Apr/Jun	3.4
- Jul/Sep	3.3
- Oct/Dec	3.3
1987 - Jan/Mar	3.2
- Apr/Jun	3.4
- Jul/Sep	3.6
- Oct/Dec	3.7
1988 - Jan/Mar	3.7
- Apr/May	3.9

Source: Central Bank of Brazil - "Brazil Economic Program".

Table 3.2 reflects a disequilibrium in public finance in 1986 much higher than that presented by official estimates. The numbers here calculated show an operational deficit of 6,96% of GDP, as against the 3,6% presented by the Central Bank. From this amount, 90% (5,29% of GDP) was externally financed. The external financing is closely associated with the deterioration of the commercial balance which occurred in this year. Exports were controlled and imports largely used to support the artificial price

[1] Of course this high correlation is in part due to the fact that most assets included in M_4 are indexed. However, this does not imply non-contralability.

controls. The contribution of external savings to minimize   the
ex-ante excess demand translates into the sharp increase   in   the
current account deficit, which, in constante dolars of 1987, averaged
327 million dollars in 1984, 1985 and 1987, as agaist 4,6 billion
dollars in 1986.

The process of continued borrowing in foreign currency
by the government can also be observed in Table 3.2. Between 1984
and 1986, the part of the real deficit externally financed   jumped,
as a percentage of GDP, from 0,44% in 1984, to 2,32% in 1985 and to
5,29% in 1986. In 1987 the process was reversed, with only 36%   of
the governments budget deficit being externally financed   (this
represented 1,57% of GDP).

The evaluation of the real deficit is also   useful,
since this is the concept most correlated with ex-ante aggregate demand.
Indeed, when inflationary tax falls, the operational deficit remains
unchanged, but the real deficit increases.   The   same   thing,
incidentally, happens with aggregate demand, since the avaiable real
income of the private sector (calculated with real interest) increases.
In this way, the fact that the real deficit was bigger   in   1986
than in any other year helps to explain the outburts of   consumption
which occured in this year. Besides the increase of real wages[1],
the fall of the real inflationary transfers from the private sector
to the Monetary Authorities was one of the factors behind this fact.

The preceding discussion presents the reasons   for
the failure of the Cruzado Plan. Fundamentals were not taken into
account as they should have been. Policy makers were too ambitious

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(1) As shown in Table 4.3, average real wages increased around 19% between 1985
    and 1986.

in establishing economic goals. In their own words, architects of the Cruzado Plan stated it should "allow a growth like Japan's with an inflation rate like Switzerland's". Moreover, the Plan should be able to reverse the effects of previous "unfair" economic policies carried out in Brazil[1]. Finally, it should serve as a lesson to the Argentinians, who were regarded as facing an unnecessary recession with their Austral Plan. The Cruzado Plan should demonstrate that it was possible to tame inflation with no recession. At least in one respect all this presumption was useful: it could serve as an appropriate mean of account to measure the proportionally huge disaster.

The financial intermediation process in Brazil was in many aspects influenced by the Cruzado Plan. The Brazilian banking system, as shown in chapter two, has been rewarded with considerable real transfers from the non-banking system, due to the high rates of inflation. Following the economic principle by means of which marginal costs should be increased up to the limit where they reach marginal receipts, many banking agencies operated under circumstances that would not be profitable with zero inflation. The agencies operated in remote geographical areas with excess employees, or operated in largely competitive environments. In the first months after the beginning of the Plan, when it was still believed (with prices frozen) that zero inflation was a feasible target, analysts expected the closing of some agencies and temporary difficulties experienced by certain banks. These developments really did take place, but below the extent forescated. This because the government itself was also not prepared to live without an inflation tax. In

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(1) This was said by the Labor Minister in a Conference held in São Paulo sometime after the starting of the Plan.

the very near future economic conditions would return to the previous situation. Inflation would return to its old level[1] providing the banks and the government easy eccess to inflationary transfers and to inflationary tax.

Just after introduction of the Cruzado Plan, the stock exchanges experienced a sharp expansion. Expectations about future profits were most optimistic. Real interest rates were forescast to be kept very low, which supported the initial enthusiasm. At the same time, real estate prices jumped based on the same reasons. Many micro-firms emerged with easy credit and there was an outburst of aggregate demand. However when the failure of the Plan became clear the situation completely reversed. Stock prices fell more rapidly than profits. The dollar price of real estate also fell sharply. Many micro-firms became insolvent. Fortunately for them, they were granted a partial debt amnesty by the new Constitution. This amnesty represents a heavy financial burden to the government, since most of the loans were provided by Banco do Brasil, and also to private banks (the total amount of loans was 0,8% of GDP).

With the sharp decline in inflation associated with the Cruzado Plan, the deposits at "Caderneta de Poupança", the most popular savings account in Brazil, declined at an alarming rate. Since this indexed asset pays a constant real interest rate, despite the rate of inflation, some analysts agreed that these withdrawals constituted a clear evidence of "money illusion". One could find many people at this time worried about the decline in monetary correction credited to their savings accounts. Previously, 15% monthly inflation generated fifteen Cruzados of deposits. Some people

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(2) Or even higher levels.

interpreted this as a real gain, rather than a simple replacement of the purchasing power of the investment. It is interesting that according to the econometric estimates presented in chapter two, money illusion, if it existed, was not significant on the whole. As time goes on, those who spent their monetary correction revenues realize that what they are really doing is depleting their accumulated capital. Another reason, completely independent of money illusion, can explain the large withdrawals from saving accounts. While the real rate of interest was kept unchaged (6% per year on savings deposits), the real interest paid by another asset, M_1, was increased considerably with the decline in inflation. Consequently, there was a portfolio reallocation based on the change of relative (real) returns.

With respect to the dollar black market, the situation development much as in the introduction of the Austral Plan in Argentina (June 16, 1985). Just before the Plan was launched, the premium on the official market reached a peak, suddenly falling after new measures were announced and understood by the population. In Argentina, high (domestic) real interest rates perpetuated this situation for some months. In Argentina, on some occasions, the official dollar quotation was even higher than the market quotation. In Brazil, on the other hand, the black market premium soon began to reflect an increasing suspicion concerning the success of the Cruzado Plan. Instead of increasing the real interest rate and correcting the disequilibrium in public finances, nothing was effectively done by the government to improve the situation.

3)   The Interdependence of Monetary and Fiscal Policy

        In the forty-one year period   December   1946   to
December 1987, M_1 increased by a factor of 23,582,766 times,   wich
means an average increase of 51,29% per year. An easy   conclusion
to reach from these numbers is that the Brazilian monetary   system
seems to have a natural propensity toward high growth of the   money
supply.   This can be attributed to a very simple reason: money   issue
has always been under the control of the Executive. As noted   from
Table 2.6, the use of an inflationary tax as a tool to   generate
real current receipts has been an usual procedure, from one administration
to another.   This kind of tax is particularly attractive to policy-
-makers for two reasons: First, it is indirect, being   paid   by
those who hold cash balances during a given period;   Second,   it is
an invisible tax which the average person cannot be aware of. Unlike
taxes generally levied by governments and collected in the form   of
a physical transfer of money, the inflation tax does not generate a
payment or transfer of money.

        Until 1964, there was no Central Bank   in   Brazil.
Monetary regulations were under the responsability of SUMOC   (Supe-
rintendência da Moeda e do Crédito).   Legal currency was   issued by
the Federal Treasury, at the request of Banco do Brazil. The Central
Bank of Brazil was created in 1965. The usual functions   ascribed
to Central Banks were delegated to this institution: providing a
physical money supply, acting as a banker for banks, and as a fiscal
agent of the Treasury, and providing for the custody and   register
of international reserves. While the new Central Bank assumed the
external appearance of other Central Banks, many things   did   not
change. The Executive branch of the government retained most of its

former authority in matters relating to money and credit creation. Money printing remained under control (now indirect) of the Minister of Finance. Indeed, most relevant decisions regarding monetary and foreign exchange matters have been taken, since 1965, by the National Monetary Council (Conselho Monetário Nacional, CMN) which is chaired by the Minister of Finance. There is, even nowadays, no independence of the Central Bank from the Executive. Directors of this institution can be changed at any moment, at the discretion of the President of the Republic. Their terms are not pre-established which makes them subject to political pressures.

An important complication to Central Bank credit control has been posed by the so called "movement account"[1]. This facility allowed Banco do Brasil to withdraw monetary resources at the Central Bank paying a nominal interest rate of 1% per year. In effect, this made Banco do Brasil a second Central Bank, since its active operations were not limited to its available resources, but to the limits settled by the National Monetary Council. The following illustration reflects how Banco do Brasil operations actually generated a simultaneous increase in the stock of High Powered Money (the Monetary Base).

Banco do Brasil		Central Bank	
Assets	Liabilities	Assets	Liabilities
Δ Loans	Δ Movement Account	Δ Movement Account	Δ Monetary Base

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(1) Nowadays (actually, as of March, 1986) called "supply account" (Conta de Suprimento).

In effect, new loans provided by Banco do Brasil to the private sector led to a drawing of funds from the movement account and, consequently, to a expansion of the Monetary Base.

Due to Banco do Brasil automatic access to monetary resources provided by the Central Bank, the balance sheets of these two institutions have been presented as consolidated, under the designation "Monetary Authorities Balance Sheet".

In theory, Banco do Brasil could use this rediscount facility only up to the limits pre-determined by the CMN. Until 1979, excesses were penalized with heavy rediscount rates. From 1979 on these penalties were practically abolished. This situation lasted until March, 1986, when policy-makers tried to eliminate the role of Banco do Brasil as a Central Bank by extinguishing the "movement Account" and creating the "supply account". The difference between the two is that, in the second case, the monetary transfers from Central Bank to Banco do Brasil should be subjected to the approval of the Secretary of the Treasury. Since the institutional basis which determines the relationship between the Treasury, Banco Central and Banco do Brasil were not effectively modified, the change has been purely semantic. Invariably the Secretary of the Treasury has not denied approval to most of Banco do Brasil expenditures. This is because this institution (BB) is a strong political force; and because Banco do Brasil continued conducting operations (established in prior agreements which were not modified) of interest of the Executive. It should be noted these operations are largely disassociated from normal commercial bank operations.

While many things remained the same, in practice (starting March 1986) Banco do Brasil is no longer officialy classified as a Monetary Autority. The demand deposits in Banco do Brasil,

which previously were counted as part of the stock of High powered
Money, are now considered to be part of commercial bank sight deposits,
and are not accounted in the Monetary Base. The Brazilian banking
multiplier and High Powered Money series must be analyzed with
care. Starting in March 1986 the latter decreased and the former
increased. The series organized under the new methodology were
published starting in December 1982. Although Banco do Brasil now
is treated as any other commercial bank, its function as a development
bank and as the government's bank remain pratically unchanged. An
indication that changes were purely semantic is given by the real
value of the transfers from the Central Bank to Banco do : Brasil.
They did not decrease after March 1986. In the twelve months period
before March, 1986, the transferences from Central Bank to Banco do Bra-
sil averaged, $BCz\$_{02/88}$ $153,247^{(1)}$. In the 23 months period later
(up to February, 1988) these transfers averaged $BCz\$_{02/88}$ 201,075.
This is the best prove that the change of Banco do Brazil's status
was purely cosmetic.

The National Monetary Council (CMN), the decision-
making organ related to monetary and foreign exchange policy, is
composed of five Ministers of State, eight Chairmen of federal
financial institutions (including the Banco do Brasil and the
Central Bank), and by a fixed number of private advisors. As
previously mentioned, the Council is chaired by the Minister of
Finance. The CMN is responsible for the so-called Monetary Budget,
which refers to the several ceilings applied to aggregate monetary
expansion. Among the ceilings included in the Monetary Budget are
the maximum yearly expansion rate of the monetary base, means of
payment, and Banco do Brasil assets.

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(1) $BCz\$_{02/88}$ means billions of cruzaaos witn purchasing power of February, 1988.

In addition to the Fiscal Budget, the evaluation of brazilian fiscal policy is complicated by the existence of two additional budgets: the "Monetary Budget", which we have just referred to, and the "State Enterprises Budget", which establishes ceilings for state enterprises net financial borrowings. The co-existence of the fiscal and monetary budget provided a way of transforming large budget deficits into official surpluses. Indeed, many operations of the Federal Government were included among the assets and liabilities of the Monetary Authorities, often creating large current deficits, financed by increases in money supply. Since these deficits, arising from subsidized credits and transfers, were not included in the fiscal budget sub mitted to the Congress, an official surplus could emerge.

One large government expense not included in the fiscal budget was the payment of interest on the public deficit. Since 1971, following the "Lei Complementar número 12", the Central Bank was allowed to issue Federal Government debt. It was a counterpart of the many operations of the Federal Government carried out by the Monetary Authorities. Interest paid on the debt was also under the responsibility of the Monetary Authorities, and was not included in the fiscal budget.

Beginning in March 1986, many measures have been introduced to simplify the complicated relations involving the Federal Treasury, Central Bank and Banco do Brasil. The first we have already described, that was to classify Banco do Brasil as a commercial bank, rather than a Monetary Authority. Another group of resolutions aimed at including in the fiscal budget all current expenditures of the federal government carried out by the Central Bank. The purpose was to make fully transparent to the taxpayers,

represented by the Congress, the destination of taxes paid. Central Bank power to issue debt in the name of the government was removed. In addition the cost of the federal government debt service was assigned to the Treasury Secretary (Secretaria do Tesouro). For this purpose, the LBC (Letra do Banco Central, Central Bank short term liability) is being replaced by the LFT (Letra Financeira do Tesouro) as concerns open-market operations. An important difference between LBC and LFT is that interest paid on LFT is to be included in the fiscal budget, since it is issued by the Treasury. The Central Bank continues to act as a dealer for the Treasury. It remains to be seen if this increased transparency will result in increased budgetary efficiency by the Federal Government.

Another institutional change to accur as of 1989 is the use of esclator clauses in the fiscal budget. Pratically, the means of account in this budget will be the OTN, rather than the cruzado. This procedure may be unavoidable, if one wants the fiscal budget approved by the Congress to be representative of actual expenses. Indeed, with a 15% - 20% monthly inflation, the use of figures denominated in cruzados would ne subject to severe changes. Monetary correction applied to federal government securities would make the monthly budget expenses subject to large upward revisions. On a cumulative basis these revisions in the budget could inflate the budget deficit to a high percentage of GDP. Evidence of the need to index the budget is given by the recent (1986-87) past, when the figures initially determined for the budget turned out to be totally inadequate relative to actual needs.

The Changes with the New Constitution

The new brazilian Constitution, enacted in October 5 1988, is carachterized, in many aspects by an increase of the power of the Congress. As it relates to our previous discussion, three budgets will be examined by the Congress: the Fiscal Budget, the State Enterprises Budget and the Social Security Budget. Additionaly, the Congress will be responsible for setting limits related to money printing and also to the consolidated government debt.

New expenditures can be created by the Congress, provided that the respective resources are explicitly indicated.

Central Bank is prohibited to directly or indirectly finance the government.

In a very criticized decision, the new Constitution set a ceiling to real interest rate of 12% per year.

It remains as an enigma how these two last measures will be compatibilized with the present budget deficit, which amounts to around 6% of GDP. At the date this book was being written, the 12% limit was not in practice yet. Further ordinary regulations were expected to determine the details and sanctions related to this non usual constitutional principle.

4) Financial Innovations and Money Demand.

As defined in the previous chapter, we define "financial innovation" as anything which decreases the cost of converting assets from money (M_1) into interest bearing assets. Among these financial innovations one can cite as examples the popularization of public applications into government assets (overnight or longer periods) since the beginning of the eighties, the reduction of the minimum term of deposit in "caderneta de poupança" in 1984, and the introduction of the "contas remuneradas" (remunerated accounts) in 1988. The remunerated account allows the bank customer to obtain daily remuneration on his sight deposits (based on the overnight interest rates). Technically, daily remuneration does not accrue on the sight deposit, but on overnight applications in LBC (Central Bank Bills) or LFT (Treasury Bills) . However, commercial banks provide for daily transfers at the close of the business day, of these funds. Consequently, they are treated as overnight applications, but for practical purposes function as demand deposits.

Before the Cruzado Plan, when inflation reached 235 percent in the twelve month period before December 1985, transfers from sight deposits to one day or one week applications already were becoming a widespread practice. They required only a telephone call to the bank officer. The higher the amount of transfer, the higher the interest rate paid on the funds. Thus an application of ten million cruzeiros could enjoy a return for one day of ninety percent of the overnight rate (the remaining ten percent accruing to the financial institution). At the same time, an application of five million cruzeiros for a one day application could enjoy a return of eighty percent of the overnight rate. These hypothetical numbers

provide an indication of how each bank could determine rules   for negotiating for these funds under the limits imposed by the relevant Central Bank regulations.

At the end of 1987, with a yearly inflation rate over 415%, the practice of shifting funds from sight deposits to one day government assets was, in many banks, automated. This new financial innovation was called "contas remuneradas"(remunerated accounts) . The excess of funds over a certain limit (established by each bank) was regularly and daily transferred for depositors to LBC or LFT. The Central Bank was the loser in this case, since it could   not earn the high real interest rates on commercial   bank   reserve requirements (which decreased in the operation due to the accounting of sight deposits as LBC purchases). The inflationary tax   which had been accruing to the Central Bank now was shared with   deposit customers of the bank in what in effect was a zero sum game.

All of these defensive maneuvers reflect an   attempt on the part of economic agents to escape from the heavy burden   of high negative real interest rates associated with holding   money assets (M_1). Since M_1 pays no nominal interest, the real   interest paid by firms and citizens to hold this asset   is   inversely proportional to the rate of inflation[1].

In 1987, for instance, when inflation   was   415,8%, the real interest paid by those who held money was 80.61% per year.

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(1) If π stands for the inflation rate during period Δt, the real interest paid by all those holding M_1 during this period is given by $\pi/(1+\pi)$. Indeed, if i stands for the nominal interest and r for the real interest paid on M_1, we have, following the definition of real interest rate, $1+r=(1+i)/(1+\pi)$. Making i = 0 in this expression, we get $r = -\pi/(1+\pi)$, what means that M_1 pays negative real interest or, put in another way, who   holds   money   pays $\pi/(1+\pi)$ to banking system.

To make this point clear, let us take an economic agent who held one thousand cruzados during 1987. It follows that he could buy one hundred units of a certain good with a unit price of ten cruzados. At the end of the year, though, if the price of this good rose according to the rate of inflation, it will cost Cz$ 51.58, and he will only be able to buy 19 (100,000/5158) of them. The remaining 81 are real gains of the banking system. This loss (81 out of 100) reflects the 80.61% a year real interest paid by holders of money balances[1].

Financial innovations tend to increase in use with the escalation of nominal interest rates, the opportunity cost of holding money. This means that, coeteris paribus, monetary policy becomes less effective when the purpose is to use higher interest rates to control economic activity. Indeed, a reduction of real cash balances also leads to an autonomous fall of money demand. Theoretically, it can be argued that the LM curve becomes more elastic(less steep) when the economy tends to present quicker responses (financial innovations) to increases in nominal interest rates. This point suggests strongly that application of tight monetary policy in Brazil (as in the eighties) is much weaker in its effectiveness than a similar policy would have been had it been implemented in the sixties.

In order to examine the interest and income elasticities of money demand in Brazil, as well as to measure the possible autonomous fall of money demand due to financial innovations, we estimated some regressions for the period 1947-1987. The five equations presented in Table 1 display the values of the estimates for the basic equation:

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[1] We assume indivisibility of the good, and therefore rounded 80.61 to 81.

$$m - p = a_0 + a_1 y + a_2 \pi + a_3 t \qquad (3.2)$$

where $m - p$ logarithm of real cash balances

     y real product index

     π logarithmic inflation rate

     t year - 1964 (tendency variable)

We work with the inflation rate replacing the nominal interest variable due to the lack of a reliable series for this latter variable in Brazil. In many periods interest was controlled, making the recorded values highly artificial. The tendency variable used in estimations (4) and (5) tried to capture the process of financial innovations which occurred after 1964.

Table 3.4

Money Demand Estimates (Equation 3.2) for Brazil

(1947(8) - 1987)

Coefficients / Estimates	a_0	a_1	a_2	a_3	Method	$\bar{R}^2$	DW
1	4,8 (42,7)	0,79 (21,5)	-1,07 (-11,4)	-	OLSQ	0,92	1,1
2	4,8 (40,4)	0,79 (20,9)	-1,07 (-11,4)	-	IV Y_{-1} π_{-1}	0,92	1,07
3	4,6 (23,8)	0,83 (13,9)	-1,15 (-9,1)	-	C.O. $\rho = 0,47$	0,94	1,77
4	2,8 (4,3)	1,6 (5,8)	-0,84 (-7,5)	-0,06 (-3,06)	OLSQ	0,93	1,4
5	3,0 (3,6)	1,6 (4,3)	-0,93 (-6,8)	-0,05 (-2,11)	C.O. $\rho = 0,324$	0,94	1,81

Observations: OLSQ = Ordinary Least Squares

IV   = Instrumental Variables Procedure

CO   = Cochrane Orcutt Procedure

The Numbers in parenthesis display the t-statistics

$\bar{R}^2$ = Adjusted R^2 Coefficient

DW   = Durbin-Watson Statistic

Instrumental Variables were used in equation (2) because the rational expectations hypothesis for the expected inflation rates make the residual of equation (3.2) correlated with the explaining variables.

Cochrane Orcutt method was used in equations (3) and (5) in an attempt to minimize the serial correlation of the residuals.

Average annual data were used for both P(Price Level) and M_1 . The new concept of M_1 (including demand deposits at the Caixas Econômicas and BNCC) was used as of December 1982.

Source of original data: Central Bank of Brazil - Boletim Mensal and Getúlio Vargas Foundation - Revista Conjuntura Econômica.

All estimates present the signs predicted by theory. Moreover, t-statistics do not allow us to neglect any one of the explanatory variables.

Given the way we defined the inflation rate $(\ln(P_t/P_{t-1}))$ in (3.2), the interest elasticity of money demand is not constant, but equal, in each year, to a fraction $(\pi/(1+\pi))$ of the coefficient "a_2" presented in Table 3.4. These estimates can be interpreted, then, as upper limits of the absolute value of the interest elasticities. They range, as it can be observed in Table 3.4, from 0.84 to 1.15. The income elasticity, on the other hand, ranges from 0.79 to 1.6, depending upon the equation considered.

The possibility that money demand was particularly affected by financial innovations that took place after 1964 cannot be rejected in terms of the trend variable. Besides being significant at the five percent confidence level, if follows the predicted negative sign.

In order to measure this autonomous decline in money demand as a response to financial innovations we reestimated equation (3.2) with first differences:

$$z_t - \pi_t = b_0 + b_1 n_t + b_2(\pi_t - \pi_{t-1}) + b_3 DU_3 + b_4 DU_4 + b_5 DU_5 \qquad (3.3)$$

where
$z_t = m_t - m_{t-1}$ = monetary expansion

$\pi_t = P_t - P_{t-1}$ = logarithmic inflation rate

$n_t = Y_t - Y_{t-1}$ = real product rate of growth

DU_3 = Dummy Variable for the period 1979-87[1]

DU_4 = Dummy Variable for 1986

DU_5 = Dummy Variable for 1987

(1) Dummy Variables for period t assume value 1 for period t, and zero in the other years.

The underlyign hypothesis is that financial innovations shift the demand function according to a trend component plus a random walk. This would explain the poor Durbin-Watson statistic presented in Table 1, as well as the low income elasticities relative to estimations (1), (2) and (3). The absence of a third variable non-orthogonal to the others would lead to a bias of the estimated coefficients. Particularly in the case of the income variable, the income elasticity would be underestimated.

The results based on equation (3.3) are displayed in Table 3.5:

Table 3.5
Money Demand Estimates
Equation (3.3) - (1948-1987)

Coefficient \ Estimates	b_0	b_1	b_2	b_3	b_4	b_5	Method	$\overline{R^2}$	DW
6	-0,059 (-1,32)	1,78 (2,96)	-1,24 (-6,76)	-	-	-	OLSQ	0,62	2,16
7	-0,059 (-1,79)	1,55 (3,75)	-0,69 (-4,47)	-0,09 (-2,09)	0,81 (7,18)	-	OLSQ	0,84	1,64
8	-0,057 (-2,22)	1,50 (4,69)	-0,54 (-4,52)	-0,06 (-2,0)	0,83 (9,51)	-0,36 (-4,91)	OLSQ	0,91	2,12

Observations: Dummies D_4 and D_5 are used due to the institutional changes during and just after the Cruzado Plan in 1986.

All these equations present the signs as theoretically predicted. The adjusted R^2 coefficient seems very reasonable for first difference estimates, especially in equation (8). The improvement of the Durbin-Watson statistic corroborates our previous hypothesis of the autonomous stochastic shift of the money demand function.

The coefficient b_0 translates into an autonomous decline in money demand of 5.9% to 6% a year. [1] Under the hypothesis here presented, this is explained by the continuous development of the money market and appearance of financial innovations. The significance of the coefficient b_3 does not allow us to neglect that this process becomes accelerated due to the increase of inflation as of 1979 . Indeed, this was the period when open market operations became more popular and feasible to most economic agents.

What these results show is that the understanding of monetary policy making in Brazil, mainly in the last eight years, has to be considered in connection with the continuous shifts of money demand. In turn these shifts of money demand are in part due to the development of the financial market. This has led to the need for economists to consider using broader concepts of money than M_1 in evaluating the effects of monetary policy and other factors in the demand for financial assets.

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(1). Remember that b_0 represents logarithmic rates of growth.

APPENDIX

Let S stand for the nominal wage and P(t) for the price level at time t. If the instantaneous inflation rate is constant over time, and equal to $\tilde{\pi}$, the average real wage (W_A) between time 0 and 1 will be given by:

$$W_A = \int_0^1 W_p \, e^{-\tilde{\pi}t} dt \tag{1}$$

where W_p represents the value of the real wage just after the last adjustment has been made. Since W_p and $\tilde{\pi}$ are constants, integrating (1) we get:

$$W_a = W_p \, \frac{1 - e^{-\tilde{\pi}}}{\tilde{\pi}} \tag{2}$$

Instantaneous inflation rate $(\tilde{\pi})$ relates to the periodical rate π by the expression:

$$\tilde{\pi} = \ln(1 + \pi) \tag{3}$$

Substituting (3) into (2), we get the expression used in this chapter:

$$W_A = W_p \, \frac{\pi}{(1+\pi) \, \ln(1+\pi)} \tag{4}$$

b) If the purpose is to depart from a given average real wage to get the "peak" value W_p based on an expected rate

of inflation π^e, this formula leads to:

$$W_p = \frac{W_A(1+\pi^e)\ln(1+\pi^e)}{\pi^e} \qquad \text{if} \qquad \pi^e \neq 0$$

or

$$W_p = W_A \qquad \text{if} \qquad \pi^e = 0$$

c) To show the negative correlation between full employment real wages and supply shocks, we depart from the labor demand equation for a competitive economy:

$$\frac{S}{P} = f'(N) \qquad f'' < 0 \tag{5}$$

where   S = Nominal Wage

P = Implicit GNP Deflator

f'(N) = Marginal Productivity of Labor

N = Labor force

We have the consumer price ondex (Q) to be given by:

$$Q = (EP^*)^{\alpha} \ (P)^{1-\alpha} \ (1+t) \tag{6}$$

where

P* = Price Index of Imported Goods

E   = Nominal Exchange Rate

α = Share of income spent on the imported good

t   = Indirect tax applicable to both the domestic and the imported good.

Making Z represent the real exchange rate, expression

(5) can read:

$$Q = Z^{\alpha} P(1+t) \qquad (7)$$

Using (7) and (5),

$$\frac{S}{Q} = \frac{f'(N)}{Z^{\alpha}(1+t)}$$

If we define supply shocks as consisting of either a real exchange rate devaluation, an increase of indirect taxes, or a decrease in the marginal productivity of labor, the immediate conclusion is that supply shocks lead to a fall of the full employment real wage. This is shown in the graph below:
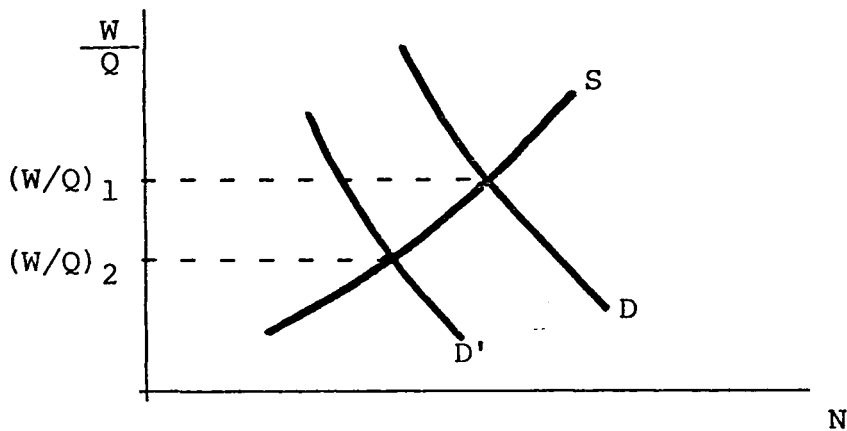
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