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## Inertial inflation and monetary reform in Brazil

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INERTIAL INFLATION AND  
MONETARY REFORM IN BRAZIL\*

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Preliminary 2nd. Version

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was obtained in 1967 when inflation was brought to slightly below the 20% level. From 1967 to 1973, the rate of inflation was stabilized around 20% per year in spite of a vigorous recovery that rapidly decreased unemployment and excess capacity indexes. The oil supply shock of 1973 increased the rate of inflation to the 40% per year level during the 1974 to 1978 period. This four year period showed once more a remarkable stability of the rate of inflation. The second oil shock, accompanied by the halving of the indexation interval for wages and rent contracts and a 30% devaluation of the cruzeiro on top of parity depreciation vis-a-vis the dollar at the end of the year of 1979, explain the acceleration of inflation in 1979 and 1980 to the 100% level.

In face of rising inflation rates and the growing evidence on Balance of Payments disequilibrium due to tightening of external credit markets, the turn to austerity measures was deemed crucial by the end of 1980. A package of fiscal measures envisaging across the board cuts in all public investment programs and the anticipation of corporate income tax were implemented. Monetary policy had already become quite restrictive since mid 1980 through an aggressive public debt policy in the open market undertaken by Central Bank. Further monetary restriction was ensured by imposing quantitative credit limits for private banking at levels significantly below the going rate of inflation. Real interest rates rose sharply. The prime rate averaged around 30% per year with consumer credit and marginal lending rates reaching even higher levels.

The impact on economic activity was significant. The industrial production, that averaged a real growth rate above 7% per year in the 1968-1980 period, declined by almost 12%. Irrespective of rapid rising unemployment and the collapse of both public and private investment, inflation, however, showed only a marginal decline from 110% in 1980 to 100% in 1981. This small gain was obtained through a decrease in the rate of growth in agricultural prices. Industrial prices were unabated.

The scenario for 1982 did not change substantially. Industrial activity fell once more by almost 7%. With no help from agricultural prices, inflation did not recede and in fact increased marginally.

The international debt crisis and the collapse of international credit markets that followed the Mexican Moratorium of August, 1982 brought the Brazilian external liquidity crisis to its critical moments. An agreement with IMF was rapidly arranged to guarantee an orderly rescheduling of the private external debt. The IMF adjustment program was standard. To restore

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external and internal equilibrium, domestic absorption was to decline. Tighter monetary policy targets were set and the public sector deficit would have to be eliminated. By IMF measurement techniques, the nominal deficit was estimated to be 16% of GDP in 1982. This nominal deficit was expected to disappear after two years of adjustment program.

All nominal targets set by IMF were revised after the new real exchange devaluation of 30% in February of 1983. Even the revised targets, however, were shown to be unfeasible in the subsequent quarters. The acceleration of the inflation rate to 210% in 1983 rendered futile all attempts to comply with previously agreed nominal targets for monetary expansion. Once again, the Brazilian inflation displayed its recurring pattern of being extremely sensitive to adverse supply shocks while insensitive to restrictive demand policies. The role of indexation practices and the resulting impossibility of eliminating the nominal public sector deficit were not immediately understood by IMF.

The need to define and measure the real or operational deficit of the public sector was eventually accepted by, and included as a parallel target in, IMF stabilization programs. The real or operational deficit of the public sector is defined as the difference between the nominal deficit, or the public sector borrowing requirements in IMF nomenclature, and the value of monetary correction which incides on the stock of indexed public debt. Although it should be apparent that this is the economically relevant definition of public deficit, a hardly justifiable confusion is still present in most appraisals of Brazilian fiscal policy in the past two years.

The real public sector deficit was measured to be 8% of GNP in 1982. In 1983 it was reduced to 3.5% of GNP. As the end of 1984 comes near, the fiscal deficit turns out to have been practically eliminated. By all possible standards of judgement, this is a dramatically reversal of previous fiscal disequilibrium. The nominal deficit, however, has not been reduced. In point of fact, it has slightly increased. The discrepancy between the behaviour of nominal and real or operational deficits since 1982 is explained by the acceleration in the rate of inflation. It is trivial to note that if the rate of inflation persists at the 200% level, the complete elimination of the nominal deficit in one year would require a real fiscal surplus of 2/3 of the real value of stock of public debt at the beginning of the period. It stands to reason that the reduction of the real value of the stock of public deficit accumulated over the history of the economy to one third of its value in one year is an impossible task. Since the portfolio equilibrium of agents in the economy is based on the real magnitudes of assets, it is clear that the public financing requirements

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that stem from the pure nominal recomposition of the real value of the public debt eroded by inflation, exerts no pressure whatsoever on the equilibrium of the economy. It is to be lamented that elementary confusions, such as the comparison of the real savings rate to the nominal public deficit, or calculations of an alleged crowding-out based on the nominal roll-over of the public debt, are still frequent in the debates about the Brazilian economy.

These confusions have been fostered by the fact that inflation showed no sign of receding over the current year. Brazilian inflation is to close the year of 1984 near the 230% level. The perplexity caused by the resistance of the inflation process led some experts to mistakenly conclude that the adjustment program had not been implemented over the past four years. The spectacular reversal of the trade balance from a 3.5 billion of dollars deficit in 1982 to a 6 billion surplus in 1983 and a 13 billion surplus in 1984 leaves no room for doubt: the adjustment has indeed occurred. The Brazilian economy today is leaner and revigorated. The reasons accounting for the inflation resistance to austerity measures cannot be found in the dismissal or denial of the adjustment effort, and therefore must be found elsewhere.

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## II. Misconceptions.

The failure of austerity measures in bringing down inflation gave rise to different interpretations and suggestions. Before moving to our specific appraisal of the inflationary problem, we summarize in this section five of the most important competing approaches. Since they involve a vast array of issues, a full discussion would be out of place here. Nonetheless, it is useful to identify them and lay down explicitly their deficiencies.

The first approach denies the failure of austerity measures. It argues that monetary restraint affects inflation with a lag. The decline in output is viewed as the first phase in the process of disinflation; this decline would give rise to a second phase in which output would increase and inflation would decline. According to the first approach, Brazilian inflation would eventually diminish provided that monetary contraction persists for a sufficiently long period of time. The problem of this approach is that it rests upon an unspecified lag. Unless one can provide an explanation for the abnormal lag that is allegedly preventing monetary control to affect inflation, this approach is reduced to an act of faith which does not seem to offer a firm basis for economic policy.

The second approach denies not the failure but the very existence of austerity measures. It rests upon a narrow argument according to which no inflation can occur without an underlying fiscal deficit being financed by monetary expansion. In face of the evidence of monetary contraction, the supporters of this approach point to the necessity of enlarging the concept of money hoping that it would be possible to find a monetary aggregate sufficiently inclusive to explain the current rate of inflation. To the evidence of stern fiscal policies, supporters of this approach point to alleged mismeasurements of fiscal deficits. In a surprising twist of the usual arguments, they view inflation as revealing an otherwise hidden fiscal deficits. The actual figures which show a dramatic decline in fiscal deficit from 8% in 1982 to zero in 1984 are viewed with suspicion. The fact that they have been endorsed by IMF and Central Bank officials and cohere to the entire set of data available is not deemed sufficient. The argument that inflation testifies to the deficit which supposedly accounts for it, however, is fragile because the elimination of fiscal deficit in the operational concept is a condition necessary, but not sufficient, to curb inflation down. Although the extent of the fiscal deficit is an empirical question, the refusal to accept evidence suggests that this approach cares more for simplified minded theories than for the understanding of concrete realities. The fact that

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it is always possible to find a monetary aggregate large enough as to be highly correlated with inflation can hardly be taken as buttressing this second approach.

The third approach recognizes both the existence and failure of austerity measures. It interprets them as testifying to the "psychological" nature of Brazilian inflation. Inflation would continue only because Monetary Authorities have no credibility. The Brazilian inflation would look like a speculative bubble whose unfolding could be brought to a standstill with the installment of a new government endowed with credibility. The sudden end of hyperinflations is frequently cited to support this approach.

The deficiency of the third approach lies not in emphasizing the expectational aspect of chronic processes of inflation. The mere quest for credibility, however, falls short from providing definite strategies to deal with inflation. Apart from not offering specific policy suggestions, the "psychological" approach also fails to explain the rationality requisites of inflationary expectations. As it will be argued below, the sudden end of hyperinflations offers us valuable lessons which have not been explored by the supporters of the "psychological" approach.

The fourth approach is the orthodox shock. It argues that a much larger and abrupt monetary contraction would of necessity bring inflation down. It criticizes current austerity measures for being too timid; it criticizes the "psychological" approach for not recognizing that credibility stems from the capacity to impose a once and for all, definitive shock that would cure inflation by drastically curtailing nominal income.

The deficiency of the orthodox shock lies in its costs in terms of output and employment. Its effectiveness in reducing inflation is beyond doubt. The benefits to be achieved by a sustained reduction in the rate of inflation are well known, but they have to be set against the costs in achieving this reduction. If disinflation is very costly, adjusting to the on-going rate of inflation may, in the absence of better proposals, be superior than trying to reduce it to any given figure deemed acceptable by common sense.

It turns out that the monetary reform discussed below provides a disinflation strategy with much smaller costs than the orthodox shock proposals. To appreciate the costs of orthodox proposals, note that abrupt disinflation by orthodox demand shocks is likely to be accompanied by drastic changes in relative prices. The point is that contracts in the Brazilian economy have a fixed length period. The real value of the contract

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over the period depends on the ruling inflation rate even if the contract contemplates full restoration of the previous peak level after every period. Under these circumstances, an abrupt decline of inflation from 230% to 0%, for instance, would mean an immediate increase of approximately 30% in real wages since nominal wages are readjusted every 6 months in accordance with past inflation. It requires little imagination to figure out the disruptions caused by the sudden changes in relative prices following an orthodox shock in an economy in which all contracts have indexation clauses.

The fifth approach is the heterodox shock. Supporters of this approach recognize the inertial character of Brazilian inflation. Instead of breaking down inertia by demand management, however, they favour administrative controls. Some form of social pact would bring inflation definitionally to zero by freezing nominal wages, fixing the exchange rate and controlling prices. The freeze would eliminate the inertial component of inflation. Since the fiscal deficit in the operational concept is negligible, agents would have reason to believe that, after the end of the temporary freeze, the zero inflation situation would persist over time.

The strength of the heterodox shock proposal lies in its explicit recognition of the inertial nature of Brazilian inflation. Its shortcomings lie in the remedies proposed. At high inflation there is high volatility of relative prices. A photograph of the economy at any given point of time would exhibit inconsistent relative prices. It is only through time that relative prices achieve their fragile equilibrium. To freeze nominal prices at any given day by legislative fiat would in all probability freeze inconsistent relative prices. If the announced freeze is too short, it fails to suppress the inflation drive inherited from the past; if it is too long, the inconsistency of relative prices as well as any shocks to supply and demand will have to be absorbed by rationing devices. In this case, the lifting of the freeze is likely to be followed by strong pressures to restore previous relativities which would revive inflation.

Leaving aside the nearly unsurmountable practical obstacles to the implementation of a successful freeze on wages and prices, there are two aspects of the heterodox shock that deserve emphasis. The first is the correct diagnosis of inertial inflation about which more will be said in the next section. The second is the monetary expansion which supporters of the heterodox shock have argued for. When wages and prices are frozen, money recuperates its function as a store of value. The losses incurred in holding money during the freeze period are limited to the real interest rate. The demand for money during the freeze increases. Without a monetary expansion, the freeze would exhibit latent deflationary pressures. Little reflection, however, indicates that similar results follow from the

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indexation of money. For if wages and prices increase in nominal terms, but money is indexed to the on-going rate of inflation, money recuperates its store of value function exactly in the same way as under the heterodox proposal. For a given level of income, the demand for indexed money also depends solely upon the real interest rate.

These considerations suggest that the dual counterpart to the freeze proposal is the issuing of indexed money. But before stating the mechanics of monetary reform, some discussion on inertial inflation is needed.

### III. Inertial Inflation and Indexation.

Inflation becomes inertial when contracts have indexation clauses that restore their real value after fixed intervals of time. Central to inertial inflation is the fact that the readjustment of nominal contract values by 100% of the inflation over the previous period does not assure the targeted constancy of real value. For given the length of the period that elapses between two readjustments, the average real value of a given contract depends on the ruling inflation rate even if the contract contemplates full readjustment of losses due to past inflation. Unless the length of the period is minimum, 100% indexation clauses are an imperfect hedge against inflation. For a given indexation period, the higher the inflation rate, the smaller the real value of the contract. For a given inflation rate, the shorter the period between readjustments, the higher the real value of the contract. The rate of inflation and the length of the indexation period are the two crucial dimensions of contracts with 100% indexation clauses in processes of inertial inflation.

These two dimensions, however, are not independent. The Brazilian economy provides no exception to the rule that large accelerations of inflation lead to a reduction in the normal length of contracts. Given the transaction costs involved in recasting contracts, minor accelerations of inflation are not offset by reductions in the indexation period. But the losses caused by large accelerations of inflation render the legal recasting of contracts

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inevitable. The higher the on-going rate of inflation, the smaller the normal indexation period tends to be.

The sluggishness in adjusting the indexation period is a mixed blessing. From the viewpoint of supply shocks, it is certainly desirable. For the change in relative prices brought by a supply shock occurs in an indexed economy by alterations in the rate of inflation. If agents respond very rapidly to any acceleration of inflation by reducing the length of the indexation period, a small change in relative prices lead to dramatic accelerations in the inflation rate. It is trivial to show that the inflation rate caused by the real devaluation of exchange rate in February 1983 would be much higher if workers succeeded in imposing three-months indexed contracts in replacement of the semi-annual pattern that exists today. The inflationary sequela of a supply shock depends crucially upon the barriers preventing agents from defending themselves against the change in relative prices by imposing shorter indexation periods.

From the viewpoing of inertia, however, the sluggishness in indexing is unfortunate. For it is the indexation period that governs the memory of the economic system. For simplicity, imagine that contracts are staggered over time. All contracts are of the same duration, six months, say. At each point of time, the nominal value of each contract is revised upwards. Then at every point of time, events that happened up to six months in the past are brought to bear to the current price increase. Six months is the extent of the past kept in the memory of the economic system. If one succeeds in decreasing the rate of inflation in period  $t$ , say, this success is undermined by the fact that contracts revised in period  $t+1$  keep information of the higher inflation rates that have prevailed from period  $t-5$  to  $t$ . It stands to reason that zeroing the memory of the system is a crucial condition for breaking down the inertia in inflation processes.

In fact, this crucial condition is met during hyperinflations. One of the hidden secrets to the success stories on how hyperinflations end is that during an hyperinflation, all the presumed conveniences of long indexation periods are overridden by the need to revise prices almost continuously. The inertia in inflation by which events that happened six months ago, say, imprint their mark upon the present disappears. Hyperinflations carry in themselves the seeds of their own destruction in the precise sense that they force agents to dwarf the indexation period. If the path from a low three digit inflation to an hyperinflation could be traversed without costs, one possible solution to the inflation problem in Brazil would be to inflate the economy up to an hyperinflation situation in order to obtain the shrinking in the memory of the economic system. Needless to say, the hardships caused by hyperinflations rule out this solution. Yet

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the lesson remains. It will be seen below that monetary reform separates out the desired effect - namely, the reduction in the indexation period - from its spontaneous cause - namely, the acceleration of inflation. The idea of monetary reform is to induce the shrinking of the memory of the economic system without having to wait for an hyperinflation to take place.

One aspect of indexation deserves emphasis in this connection. Indexation by contracts revised in fixed length intervals of time is not perfect (from the practical point of view) unless the interval is very small. Why would agents, and particularly workers, adhere to the fixed length interval contract if the indexation clause supposedly aims to keep the real value of the contract constant? Two conjectures can be offered as tentative answers to these questions. On purely Keynesian grounds, it is possible to argue that by sticking to contracts that revise nominal values at fixed intervals of time workers succeed in keeping the relative wages structure constant. The average real wage depends on inflation, but the relative wages between labour categories remains insensitive to the inflation rate. On a deeper conceptual level, it is possible to argue that the obvious alternative arrangement, namely, contracts endowed with trigger point indexation clauses, is unstable. Under trigger point indexation, the nominal readjustment occurs whenever inflation since the previous readjustment reaches a given magnitude of 20%, say. The higher the inflation rate, the smaller the length of intervals. It is trivial to show that trigger point indexation renders the real value of contracts insensitive to the rate of inflation. To apprehend the instability aspect, consider a firm with trigger point indexation contracts on wages and raw materials. The firm does not know when contracts will be revised upwards. Profit margins depend on the relation between the rate of increases in the firm's own product price and in the general price index. If the former is slower, contracts increase faster than firm's price and profits decline. The incentives towards acceleration of inflation under trigger point indexation schemes are apparent.

#### IV. ORTN, Exchange Rate and Wages.

The dialectics between increasing inflation (which reduces the real value of contracts) and shorter indexation periods (which increase the real value of contracts) is crucial to the Brazilian experience. It shows

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that indexation is a natural response of agents in processes of inertial inflation. This naturalness of the indexation response is somewhat blurred by the legal status accorded to indexation in Brazil through ORTNs.

ORTN is the abbreviation for Indexed Treasury Bond. Every month Monetary Authorities announce the change in the ORTN value. In present circumstances, this monthly change corresponds to the change in the general price index. Almost all indexed contracts in Brazil are nowadays denominated in ORTNs. Indexed contracts account for the larger segment of financial transactions and for an increasingly large segment of non-financial transactions. Most industrial prices are implicitly quoted in ORTNs; real estate property is more and more quoted explicitly in ORTNs.

The legal status accorded to ORTN indexation led some experts to conclude that indexation results from purely legal rules. This conclusion is hardly tenable. To ascribe to the legal enforcement of indexed contracts the main role in giving inertia to inflation is to espouse an overly institutional view of the Brazilian economy. Government enforced laws preventing indexation to the price index in ORTN denominated contracts would only force agents to resort to informal and more costly (from the transactional point of view) indexation mechanisms. The indexation to the dollar (or to any stable currency) would be the most likely replacement candidate.

In spite of the increasing importance of ORTN indexation, two key variables in the Brazilian economy are indexed differently. The nominal exchange rate is revised in accordance with a crawling peg regime almost every week. Since the devaluation rule does not discount for external inflation, the ORTN appreciation and the devaluation of the exchange rate coincide exactly every month period. Leaving aside the faster speed of adjustment of the exchange rate, it is true that all ORTN contracts are set in terms of the exchange rate. However, there is no convertibility. The exchange rate regime is an active fixed real exchange rate regime. There are no constraints on buying and selling foreign currency for trade purposes. Residents, however, cannot exchange cruzeiros for dollars for portfolio reasons. There are quotas for specific purposes (tourism) and holdings of foreign assets are illegal unless derived from income received from abroad. An unbroken history of continuous capital controls probably explains both the relatively small holdings of dollars and the fact that dollars were never widely used as medium of exchange.

The other key variable are wages. Under the present system, most wage contracts are of six months. They are endowed with 100% indexation on the change of the consumer price index. Leaving aside the different

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behaviour of consumer and price indexes, the effects of an acceleration of inflation is felt much more keenly on wages than on ORTN indexed contracts.

#### V. The Monetary Reform: Premises and Mechanics.

The recognition of the inadequacies of the five proposals briefly summarized in Section II led most Brazilian experts to an immobilist stance regarding inflation. Yet the understanding of the nature of inertial inflation and indexation opens up a way out of this frustrating deadlock. In a nutshell, the proposal submitted here involves the shrinking of the memory of the system and the the issuing of indexed money. It is based on the following premises:

(i) The primary factors of demand on the demand side, namely, the operational deficit of the public sector and monetary policy, are under control. Brazilian economy cannot be said to be under excess demand pressure.

(ii) There is no supply shock pressure. The main relative price adjustments - the real devaluation and the elimination of subsidies to basic consumption goods and to public services - have been implemented. To argue for further devaluations on the basis of anticipations of difficulties in meeting obligations in foreign currency seems premature. Wage drifts imposed by unions might occur in the future but do not pose a current threat. There is no pressure from agricultural prices either. This year they are running below industrial prices. Additionally, the dazzling success in the trade balance this year has assured a minimum of reserves in convertible currencies needed to avoid bottlenecks in imports.

(iii) Inflation in Brazil today is, therefore, by and large inertial. The best predictor for future inflation is past inflation itself. Indexed contracts keep alive the memory of the past inflation.

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The attractiveness of monetary reform does not depend upon the absolute validity of these premises. It is always possible to argue that the operational deficit of the public sector has not been completely eliminated, but only covered up by accounting gimmicks and statistical fabrications. It is also possible to argue that monetary policy has not been sufficiently restrictive; or that the external constraint cannot be said to be solved without a permanent debt reform. At stake, however, is the acceptance of the predominantly inertial nature of current inflation. That is, a major component of current inflation is past inflation itself. The absolute validity of premises (i)-(iii) guarantees that a monetary reform is a sufficient condition for price stability. If inflation is not purely inertial, the monetary reform is still a necessary condition to stabilize prices. The monetary reform is not meant to substitute policies which attack the fundamentals of inflationary processes. There is no point in implementing a monetary reform to halt an inflation deriving from fiscal deficits or supply shocks. Monetary reform deals with the inertial component of inflation - neither more nor less. In our view, the straight denial of Brazilian inflation being inertially driven by indexation contracts is hardly tenable. Monetary reform, therefore, maintains its validity even if premises (i)-(iii) do not exactly hold true.

The monetary reform proposal consists of:

(i) The introduction of indexed money. On a pre-announced date, the New Cruzeiro (NC) will be put into circulation. The NC would have a fixed, one to one parity with respect to ORTN. The ORTN appreciation in turn will continue to be given by the change in the general price index. The value of ORTN in terms of cruzeiros would be revised as the information on the rate of change in the general price index becomes available (approximately 10 days). The exchange rate between the NC and the cruzeiro would be revised daily in accordance with the geometrical interpolation of the available ORTN values. We shall designate the period in which the two monies co-exist as the transition period.

(ii) During the transition period, the exchange rate in cruzeiros would follow the crawling peg system. The exchange rate in NC is constant at the real exchange prevailing before the monetary reform. Capital controls will not be lifted.

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(iii) Beginning on the day the NC is introduced, agents are allowed to convert cruzeiros for NC or vice-versa at the going exchange rate. The conversion will be held in commercial banks and other pre-announced places. The possibility of free conversion of cruzeiros into NC is crucial to avoid an increase in the circulation velocity of cruzeiros. If the introduction of NC is associated with the repudiation of cruzeiros, of inflation as measured in cruzeiros becomes ineluctable. In the monetary reform, the Central Bank accomodates the demand for NC at the daily rate of exchange.

(iv) Demand deposits in the banking system would be immediately converted in NC and thus defended against the depreciation of cruzeiros.

(v) All transactions carried out by Central Bank in financial markets would be quoted in NC. The Central Bank would set the "overnight" rate that applies to daily funding of government bonds and bills in NC. Time deposits, passbook savings, loans and all other financial transactions would be made in NC.

(vi) All ORTN contracts could be immediately transformed into NC contracts. Extant nominal contracts would be maintained. Since the Central Bank announces the daily quotation of NC, the computation of NC magnitudes for actual transaction purposes at maturity presents no difficulty.

(vii) Administered prices set by government fiat would be immediately quoted in NC. The conversion would be made by the average real price in cruzeiros prevailing over the last indexation period.

(viii) The computation of inflation in cruzeiros would continue after the issuing of NC. Inflation in NC during the transition period in which cruzeiros and NC co-exist is, by definition, nill. The superiority of the NC in terms of the three traditional functions of money - as a store of value, a unit of account and a unit of transaction - is obvious enough to induce a rapid switch of price quotations towards the NC. As the number of prices quoted in NC increases, the very notion of a general price index in cruzeiros becomes deprived of meaning. After the transition period, the need to compute the index of prices in cruzeiros disappears. From this moment on, the Central Bank would simply fix the rate of depreciation of the cruzeiro regarding NC based on the average rate of inflation observed in the recent past. If this average is 10% per month, the cruzeiro would depreciate relative to NC by 10% every month ad infinitum (or until the cruzeiro leaves the economic scene completely). This would maintain the incentive towards replacing cruzeiros for NC. The real value of the residual stock of cruzeiros would approach zero rapidly.

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(viii) Wage indexation schemes, according to which nominal wages increase every six months based on the previous six months of inflation, will not be legally abolished. It would be possible, however, to opt for a conversion of wage contracts in NC in accordance with a definite formula. The conversion formula would calculate the average real wage in cruzeiros over the last six months and transform it into NC. The conversion into NC by peak real values is equivalent to a distributive shock whose effects are well described by core theories of inflation. NC wages would be paid monthly.

(ix) The same conversion rule would apply for rents and all other indexed contracts. Apart from preferences regarding risks derived from inflation fluctuation and possible inequalities in present discounted values due to interest rate effects, the conversion formula is not intended to give either gains or losses to those switching to monthly NC contracts. Those, however, wishing to maintain their contracts indexed in cruzeiros would be allowed to do so. An incentive towards shifting to NC contracts might be provided by the Central Bank setting the rate of depreciation of old cruzeiros at a rate slightly above the average past rate of inflation.

Points (i)-(ix) above summarize the most relevant aspects of the implementation of the monetary reform proposal. Leaving aside mechanics, we will concentrate next on some of its macroeconomic aspects.

## VI. Indexed Money.

During the transition period, NCs and cruzeiros would circulate side by side. NC would exhibit a fixed parity to ORTN and the dollar. The parallel circulation of the new money gives it credibility. Agents observe that NC appreciates daily with respect to cruzeiro and the price level in NCs would, at least during the transition, be stable.

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The new money would be an asset in high demand. Since NC is protected against inflation, a rapid and sharp reduction in velocity is to be expected. After the transition period, the ratio of nominal income to the new stock of monetary base would be significantly inferior to the ratio between nominal income and monetary base in cruzeiros which prevailed before monetary reform. In fact, the increase in money demand would be such that Central Bank will not be able to restrict itself to the simple exchange of old for new money. The relative costs of holding money relative to holding short term financial assets, particularly close money substitutes like overnight accounts which have proliferated with the acceleration of inflation, would be sharply reduced. A sharp reduction in the demand for these assets and an increase in the demand for money (cash and demand deposits) is to be expected. Expansionary open market operations would be necessary to avoid a liquidity crisis in financial markets.

Moreover, changes in banking regulation would be needed to compensate banks for losses in their collected share of the inflation tax. The point is that inflationary gains over sight deposits have stimulated banks to compete for deposits through the installment of a costly structure of free services to the public. Simultaneously, very restrictive reserve requirements and deficitary compulsory lending to subsidized activities have been imposed by the Central Bank upon the banking system. These impositions would have to be relieved to a significant extent until banks adapt to the new prevailing conditions.

In addition to eliminating inertial inflation, monetary reform provides a windfall seigniorage gain for the government. Under present 230% inflation conditions, the seigniorage gain outweighs the inflation tax. Since the demand for money increases, government expenditures can be financed at zero interest rate. Further increases in taxes or debt issuing may therefore to some extent be avoided.

## VII. The Post-Monetary Reform Economy.

The shift to NC is in the self-interest of economic agents. Incentives towards recontracting in NC exist because of risk aversion (relative to cruzeiro contracts, NC contracts provide the same average real wage with much smaller variance due to unexpected changes in inflation);

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as argued above, they may be reinforced by setting the daily quotation of NC in cruzeiros slightly above the level indicated by current inflation. From the viewpoint of cruzeiro holders, it is rational to move to NC because of the inflation tax in cruzeiros. Given that ORTN indexation is already large, and still expanding, the move to NC is a natural step from the perspective of tendencies unfolding in the current state of the Brazilian economy. It is our impression that the transition period will not exceed two months.

After the transition, both contracts and exchange rate are denominated in NC. The economy that emerges from the monetary reform is thus a non-indexed economy. Indexation, however, may prop up again if price stability cannot be maintained. The price level in NC is by definition constant during the transition. Its behaviour in the post-monetary reform economy depends (at least partly) on the non-inertial component of inflation existing before the monetary reform. While monetary reform suppresses entirely the inertial component, it leaves unaltered the non-inertial component which derives from fundamental causes such as monetized fiscal deficits or supply shocks. If the non-inertial component is large, the adoption of a crawling peg regime for the exchange rate and the installment of indexation clauses on contracts will be inevitable. Under this unfortunate outcome, the setting of the average indexation period becomes crucial. If the average indexation period after the reform is approximately equal to (or larger than, or smaller than) the period prevailing before the reform, post-reform inflation is approximately given by (or exceeds, or is surpassed by) the non-inertial component of pre-reform inflation.

The above discussion stresses that monetary reform as described here is not a panacea. It is the best strategy to deal with the inertial component of inflation; but it cannot be expected to change the non-inertial component. Since indexation is a natural response to inflationary environments, monetary reform will only succeed in eliminating indexation if previous inflation is by and large inertial. If inertia is absent, the monetary reform is innocuous: the same rate of inflation in cruzeiros reappears under NC.

Four features of the post-monetary reform economy need clarification: exchange rates, interest rates, wages and money indexation. To apprehend the effects of monetary reform on these variables, one has only to investigate whether they are in any real sense a function of the inertial component of inflation.

Turning first to the exchange rate, note that monetary reform does not contrive in any sense the range of alternatives available regarding the optimal exchange rate regime. Apart from the well known problems deriving from pegging to the dollar (instead of to a basket of monies), we do favour the adherence to the present active fixed real exchange rate regime. If future

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circumstances render devaluation necessary, the exchange rate between NC and the dollar (or the reference basket) can be revised upwards. The same arguments for and against other exchange regimes, however, apply to both pre- and post- monetary reform situations. Support for monetary reform is compatible with the belief in the virtues of flexible exchange rate regimes, for instance.

Likewise, there is no reason to expect monetary reform to alter real interest rates. In contrast to the exchange regime, we do not favour the present policy of imposing real interest rates well above current external levels. The most likely effect of selling indexed bonds at 16% or even higher real interest rates is not deflationary (as naive believers in the one to one relation between money and prices may infer) but contractionary (for the higher the interest rate on bonds, the stronger are the pressures against budget equilibrium in an inter-temporal perspective). But again it must be said that monetary reform per se has no bearings on the optimal interest rate policy.

Real wages are not altered by monetary reform. Workers will be better off to the extent to which they pay the largest part of the inflation tax; but monetary reform is not meant to replace incomes policy or any package of policies aiming at promoting greater equity and social fairness.

Finally, note that money indexation as discussed here disappears in the post-monetary reform economy. For NC are indexed to the price level in cruzeiros and not to the price level in NC. It might be argued that money indexation should be allowed to persist after the reform in the form of government compensating holders of NC for losses in purchasing power every time the price level in NC exceeds a critical pre-announced level. A discussion of after-reform money indexation is out of place here. As to monetary reform, money indexation pertains strictly to the short transition in which two monies co-exist. We shall leave open the discussion of whether NC indexation to the price level in NC provides an optimal fiduciary system from the viewpoint of price stability.

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### VIII. The Anchor for the NC

The monetary reform will fail if the NC is not anchored in such a way as to preserve its real value over time. Rules penalizing the government against reinflating the economy are necessary. The seduction of inflation shocks is no secret to private agents. Unless government is restricted in its discretionary powers over the supply of NC, agents anticipate inflation and inflation may result even before government in fact over-expands the money supply.

One possible anchor is a rule limiting drastically the quantity of NC supplied to the economic system. While such a rule would have positive effects on expectations, it is hardly appropriate from the viewpoint of the maintenance of price stability. Since we don't know the rate of increase in money demand induced by the monetary reform, a rule sufficiently stern to break down expectations may easily lead to deflation. In fact, negative growth of prices was observed in historical instances of monetary reform in which this rule was enforced. If the demand for money increases to a large extent (which we believe will happen), government would have either to violate the self-imposed money growth rule or permit massive over-contraction with deflationary sequelae.

Another anchor is the exchange rate. Government would lift capital controls and stands ready to buy or sell dollars at the given exchange rate. From the theoretical point of view, pegging the exchange rate is superior to limits on money growth. In several historical instances, a key feature to the success of monetary reforms is an inflow of foreign capital and the ensuing building up of reserves that allow the country to demonstrate an ability to peg the exchange rate. This anchor, however, is unfeasible in the Brazilian case. The needed inflow of foreign capital is not going to come to the most heavily indebted country in the world.

Some reflection on the status of the largest world debtor, however, indicates the proper anchor: the external rate of interest. This Wicksellian anchor draws on an important Brazilian institution: Resolution 432 of the National Monetary Council.

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Resolution 432 allows private corporations indebted in dollars to prepay their debt to the Central Bank. The prepayment is in cruzeiros at the current exchange rate. Under the new scheme, withdrawals of 432 deposits (also in cruzeiros) would also be allowed. With the lifting of transaction constraints against 432 deposits, an instantaneous arbitrage between the expected cost of dollar liabilities (namely, the external interest rate plus spreads charged to the country plus the expected probability of real exchange rate devaluation) and cruzeiro liabilities (namely, the domestic interest rate) will hold. The amount of 432 deposits is much larger than the stock of high powered money.

The anchor to the NC would be given by a legal ceiling on a new monetary aggregate defined by the sum of the stock of high powered money and 432 deposits. Consider an increase in money demand. It would lead to an increase in the domestic rate of interest; for arbitrage reasons, corporations would draw on 432 deposits. The stock of high powered money increases but the stock of 432 deposits decreases. Money demand accommodation is obtained without breaking the self-imposed monetary rule. Consider now government financing expenditures through money. The increase in high powered money decreases domestic interest rates; by arbitrage, corporations increase 432 deposits by borrowing on domestic credit markets. From the viewpoint of the monetary aggregate, all that matters is the net effect. If the net effect is expansionary, it must comply with the self-imposed rule on the monetary aggregate. The Wicksellian anchor provides room for money demand accommodation without easing on the monetization of deficits.

#### IX. A three-fold inflation taxonomy.

The accounts of hyperinflations cast light upon the erosion of the functions of money when inflation accelerates. First, the store of value property is lost. As inflation reaches the three digit levels, the unit of account property is gradually lost. In fact, the bulk of financial

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and large real transactions are already implicitly or explicitly quoted in ORTNs in Brazil. At the very late stages, when hyperinflation sets in, money also loses its mean of exchange property. Brazil has not reached this stage yet. The natural substitutes for the domestic currency plagued by the inflation disease are foreign currencies. The physical shortage of foreign currencies is usually the limiting factor in this substitution process. In the final stages of hyperinflations, private monies, backed to foreign currencies or to real assets, are issued and gain increasing acceptance as means of exchange.

The most surprising aspect of the end of hyperinflations is the sudden form by which prices are stabilized. This abrupt end of all known hyperinflations has been interpreted as an evidence that a credible change in economic policy regime suffices to bring chronic inflation to a sudden halt. This assertion apparently underplays the downward rigidities typical of chronic inflation processes put into relief by inertial inflation theories.

The contradiction, however, does not exist. A three-fold taxonomy of inflation processes is useful in this connection. Low, one digit inflation is essentially distinct from chronic two or three digit inflation processes; and the later in turn are to be distinguished from open hyperinflation situations. In low, one digit inflation processes indexation mechanisms have not been developed yet. In chronic inflationary processes, lagged or backward looking indexation clauses become widespread. In open hyperinflations, the shortening of the indexation period approximates the economy from the instantaneous indexation paradigm. The inertia caused by long contracts which causes real contract values to undergo peaks and valleys as well as the inconsistency of relative prices at any given point of time are eliminated in the later stages of hyperinflations. The memory of the economic system has already shrunk to a point in which past inflation becomes once again irrelevant. The nature of hyperinflations thus render true that an abrupt halt to the price increase can be brought solely through a credible change in economic policy. Credibility, however, is not yet a sufficient condition when inflation is still in its chronic, inertial two or three digit phases.

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## X. Conclusions

The shift to indexed money is equivalent to an almost complete and instantaneous indexation of the economy. Inflation measured in the old money loses its meaning. The real problems caused by backward-looking indexation and inertial inflation are thus solved. The false problems, such as the nominal deficit of the public sector, disappear. Measured in the new money, the nominal and real deficit coincide. If the latter is close to zero, the former would also come close to zero. The false problem of the roll-over of the nominal public debt would also disappear. Measured in ORTNs, the rate of growth of the public debt in the last years is already shown to be moderate and responding mainly to the attempt to control monetary supply. The large demand for NCs will open space for, and even require, the reduction of the real value of the stock of the public debt held by the private sector. The elementary confusion between nominal and real values that unfortunately still inspires erroneous diagnosis and therapies would at last disappear.

The advantages of the monetary reform through the issuing of indexed money as suggested here are clear. In opposition to both the monetarist shock and the gradualistic stance currently adopted, the monetary reform would allow for a liquidity expansion without which real interest rates cannot come back to international levels. The decline in interest rates is a necessary pre-condition for private investment to flourish. The fiscal burden imposed upon the private sector in the vain attempt to control the nominal public deficit can be relaxed with the help of the windfall seigniorage gain. The historical experience shows the recovery of economic activity and employment that follows from stabilization programs that eliminate hyperinflations. Stabilization in these cases occurred without the recessive burden that follows from orthodox or austerity monetary and fiscal policies in indexed economies.

As to the heterodox shock of price and wage freezes, the monetary reform as proposed here has the advantage of being neither compulsory nor dependent on administrative controls and of preserving the functioning of markets. It boils down solely to the introduction of a monetary asset which is superior to the old money whose credibility has been subverted by inflation. The flight from contaminated money, which responds for the reduction in the real stock of money from 15% of GNP ten years ago to less than 3% today, is thus interrupted.

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De-indexation through indexation of money not only restores the effectiveness of demand policies to affect the path of the price level, but is in itself a necessary condition for the feasibility of these policies. To the extent to which Brazilian inflation is inertial, government credibility, independence of Monetary Authorities from political pressures, public budgeted visibility, monetary and fiscal discipline are complementary to, and not substitutes of, the monetary reform as proposed here.

We conclude by warning against the immobilist stance that dominates policy debates in Brazil. Inflation is apparently stable at 230%. But processes of inertial inflation are very sensitive to adverse supply shocks while responding little to demand management. Since the former cannot be ruled out, Brazilian inflation, under the hypothesis that present immobilism persists, will eventually become an hyperinflation. It took 10 years for Brazilian inflation to move from 20% to 200%; it may take some years more until the hyperinflation stage is reached. Without looking down on the fundamental deficit control, it is clear that those that still view with suspicion monetary reform at 200% will be forced to support it when inflation comes to 2000%.

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APPENDIX: Inertial Inflation in the Brazilian Literature.

The inertial character of chronic inflationary processes that stems from indexation clauses has by now established a tradition in the Brazilian economic literature. Papers by Arida(1,2), Arida and Lara-Resende (6), Bacha and Lopes (7), Lara-Resende (11), Lopes (19), Lopes and Modiano (16), Lopes and Williamson (17) and Simonsen (22,23) have contributed to put on a firm basis the framework for understanding the inertial component of inflation in indexed economies. See also Frenkel (8) on the Argentinean case.

The empirical evidence on the downward rigidity of inflation in the Brazilian economy and the resulting unfavourable Phillips-curve trade-off may be found in papers by Modiano (9,10), Lara-Resende (12), Lara-Resende and Lopes (15) and Lopes (18).

Several proposals have recently emerged as attempts to break the downward rigidity of Brazilian inertial inflation. Lopes (20) proposed the heterodox shock in opposition to traditional orthodox shocks. Simonsen (24) has proposed a scheme for legal de-indexation and Arida (3) has argued for the neutralization of inflation through higher degrees of indexation. De-indexation through indexed money was proposed by Lara-Resende (13). Arida (4,5), Lara-Resende (14), Lopes (21) and Simonsen (25) have developed arguments in favour of the indexed money reform.

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