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INFLATION IN URUGUAY

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Introduction

Uruguay has a long history of inflation. The average compound growth rate in the CPI for the period 1950-89 was of 42.8% per year. Levels below the two digits were attained in only three of those years, all of them in the 1950's. On the other hand, inflation levels in the three digits were attained only in 1967 and 1974. Since 1983 inflation has exceeded 50% per year, a number that even though it seems small when compared with the record of the larger neighbors Argentina and Brazil, is too large to be sustainable for an economy that aspires at maintaining a relatively open financial market coupled with currency convertibility.

The reduction of inflation seems to be one of the utmost priorities of authorities. Several factors are relevant for this objective, prominent among them the fiscal deficit, the degree of indexation of the economy and finally, the gradual process of dollarization that the economy has been experiencing since 1974.

Understanding the inflation process of Uruguay and implementing measures toward reducing the inflation rate requires dealing with all of the above three issues simultaneously as all have a significant role in the determination of the final inflationary outcome and its sustainability.

INFLATION IN URUGUAY

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FIGURE 1

ANNUAL INFLATION RATE IN THE CPI: 1958-1989
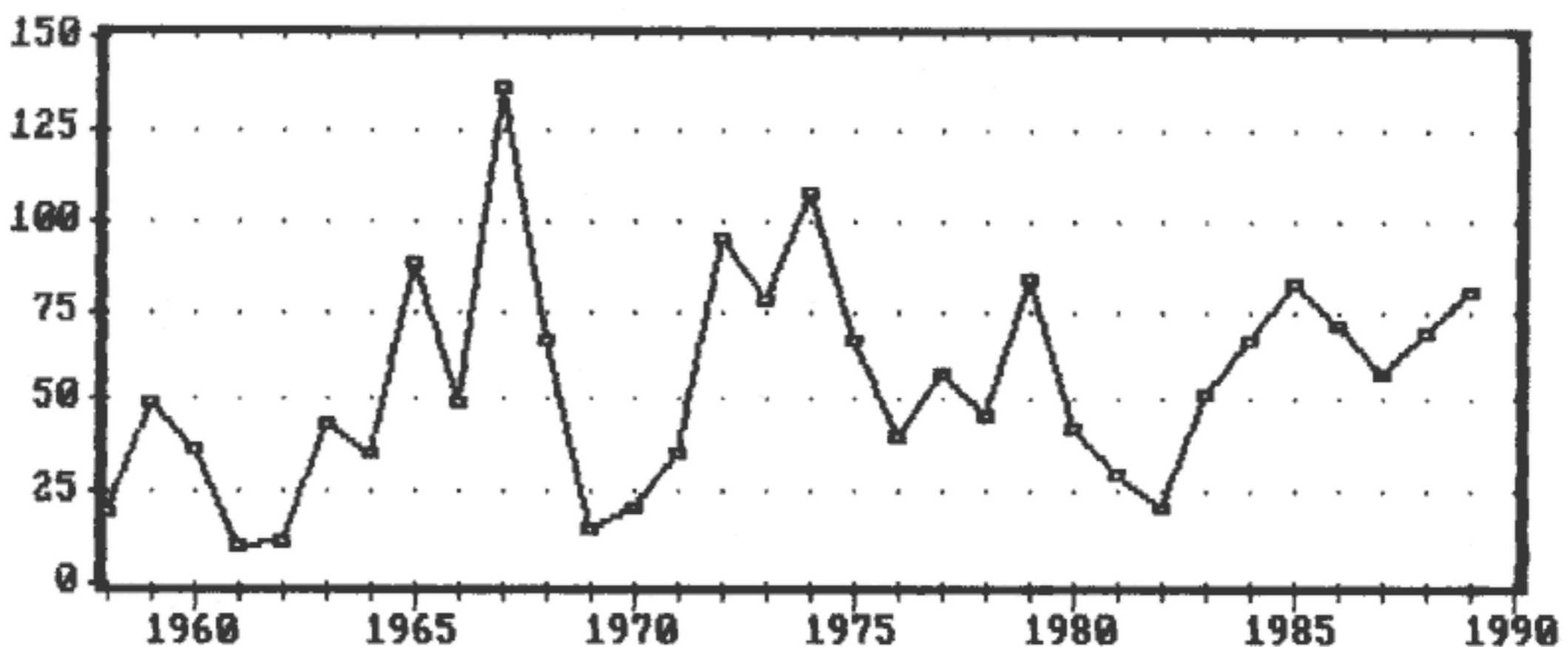
I.Dollarization and the Structure of Financial Markets
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Since 1974 the country has experienced a system of freely convertible currency coupled with a financial system where deposits can be made in either domestic or foreign currency at market determined interest rates. In 1976, by Law 14500, foreign exchange received the status of legal tender, by allowing commercial and financial transactions to be set and settled in terms of foreign exchange, and there have been no restrictions since then insofar as setting prices or any other type of contract in terms of foreign exchange.

The high and variable inflation rate coupled with the lack of financial and monetary restrictions has generated a gradual process of currency substitution, away from the domestic currency into foreign exchange, mostly the US Dollar. The availability of substitutes for the domestic currency must have worked toward reducing the welfare costs of the high inflation rate, but at the same time, by reducing the demand for the local currency, it increases the amount of inflation required to finance any given deficit of the public sector.

Figure 2 shows the time path of the share of peso monetary assets(M2: Currency plus peso demand and time deposits) of the public in their total monetary assets (M2T:M2 plus deposits denominated in dollars). As of 1975 the share of peso assets was close to 90% and fell to 58% as of the end of 1977. The process of gradual appreciation of the peso that starts in 1978 generated a positive interest differential in favor of peso denominated deposits that temporarily reversed the dollarization process started in 1974. The ratio of peso assets starts raising in 1978 and climbs up to 78% by Dec.1980. Since then, as the "Tablita" regime approaches an end, demand for peso denominated assets starts to fall again, a process that accelerates as the Tablita is abandoned in November 1982 and continues up to 1989. From the level of 78% reached in Dec.1980, the ratio of peso assets stays at 37% as of June 1990.

FIGURE 2

RATIO OF M2 (PESO MONETARY HOLDINGS) TO M2 PLUS DOLLAR DEPOSITS OF RESIDENTS (M2T)
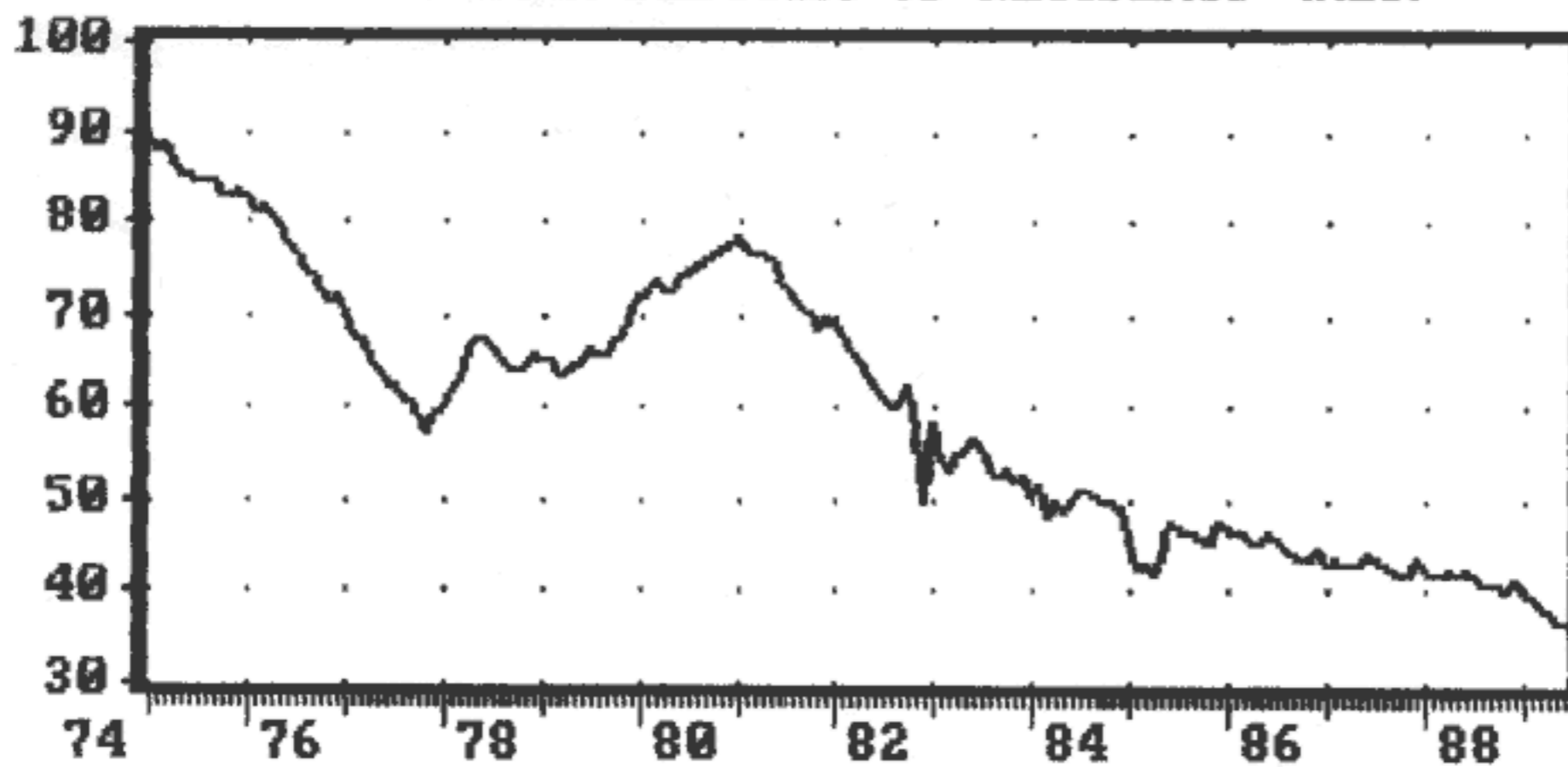
The persistent fall in the share of peso denominated monetary assets has not been matched by a fall in the real value of total monetary assets (M2T: peso plus dollar assets). In fact, the real value of M2T has increased steadily since 1975 as it can be appreciated in Figure 3. Real M2T has tripled in the period of 15 years since 1974. While there has been some slow down in the growth rate since the crisis of 1982, the trend is still positive and certainly larger than the growth rate of the overall economy. What has been observed, therefore, is a gradual process of substitution of foreign money for the highly taxed domestic money.

Figure 4 helps in clarifying the nature of the currency substitution process that has been going on since 1974. The real level of M1, mostly associated with current transactions and the one that is hurt most by inflation remained relatively stable in the initial stages of the dollarization process (1975-1981). It then takes a sharp fall of about 33% during 1982-83, never to recover again. Since the demand for M1 is closely associated to the currency in which transactions are denominated, this apparent once and for all shift in demand for M1 can be interpreted as the result of a permanent shift in the currency composition of transactions rather than as an increase in the velocity of circulation of money broadly defined to include foreign currency holdings.

FIGURE 3

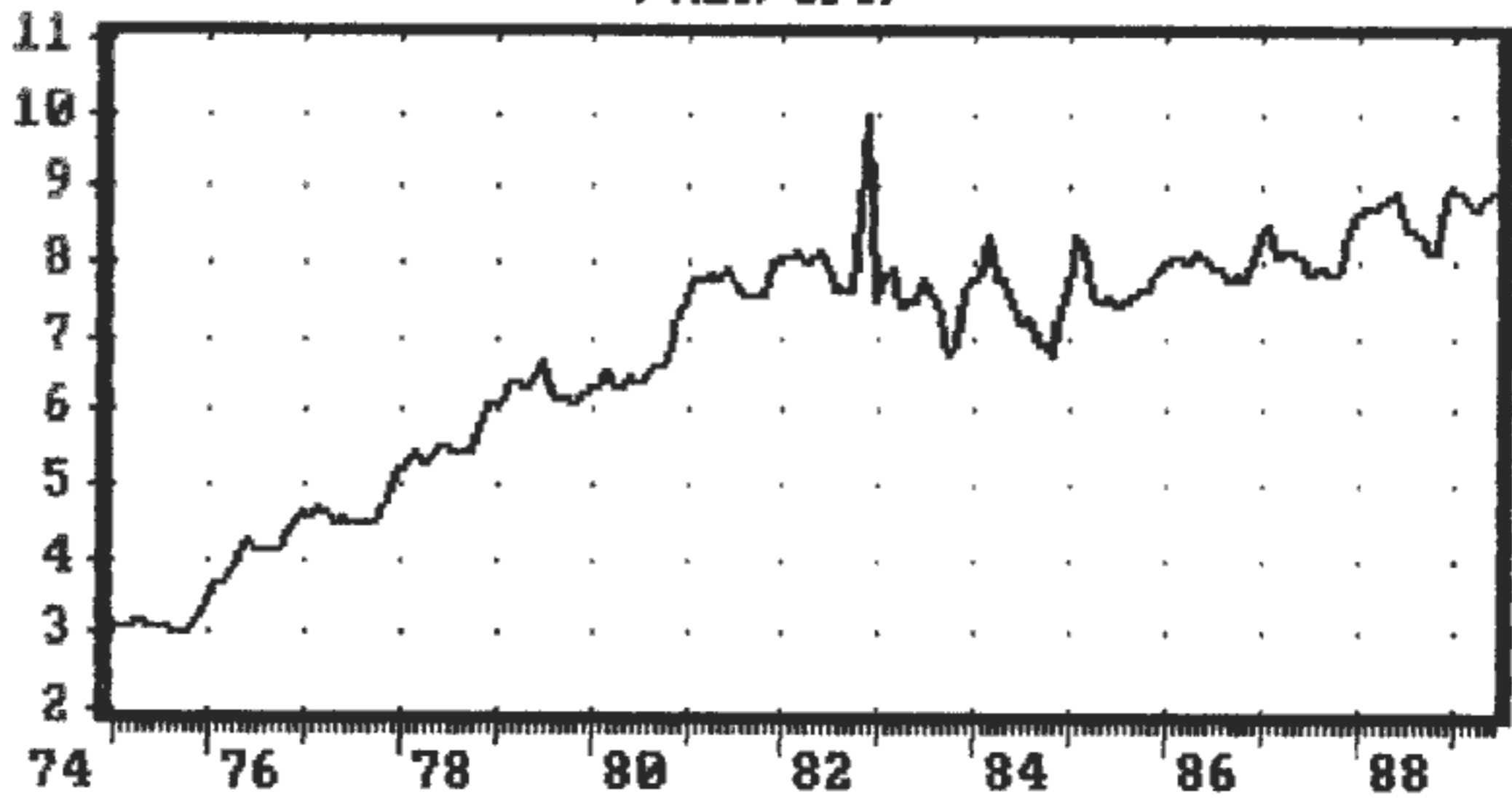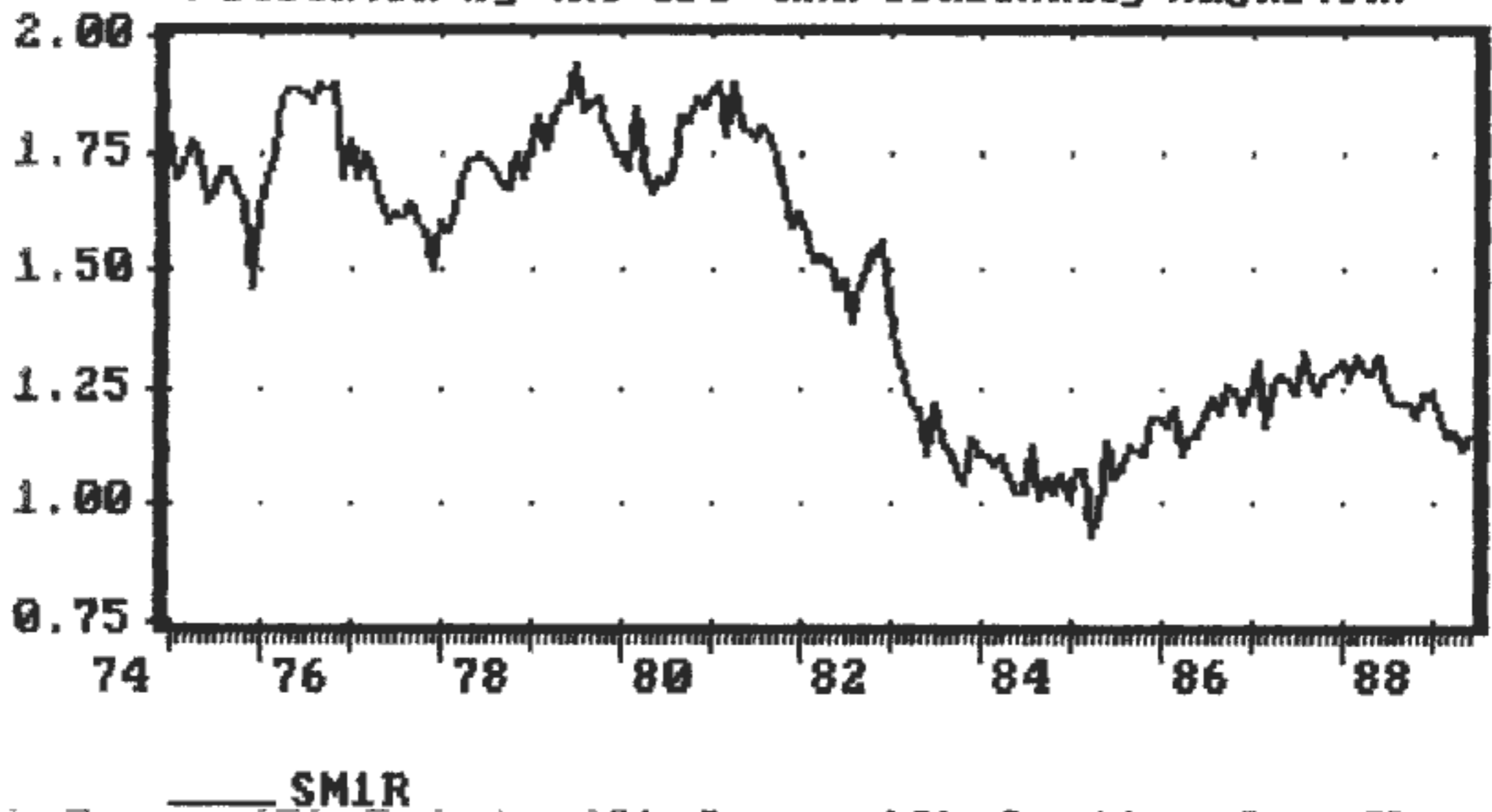## REAL VALUE OF TOTAL MONETARY HODINGS OF RESIDENTS
(M2T/CPI)

FIGURE 4

REAL M1 (CURRENCY PLUS DEMAND DEPOSITS ONLY IN N$)
(Deflated by the CPI and Seasonally Adjusted)


———— SM1R

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Econometric estimates to be presented later confirm the existence of a significant downward shift in the demand for M1 starting in 1983, after the abandonment of the Tablita regime.

Figure 5 shows the behavior of the real stocks of interest earning deposits of residents, denominated in either pesos(TDR) or dollars(DDR). It is apparent that from 1975 up to 1978 both types of deposits grew at about similar rate. FroOm the inset of the Tablita regime, peso deposits started yielding a more attractive equivalent dollar rate with little risk of devaluation and a process of reverse dollarization started as the public converted dollar deposits into peso deposits. By 1981 the sustainability of the Tablita regime is already under questioning and interest earning dollar deposits start growing again at the expense of peso deposits. This process has not stopped since then as the real value of peso deposits has been systematically falling since 1982 at a compound annual rate of -7.7% while dollar deposits of residents have grown at an annual rate of 11.6% (the period used is Dec.1981-June 1989).

FIGURE 5

REAL VALUE OF PESO TIME DEPOSITS (TDR)
AND DOLLAR DEPOSITS OF RESIDENTS (DDR)
(Deflated by the CPI)

————DDR . ...,TDR
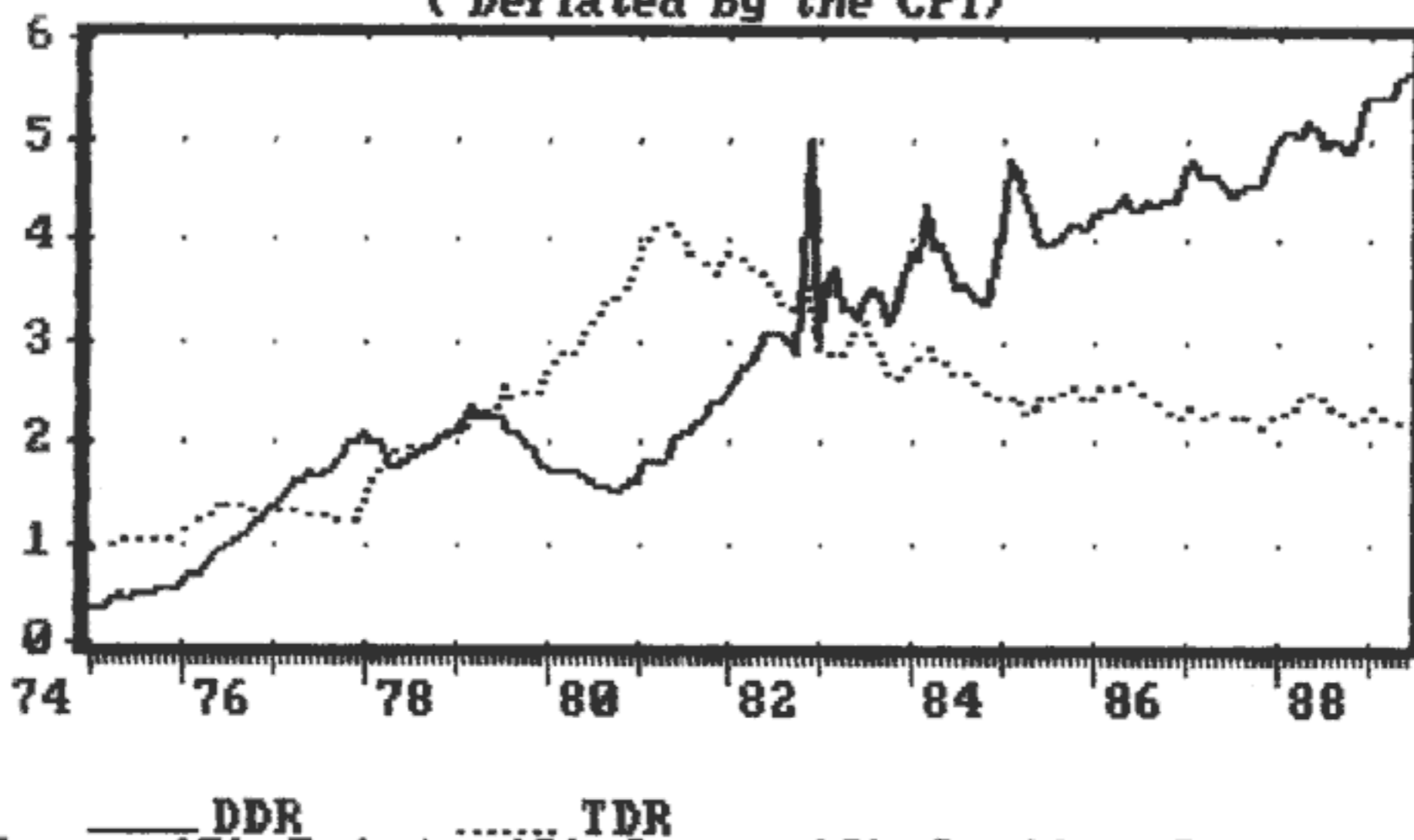
The evidence suggests that Uruguay is experiencing a gradual process of dollarization that starts around 1974 and does not show signs of stopping. The high and variable inflation rate experienced, of course, does not help stop the shift toward the dollar, but the question remains whether this process would stop

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at any inflation rate for the peso, or at least until the peso
shows signs of being a better currency than the dollar. The
public's confidence in the Peso was hit hard by the events in
1982. The fall of the Tablita regime implied a large devaluation
that wiped out all of the interest earned by peso depositors
during the previous years. An interest earning deposit
denominated in pesos made in January 1978 grew from a value
equivalent to one dollar to 2.33 dollars by October 1982. In
December 1982 that same deposit was worth 1.05 dollar after the
sharp devaluations of November and December. That sharp capital
loss inflicted by the devaluations induced a shift away from the
peso that was not to find any institutional impediment as the
financial freedom remained in place.

FIGURE 6

ACCUMULATED DOLLAR VALUE OF AN INTEREST EARNING DEPOSIT DENOMINATED IN LOCAL CURRENCY
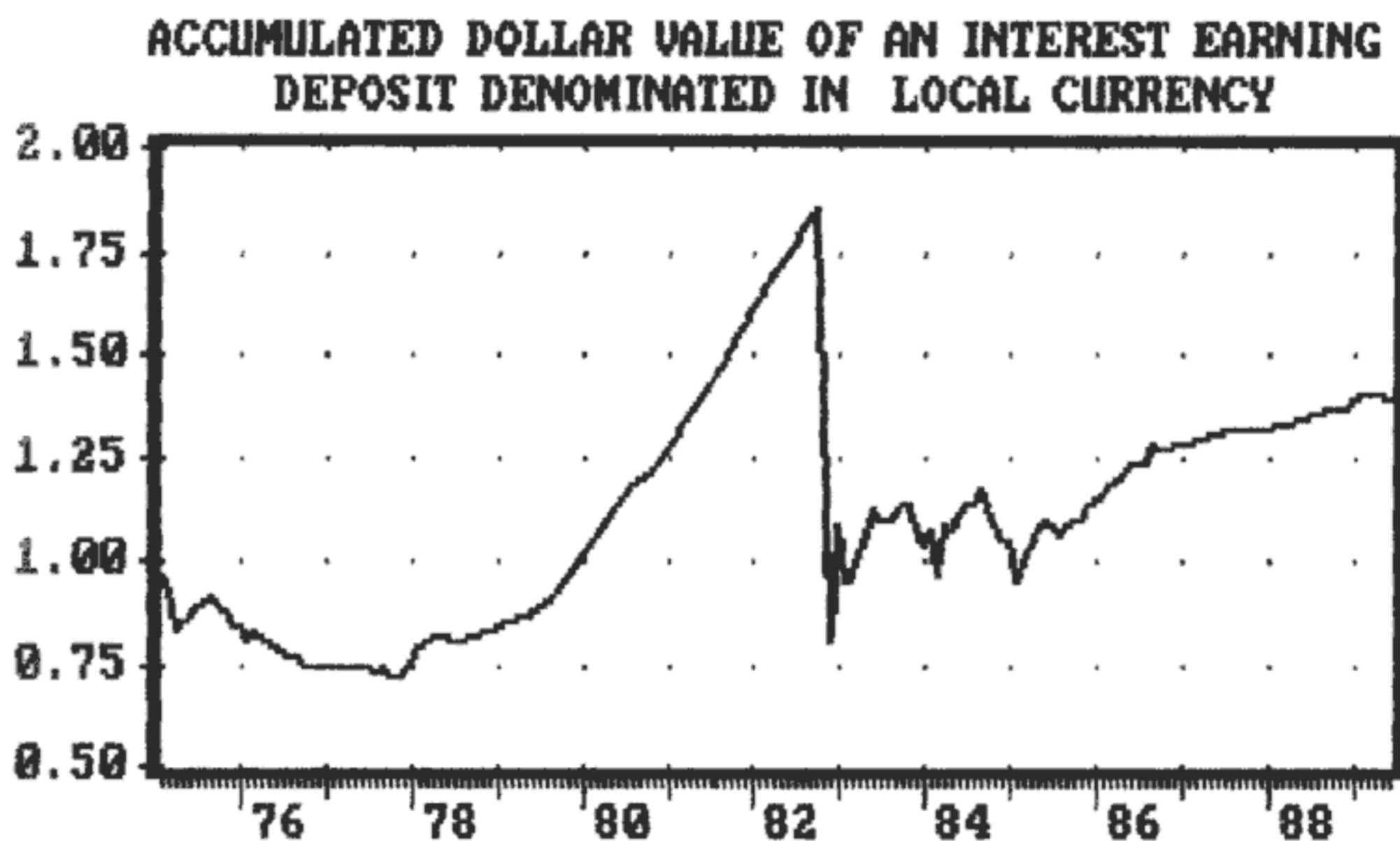
The shift away from peso assets seriously affects the
possibility of the Government financing its deficits by the
printing of new peso bills. With a falling real demand for pesos,
the financing of the same real deficit is bound to generate an
increasing rate of inflation. The higher inflation, in turn, will
further reduce the demand for peso assets and spiral the
dollarization process.

The process described above would reach an equilibrium with a
positive demand for peso monetary assets if there were some rate
of inflation at which the rate of dollarization reaches a stable

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level. Given the actual legal and institutional framework this may not be necessarily the case. For all practical purposes the U.S. dollar is granted a status very similar to that of legal tender, except in the case of taxes that are set and paid in pesos. In all other type of contracts the parts are free to decide on the actual indexation clause or currency of denomination for the actual settlement. Real estate, automobiles, machinery and basically the prices of most traded goods are advertised and collected in dollars. Even the Banco de la Republica keeps dollar indexed deposits at the Central Bank. The degree of dollarization of the economy is therefore a matter of decision of the market rather than something dependent on a legal or regulatory aspects. From this perspective, we feel that to the extent that there is an inflation rate on the peso higher than that of the US dollar, the role for the peso will not exceed that of providing currency for small transactions.

It is our assessment that under the present institutional arrangements and customs, there is little chance for the long run survival of a currency that carries an inflation tax higher than that on the US dollar, except for the specific services that it could provide by supplying small denomination bills and coins. As of March 1990, the highest peso note had a value of approximately 11 dollars, a fact that attests to fact that the peso is not used for settling monetary transactions of a significant amount.

Another indication of the diminished role of the peso in the carrying on of transactions is given by the significant reduction experienced in the ratio of peso to dollar demand deposits. These deposits are clearly associated to transactions motives rather than being held as stores of wealth, since neither pays interest and interest earning accounts are available in either currency. A reduction in the volume of peso checking accounts in favor of dollar accounts is therefore taken as an indication that more transactions are being set and actually paid in dollars. Figure 8 shows the behavior of the ratio of demand deposits of individual residents in pesos to dollar demand deposits of residents. This ratio has fallen from a maximum 2.3 in mid-1981 to a low 0.46 in mid-1989. This last value means that only one third of all demand deposits are denominated in pesos, the rest being denominated in dollars.

From the above perspective, a meaningful survival of the
peso (other than providing for small change) requires the
implementation of conditions yielding an inflation rate similar
or even smaller than that of the competing international
currencies, at present represented by the US dollar. Such an
objective could only be obtained through severe controls on the
rate of creation of new monetary base as well as on the rate of
monetary substitutes such as remunerated Central Bank
liabilities.

FIGURE 8

RATIO OF DEMAND DEPOSITS IN PESOS TO DEMAND DEPOSITS IN DOLLARS
(Residents only)
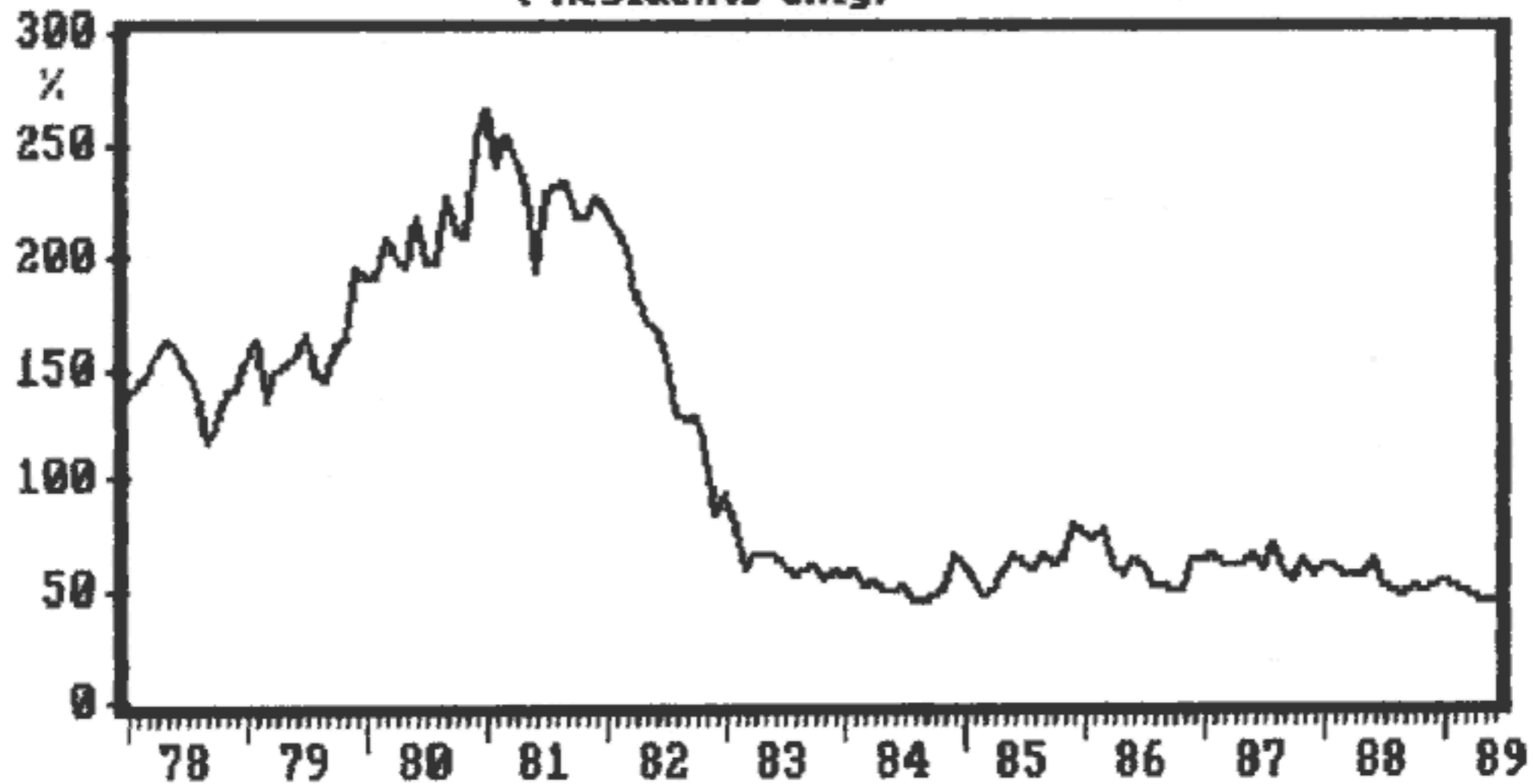
The alternative to the implementation of conditions
necessary for the competitive survival of the peso would be the
reinstallation of inconvertibility and financial regulations, a
step highly dangerous given the actual levels of dollarization of
the financial markets, both inshore and offshore, as well as the
significant size of the country's external debt. A step towards
more financial regulations would surely generate currency runs
that could hardly be stopped given the actual financial market
structure and Reserve levels.

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II. Inflation and the Revenue from Money Creation
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The revenue from money creation is derived from the ability
of the monetary authorities to issue non-interest bearing
liabilities, or Monetary Base. Normally, such liabilities include
two main items:

> (1) Currency in the hands of the public and Banks
>   vaults, and
>
> (2) Reserve Requirements on the Deposits at Commercial
>   Banks.

It has become customary in high inflation countries to
first seek for new ways of financing by raising the level of
reserve requirements on banks. This action is equivalent to
raising the demand for Base money and therefore provides for a
temporary way of non-inflationary financing. However, the
intermediation costs of banks are now raised and they are forced
to raise the spread between the borrowing and lending rates. The
deficit is therefore initially financed with the equivalent of a
tax on financial intermediation. The higher intermediation costs
generate pressures that eventually end with the Central Bank
remunerating all or part of the Reserve Requirements. At this
stage we cannot distinguish between a remunerated Reserve
Requirement and any other type of remunerated public debt. There
are however two distinguishing features:

(i) Contrary to Public Debt, Reserve Requirements are
compulsory investments and,

(ii) In the event of a fall in demand for bank deposits (a
currency run) the Central Bank is forced to print notes to
recover those forced investments at par value and therefore to
feed the run.

In some instances, Central Banks resort to issue voluntary
interest earning debt that is placed mostly with the Commercial
Banks. At other times, forced investments, not linked to deposits
levels, are imposed on Commercial Banks. Either voluntary or
mandatory, proportional or independent from deposit levels, these
investments are to be considered as Central Bank debt and not as
standard Monetary Base for the purposes of computing the revenue
from money creation. They can be viewed as potential sources of
money creation if the Central Bank is forced to print money
(base) in order to pay for them. The fact is, however, that
usually the interest on the interest earning liabilities of the
Central Banks are paid by rolling over those liabilities.

In some countries in the LA region, most of the deposits of the public at commercial banks have as counterpart Central Bank debt that is served by issuing more of such debt. To the extent that there is no real assets counterpart to these deposits, the system is technically bankrupt but able to be kept alive if all depositors are willing to roll-over the principal plus interest on their deposits. Such a system is highly unstable because it is bound to collapse in the face of even minor deposits withdrawals. When that happens the Central Bank is forced to rescue its debt with newly printed money and the up to then repressed inflation takes place. Recent measures taken in Argentina and Brazil regarding the forced refinancing of banks deposits had the aim of breaking this mechanism.

Uruguay is not immune to the problem described above. There are several channels through which the BCU borrows from the financial system. The number one channel is through the operations with the Banco de la Republica(BROU). Legally speaking, the BROU and the BCU are not part of government but autarchyc institutions and as such one cannot regulate the other. In practice this means that the BROU does not have to comply with the regulations regarding mandatory reserve requirements. However, BROU keeps significant deposits at the BCU, both in pesos and in dollars, all of which carry a competitive interest rate (85% annual as of the first quarter of 1990 for the peso deposits). At this point we turn to a description of the balancesheet of the BROU for October 1989 in order to get a clear view of the several transactions involved between BCU and BROU.

Table 1 shows the Assets and Liabilities of BROU reconstructed from information provided by the BCU. The first fact that can be appreciated is that BROU is not an exemption to the general pattern of dollarization of the economy. Out of a total stock of monetary liabilities of 1.076 billion N\$ (equivalent to 1.5 billion dollars), 80% are funded in dollars and only 20% corresponds to peso deposits. Furthermore, practically all of the peso deposits are relent to the BCU: of the 213 billion N\$, 212 billion N\$ are deposited at the BCU as of October 1989.

Dollarization is also present at the level of the granting of credit by public institutions such as BROU. Only 37 of all credit to the private sector granted by BROU is denominated in N\$, the rest being denominated in dollars. Such ratio is even lower for the private commercial banks that lend to the private sector in N\$ only 16.5%, the rest being in dollars. The exemption is Banco Hipotecario where the totality of credit to the private sector is

denominated in N$. Out of the total credit to the public sector, including credit from private banks, BROU and BHU, a share of 44.4% was granted in N$ and the rest was granted in dollars as of September 1989.

What is being observed, in practice, is that the BCU uses the BROU to conduct the equivalent of open market operations on its behalf: in order to restrict liquidity from the system, the BROU raises deposits from the public and sterilizes them by depositing them at the Central Bank. The same result would have been obtained if the BROU had relent the money and the BCU had floated a new bond for the same amount. This coordinated behavior between BCU and BROU makes difficult to predict the value of the money multiplier since the ratio of reserves to deposits for one of the largest participants, the BROU, really becomes a policy variable and not a predetermined constant like it is for the rest of private banks.

Strengthening of the peso requires, among other things, a clear and predictable monetary rule. Such objective could hardly be achieved when the Central Bank is involved in a policy of liabilities management that requires the roll over of a large fraction of interest earning liabilities, including those held by the sister institution BROU. Predictability of monetary policy would be much enhanced if the BCU were to be capitalized so that all its interest earning liabilities were to be assumed by the Treasury (as it was recently done in Chile) and be precluded from getting further into debt, implying that all open market operations should be conducted with assets and not through the issuance of liabilities (as it is the case with the US Federal Reserve). In addition, steps should be taken so that the BROU is restricted to operate as a standard commercial bank, subject to the regulation of the monetary authority, in particular with respect to the fulfillment of regulations concerning reserve requirements.

TABLE 1: ASSETS AND LIABILITIES OF BROU
(October 1989)

ASSETS
========

INTERNATIONAL RESERVES:	228357 (15.24%)
CREDIT TO PUBLIC SECTOR NON-FINANCIAL:	37487 (2.50%)
CASH IN VAULT:	32051 (2.14%)
DEPOSITS IN N$ AT BCU:	212027 (14.15%)
DEPOSITS IN DOLLARS AT BCU:	183457 (12.23%)
OTHER INTERBANK OPERATIONS:	19979 (1.33%)
CREDIT TO PRIVATE SECTOR:	785272 (52.40%)

IN N$: 290630 (37%)

IN DOLLARS: 494642 (63%)

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TOTAL ASSETS= LIABILITIES: 1498630 (100.00%)
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LIABILITIES
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DOLLAR DEPOSITS:	862532 (57.55%)
PESO DEPOSITS:	213751 (14.26%)
NET WORTH AND OTHER:	422346 (28.19%)

Interest earning peso deposits of BROU at BCU are not the only instrument used to sterilize issues of high powered money. In addition the BCU resorts to issuing Letras de Regulacion Monetaria (Monetary Regulation Bills) as a direct mechanism for regulating the stock of liquidity.

Table 2 shows the composition of the Monetary Liabilities of the Central Bank as of November 1989. Out of the total peso liabilities, only 42.1% are not remunerated and could be considered as High Powered Money for the purposes of computation of the revenue from money creation. The other 58% of peso liabilities may be considered as BCU interest earning debt. Such debt is mostly held by the BROU and represents potential money creation in the case of a run against the bank's deposits. The service of interest on this debt should be considered as part of the operational losses of the BCU and incorporated into the deficit of the Consolidated Public Sector. The fact is, however, that the service of the Monetary Regulation Bills is included in the computation of the "parafiscal" deficit but not the interest accrued on BROU deposits. A uniformity of criteria in this respect would provide a more clear meaning to the concept of "parafiscal" expenditures. The fact that a debt may be more or less automatically rolled over is not enough argument to ignore its existence as it is actually being done with the accrued interest on the BROU deposits at the BCU.

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TABLE 2

BCU: COMPOSITION OF MONETARY LIABILITIES DENOMINATED IN PESOS

	MONETARY BASE		INTEREST EARNING		TOTAL	Share of
	Currency	Deposits	Bills	Deposits BROU		Base in Total
	========	========	======	========	======	=====
1984	16.90	1.24	2.03	7.86	28.0	64.7%
1985	29.60	3.75	4.26	20.87	58.5	57.0%
1986	61.10	2.24	19.16	28.11	110.6	57.3%
1987	104.90	5.24	29.26	61.90	201.3	54.7%
1988	158.60	11.17	62.04	122.70	354.5	47.9%
1989*	218.90	17.32	91.40	233.90	561.5	42.1%

Billions of N$, end of year data.
* As of the end of November 1989.

Source: BCU Bulletin.

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The data of Table 2 also show that the amount of interest earning liabilities of the BCU is growing as a fraction of its total peso liabilities. As time passes, less of the peso system is based on non-interest earning high powered money and more on remunerated Central Bank debt. As the ratio of BCU interest earning liabilities grows, the ability of the BCU to collect inflation tax is reduced. In the limit, as all of the peso liabilities of the Central Bank pay interest, the economy would converge to a system of interest earning money, one where there could be inflation but where there is no room for the inflation tax. In such a system, the interest paid on money would be paid by issuing more money and the rate of money creation, and inflation, would be undetermined. The data in Table 2 show that Uruguay is rapidly converging to such a system with the additional complication that the demand for pesos is also falling as dollarization proceeds.

The Velocity of circulation of the non-interest earning monetary base has sistemativally increased during the last 15 years, and as of 1989 it has a value of 26 meaning that the monetary base is barely 3.8% of GDP.

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INCOME VELOCITY OF THE MONETARY BASE

Year	Value
1975	15.79
1976	13.63
1977	14.97
1978	14.55
1979	19.38
1980	18.84
1981	17.70
1982	17.67
1983	17.34
1984	21.67
1985	20.95
1986	21.68
1987	23.24
1988	23.49
1989	26.09

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An additional complication is due to the fact that the
monetary liabilities of the BCU have been growing much faster
than the demand for domestic money (measured by M2= Currency
plus demand and time deposits and Savings accounts of the private
sector). As of November 1989, the peso liabilities of the BCU
represent 81% of the value of M2. That same ratio was only 46% in
1977. This trend indicates that the backing of the peso money
supply is gradually shifting away from real assets and into
Central Bank debt. Of course, the BCU debt may have a good real
asset as collateral, such as the stock of international reserves.
The possibility of using the international reserves of the BCU to
rescue its internal debt denominated in pesos is an issue that
has not yet been subject to debate. There are discussions about
using reserves to repurchase external debt, but such an operation
would leave the remaining peso system (M2) without any real
backing to sustain it in case of a sudden portfolio shift that
would possibly include a fall in the demand for the BCU
remunerated peso debt.

    It is likely that stopping the ongoing dollarization process
will require instrumenting an inflation rate similar or smaller
than that of the dollar and conditions guaranteeing that such
rate will be sustainable over time, e.g. guaranteeing that there
will be no surprise devaluations. Among such conditions is the
backing of the remaining peso money supply. Credibility will be
much higher if the stock M2 is backed by good private sector real
assets or Reserves than if it is backed by government paper whose
interest will be served with the produce of future fiscal
surpluses. In that context, fiscal surpluses are essential for
the sustainability of the system, but the existence of actual
real assets backing the stock of money is the crucial factor in
determining the confidence in the peso.

    The Uruguayan capital markets were extremely disturbed by
the events in 1982 and have not recovered since. Other later
developments, like the Law of mandatory refinancing of bank loans
in 1985, or the official intervention of the only three remaining
national banks did not help in the recovery. It is our
hypothesis that the fall in money demand and all forms of
financial intermediation in pesos has more to do with a once and
for all step forward in the dollarization process rather than
with an increase in the standard measures of the opportunity cost
of holding pesos (nominal interest rates or inflation rates).
Our empirical estimates indicate a fall in demand for M1 held by
the private sector of around 20% since 1983 that is not accounted
for by changes in interest rates or level of economic activity.
On the other hand, the shift away from interest earning peso
deposits and into dollar deposits does not show signs of
stopping, as it can be seen in Figure 5.

The rate of decrease in demand for M1 seems to have stopped after the significant fall of 1983. Since then it recovered slightly up to 1987 and then it continued falling until present. However, the post 1983 changes in money demand can be accounted for by changes in interest rates and economic activity. Pending any other unexpected shift in money demand, that cannot be predicted with conventional analysis, it is possible to predict what will happen to real money demand given various levels of interest rates, inflation and economic activity. Such predictions, however, necessarily must be made within values not far from what has been observed in recent years. The danger of further structural change in response to modifications in the cost of holding pesos is ever present given the high degree of dollarization already reached. A sudden devaluation or inflationary outburst may induce a whole new set of transactions to become dollarized in a process that is not likely to be reversed.

The actual revenue from issuance of non-interest earning monetary base is shown in Table 3 as a percentage of GDP, as well as the corresponding inflation rates. The revenue figure was computed by calculating the monthly value of changes in nominal base, dividing them by the value of the dollar and adding these amounts over the 12 months of the year. We thus get an estimate of the dollar value of the revenue for the full year. Such value is then divided by the dollar gdp of the same year.

The last two lines in Table 3 show the average revenue and inflation rate for the five year period 1976-80 and 1985-89. We have purposely left out the period 81-84 since this is a period of sharp oscillations in financial markets that eventually resulted in the abandonment of the Tablita regime and the dollarization of a whole new set of transactions. It is clear that the ability to raise revenue from money creation has decreased in the second five year period: while in 1976-80 the inflation rate was 53.1%, the revenue reached on average 2.92% of GDP. In the later period, 1985-89, the inflation rate was raised to 71.8% and the average revenue fell to 2.37% of GDP.

There are two possible interpretations to the above result. One is the conventional view that as inflation raises, the base of the inflation tax (real Money) falls so that after a certain level, higher rates of inflation are associated with less revenue. In this view, Uruguay would have shifted to the right hand segment of the Laffer Curve, the bell-shaped relation linking inflation rate and revenue form such inflation. If this were to be the situation, more revenue could be obtained by

simply reducing the rate of monetary creation and therefore the
inflation rate. We do not feel this is, however, the case.
Rather, we find evidence that a fall in the demand for money took
place in 1983 that is not associated with the higher inflation
rate experienced since then but rather with an increase in the
level of dollarization of the economy as a result of a whole new
set of transaction that were permanently shifted from pesos into
dollars.

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TABLE 3

INFLATION RATE AND THE REVENUE
FROM INFLATION AS % OF GDP

	REVENUE AS % OF GDP	INFLATION RATE IN CPI
	=======	=========
1976	3.64	39.9
1977	2.53	57.3
1978	3.24	46
1979	2.53	83.1
1980	2.65	42.8
1981	0.88	29.4
1982	0.10	20.5
1983	1.08	51.5
1984	1.61	66.1
1985	2.81	83
1986	2.98	70.6
1987	2.37	57.3
1988	1.75	69
1989	1.95	80.3
AVG.1976/80	2.92	53.10
AVG.1985/89	2.37	71.80

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We now proceed to the empirical estimation of the demand
for money function in order to establish what part of the changes
in the revenue from money creation are due to the traditional
factors such as inflation and level of economic activity and
which are due to exogenous modifications in the level of
dollarization of the economy.

III. Estimation of the Money Demand Function
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        As mentioned before, the revenue from money creation comes
from the issuing of non-remunerated monetary base by the Central
Bank. Such revenue may be used to finance the BCU's own
operational losses or the deficit of the rest of the public
sector.

        In determining the relation between the inflation rate and
the deficit that could be financed by printing Base money it is
necessary to quantify the structural relation linking the real
demand for Base money and the variables determining it, among
them the rate of inflation, the real interest rate, real income
and the structure of reserve requirements. We will proceed by
estimating the real demand for M1 by the public (both the Base
and M1 share in common the Currency in circulation) and estimate
the demand for Base as directly proportional to M1 under the
assumption that the present structure of reserve requirements
will remain constant. Such relation is mostly affected by changes
in the relative amount of Time Deposits to the extent that part
of Base money is held on account of reserve requirents on Time
deposits.

        Figure 9 shows the evolution of the ratio of Base money to M1
held by the public. It is clear that this ratio experienced wide
fluctuations that were directly associated with changes in the
amounts of Time Deposits(as in 1979-82 when TD increased
relatively) or in the rates of Reserve Requirements. Since 1985
this ratio has remained relatively stable around 90%, a value we
shall use in projecting the revenue form money creation.

FIGURE 9

RATIO OF BASE MONEY TO M1 HELD BY THE PUBLIC
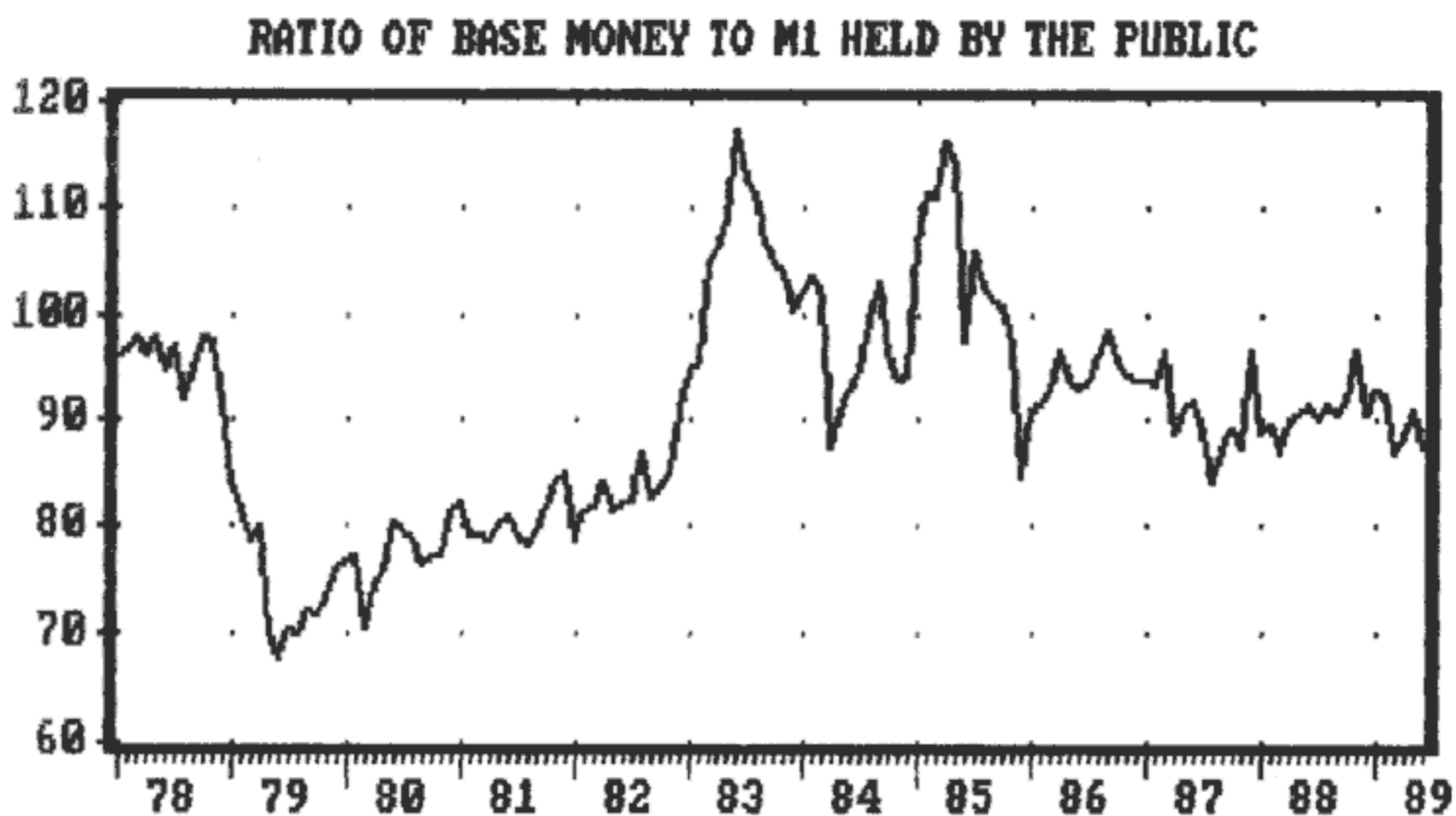
        In estimating the demand for M1 we have used quarterly
data for the period 1975.3 1989.2.   Nominal M1 is equal to
Currency outside Banks plus Demand Deposits of the Public. Real
M1 is M1 deflated by the Consumer Price Index. All quarterly
figures are averages of monthly data. The opportunity cost of
holding M1 is measured by the nominal interest rate that could be
obtained on time deposits. The level of economic activity is
measured by quarterly data on real GDP. All data comes from the
Statistical Bulletin of the BCU.

        Other studies of money demand have also used expected
inflation rates as measures of the cost of holding M1. Inflation
will be more relevant than the nominal interest rate if this last
variable were controlled at levels yielding arbitrarily negative
real values. Since 1974 this has not been the case in Uruguay
were nominal interest rates are market determined, although the
state owned Banco de la Republica has a leading role in the
determination of peso interest rates. We have not detected
attempts by this Bank, however, at keeping nominal interest rates
widely out of line with what would be determined by market
forces. In fact, given the widespread dollarization of the
financial system, any attempt to systematically pay negative
interest rates in dollar terms (peso rates smaller than expected

devaluation) would be an invitation for the final collapse of the peso system. It can be appreciated in Figure 6 that the dollar interest rate earned on peso deposits has had a tendency to be positive most of the time with the most obvious exemption of late 1982.

The compound equivalent dollar interest rate earned on peso deposits was 7.15% for the four year period 1985-88. On the other hand, the same nominal rate deflated by the CPI yields a real rate of -1% annual for the same four year period. The difference between the dollar rate and the real peso rate is explained by the existence of dollar inflation (not much in those years) and a slight rate of fall in the real exchange rate vis-a-vis the dollar.

FIGURE 10

ACCUMULATED REAL VALUE OF AN INTEREST EARNING TIME DEPOSIT
DENOMINATED IN N$ (Deflated by CPI)
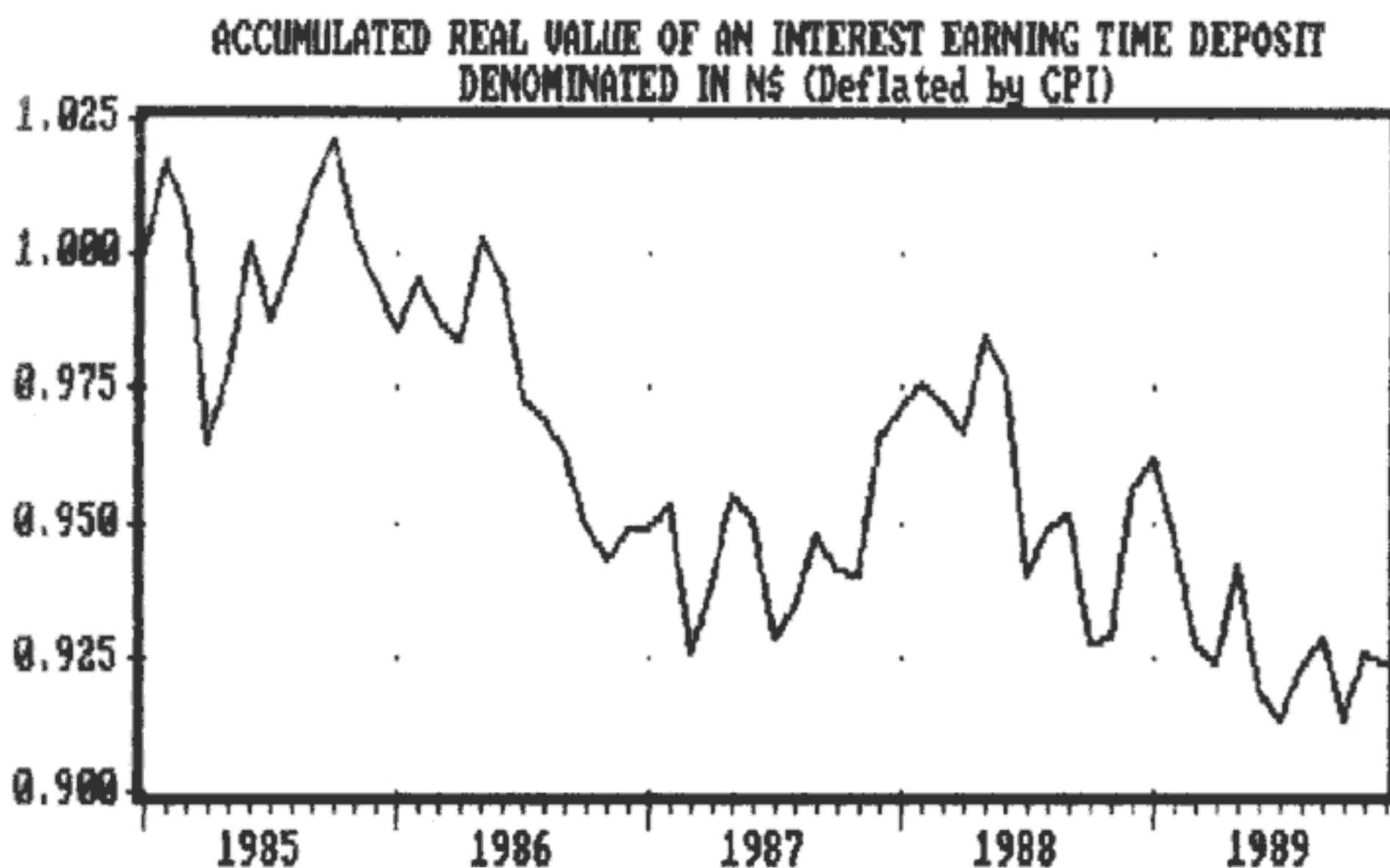
From inspection of the data it was clear that a significant shift in money demand had taken place around the time the Tabla Cambiaria was abandoned. It is clear that from 1983 onward money demand was much lower   than in previous periods by an amount that could not be accounted for by increases in the opportunity cost of holding money. Such a shift can be captured by a Dummy variable taking the value of unity for 1983 onward and zero for all previous periods. Best results with this variable take place when the timing of the shift is placed as of the second quarter of

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1983. Even though the abandonment of the Tablita and the sudden devaluation took place in December 1982, the structural fall in demand for money showed later probably because of seasonal factors (summer season in January and February) and the fact that the system operates regularly on a 90-days basis.

The structural form tested for the demand for money is as follows:

(1) $Log(M1/P) = b0 + b1*DUMMY + b2.INT + b3.Log(GDP)$

The variable DUMMY takes the value of zero before 1983.2 and unity after this quarter. The constant term before and after the shift in money demand is b0 and b0+b1.

Equation (1) has been tested for the period 1975.3-1989.2. The
estimations were made using alternatively OLS and TSLS as well
as correction for serial correlation of residuals using either an
AR(1) or an MA(1) method. Table 4 reports the values for the
coefficients under the different estimation methods.

TABLE 4

ESTIMATES OF MONEY DEMAND FUNCTIONS

$Log(m1) = B0 + B1*DUMMY + B2.INT + B3.Log(GDP)$

	R1	R2	R3	R4
B0	-1.7589 (-2.41)	-1.9405 (-4.78)	-1.6166 (-2.16)	-2.2545 (-7.12)
B1	-0.2377 (-8.11)	-0.2740 (-11.08)	-0.2227 (-5.84)	-0.2590 (-14.03)
B2	-7.9276 (-4.99)	-7.2741 (-5.21)	-10.3741 (-3.81)	-8.8334 (-8.13)
B3	0.5432 (3.45)	0.5823 (6.51)	0.5311 (3.31)	0.6601 (9.52)
AR(1)	0.6638 (5.38)	------	0.6154 (5.03)	------
MA(1)	------	0.5977 (4.23)	------	0.5859 (4.15)
Method	OLS	OLS	TSLS	TSLS
R2 Adj.	0.96	0.94	0.96	0.96
F Stat.	394	233	365	389
Period	1975.3/ 1989.2	1975.3/ 1989.2	1975.4/ 1989.2	1975.3/ 1989.2
D-W.Stat	1.65	1.98	1.50	1.71

INSTRUMENTS: C INT(-1) INT(-2) LOG(GDP) INFLATION(-1)   DUMMY

In all cases the estimates show a significant downward shift in the money demand function from 1983.2 onward. The value of the shift (given by the coefficient B1) ranges from 0.22 and 0.27 in logarithmic terms (equivalent to an algebraic fall between 19.7% and 23.6%). While all Regressions yield highly significant statistical results, the best appear to be those of R4 using a MA(1) and TSLS estimation method. We shall use the results of R4 for the purposes of estimating the revenue from money creation under alternative inflation rates.

IV. Projecting the Revenue From Money Creation

There are two sources for the revenue from money creation:

(1) The SEIGNORAGE derived from providing the extra amounts of non-interest bearing money that the market demands as a result of the real growth of the economy.

(2) The INFLATION TAX derived from providing the market with the extra non interest bearing money the market demands in order to replenish the real value of the stock on account of the fact that the purchasing power of such money is being continually depleted by inflation.

Denoting by g and π to the real growth rate and the inflation rate, and by m to the real amount of non-interest earning base money, the revenue from money creation (R) is defined as:

(1) $R = (\pi + g.\epsilon).m$,

where ϵ is the output elasticity of the demand for base money. If the rate of nominal rate of expansion of Base Money exceeds the amount $(\pi + g.\epsilon)$, the supply of base Money would be increasing more than the demand for it and the result will be either further inflation or losses of international reserves. As reserve losses can only be considered as temporary, we shall assume that the rate of inflation will be basically determined by the difference between the nominal rate of monetary expansion and the increase in the real demand for it (the seignorage, equal to the term $g.\epsilon$).

A higher rate of inflation implies higher collection of the inflation tax on the account of a higher tax rate but lower collections on account of the fact that the base of the tax, m , is bound to depend negatively on the rate of inflation. The elasticity of money demand with respect to the rate of inflation

thus becomes the crucial element in calculating the returns from money creation at alternative inflation rates.

According to Regression R4 in Table 4, the long run demand for money is of the form:

$$Ln(M/P) = -2.51358 - 8.83341*Interest + 0.660078*Ln(GDP)$$

We shall assume that the interest rate is formed according to the rule: Interest = Real Rate + Inflation

In the simulations it has been assumed that the Real Interest Rate remains at the monthly value of 0.4867% , equivalent to a real rate of 6% per year. It is also assumed that the Non-Remunerated Monetary Base is 0.9 times the estimate of Nominal Money Demand (that corresponds to M1).The base of the inflation tax is therefore:

BASE = 0.9*M

The dollar revenue from the issuance of BASE is:

$$Rev.= (P/E).(INF+ \epsilon.g)*0.9*(M/P)$$

For the actual projections, we have used the P, E and GDP values prevailing in the second quarter of 1989. Those values are:

P= 176150.7 (seasonally adjusted CPI)

GDP =112.1819

E = 558.33

After substituting for the estimated parameters from the money demand function, the dollar revenue becomes:

$$Rev. = 283.94*(INF + 0.660078*g)*EXP\{ 0.602068 - 8.83341*INF\}=$$

$$= 518.44*(INF + 0.660078*g)* EXP(8.83341*INF)$$

Since we have been using monthly interest rates in the estimation, the revenue derived above corresponds to millions of dollars per month. Annual revenue as a function of annual GDP requires to multiply monthly revenue by twelve and divide it by dollar GDP, that is estimated at 8413 million dollars as of 1989. The final expression for revenue as a function of GDP is:

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Rev/GDP = 0.73948*(INF + 0.660078*g)* EXP(-8.83341*INF) ,

where the INF and growth rates are the monthly rates in algebraic value, eg.0.05 equals 5% per month.

The maximum revenue takes place at the value

INF* = (1/8.83341)-0.660078*g.

For a value of g=0.005 (corresponding to a growth rate of 6.2% annual), the inflation rate yielding the maximum revenue is:

INF* = 0.11 or 11% per month.

The revenue associated with INF* is:

REV*/GDP = 0.0305 , or 3.05% of annual GDP.

Table 4 shows REV/GDP under alternative assumptions regarding inflation and growth rates.

It is concluded from the estimations that the revenue from money creation is a limited, albeit significant source of revenue. The maximum that can be collected with a stable rate of inflation stays around 3.0% of GDP for average growth rates of GDP but this revenue implies annual inflation rates of the order of 260% that are unlikely to be desired as a policy target.

Actually, the revenue curve flattens very fast after inflation rates higher than 40 or 50%. At 50% inflation, the revenue stays at around 1.9% of GDP for reasonable growth rate of 4%. The gain of increasing inflation to the maximum revenue rate of 260% is to bring revenue to around 3.0% of GDP. This means that bringing inflation up from 50% to 260% annual only increases revenues from money creation by one percent of GDP. The elasticity of revenue from money creation as inflation changes can be appreciated by the simulation shown in Figure 11, using assumed values of 6% annual for the real interest rate and the growth rate.

TABLE 4

REVENUE FROM MONEY CREATION AS % OF GDP

ANNUAL NFLATION RATE	ANNUAL GROWTH RATE (%)										
	0	1	2	3	4	5	6	7	8	9	10
0	0.00	0.04	0.08	0.12	0.15	0.19	0.23	0.26	0.30	0.34	0.37
2	0.12	0.15	0.19	0.23	0.27	0.30	0.34	0.38	0.41	0.45	0.48
4	0.23	0.26	0.30	0.34	0.37	0.41	0.45	0.48	0.52	0.55	0.59
6	0.33	0.37	0.40	0.44	0.48	0.51	0.55	0.58	0.62	0.65	0.69
8	0.43	0.47	0.50	0.54	0.58	0.61	0.65	0.68	0.71	0.75	0.78
10	0.53	0.56	0.60	0.63	0.67	0.70	0.74	0.77	0.81	0.84	0.87
12	0.62	0.65	0.69	0.72	0.76	0.79	0.83	0.86	0.89	0.93	0.96
14	0.71	0.74	0.78	0.81	0.84	0.88	0.91	0.95	0.98	1.01	1.04
16	0.79	0.82	0.86	0.89	0.93	0.96	0.99	1.03	1.06	1.09	1.12
18	0.87	0.90	0.94	0.97	1.01	1.04	1.07	1.10	1.14	1.17	1.20
20	0.95	0.98	1.01	1.05	1.08	1.11	1.15	1.18	1.21	1.24	1.27
22	1.02	1.05	1.09	1.12	1.15	1.19	1.22	1.25	1.28	1.31	1.34
24	1.09	1.13	1.16	1.19	1.22	1.25	1.29	1.32	1.35	1.38	1.41
26	1.16	1.19	1.23	1.26	1.29	1.32	1.35	1.38	1.41	1.44	1.47
28	1.23	1.26	1.29	1.32	1.35	1.38	1.41	1.45	1.48	1.51	1.54
30	1.29	1.32	1.35	1.38	1.41	1.44	1.48	1.51	1.54	1.57	1.59
35	1.43	1.47	1.50	1.53	1.56	1.59	1.62	1.65	1.67	1.70	1.73
40	1.57	1.60	1.63	1.66	1.69	1.72	1.74	1.77	1.80	1.83	1.86
45	1.69	1.72	1.75	1.77	1.80	1.83	1.86	1.89	1.92	1.94	1.97
50	1.80	1.83	1.85	1.88	1.91	1.94	1.97	1.99	2.02	2.05	2.07
60	1.99	2.02	2.04	2.07	2.10	2.12	2.15	2.17	2.20	2.23	2.25
80	2.28	2.31	2.33	2.36	2.38	2.40	2.43	2.45	2.48	2.50	2.52
100	2.49	2.51	2.54	2.56	2.58	2.60	2.63	2.65	2.67	2.69	2.71
150	2.79	2.81	2.83	2.85	2.86	2.88	2.90	2.92	2.94	2.96	2.97
200	2.91	2.93	2.94	2.96	2.98	2.99	3.01	3.03	3.04	3.06	3.07
250	2.95	2.96	2.98	2.99	3.01	3.02	3.04	3.05	3.06	3.08	3.09
262	2.95	2.96	2.98	2.99	3.01	3.02	3.03	3.05	3.06	3.07	3.09
300	2.94	2.95	2.97	2.98	2.99	3.01	3.02	3.03	3.04	3.06	3.07
400	2.86	2.87	2.88	2.89	2.90	2.92	2.93	2.94	2.95	2.96	2.97
500	2.75	2.76	2.77	2.78	2.79	2.80	2.81	2.81	2.82	2.83	2.84

FIGURE 11

REVENUE FROM MONEY CREATION
(In % of GDP)
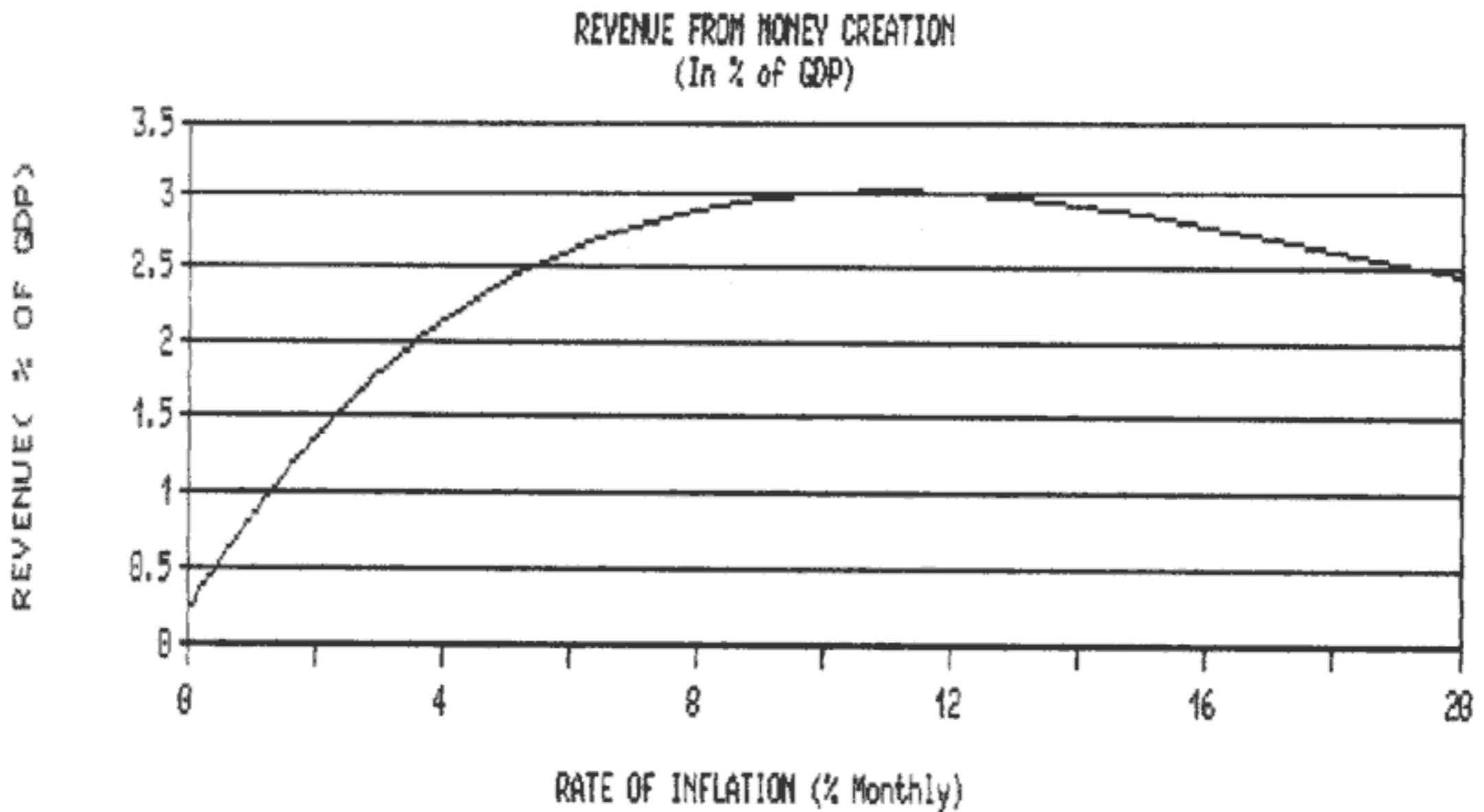
V.The Fundamental Determinants of Inflation
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    The previous analysis indicates that there is a clear
association between the rate of inflation and the rate of
expansion in the nominal money supply, the demand for money
previously estimated being the link between both variables.
Explaining inflation, however, still requires the identification
of the causes for the expansion in the money supply relative to
those of the money demanded. Several factors can be found in this
respect:

(1) Indexation and Passive Monetary Policy

Indexation of wages and exchange rate to past price changes induces a rigidity in relative prices that may delay the actual real adjustment and result in pressures for credit expansion in order to validate the nominal increases allowed by the indexation clauses. Since 1985 nominal wages measured in constant U$S dollars (nominal wages converted into dollars and deflated by the US CPI= W/(E.P*)) have increased by about 58% (January 1985 through Dec.1989). Such a rate of increase is clearly unsustainable but it can partly be explained by decomposing the increase in dollar wages into changes in real wages and in the Real Exchange Rate (the constant dollar wage is the ratio of these last two concepts e.g. W/EP* = (W/P)/ (EP*/P)).

Since 1985 the real wage (nominal wage deflated by the uruguayan CPI=W/P, shown in Figure 12) has increased by 31% and the real exchange rate (EP*/P, shown in Figure 13) has fallen by 17%. The combined effect is an increase in dollar wages of 58%. The 31% accumulated increase in real wages over a period of five years yields an annual rate of 5.5% that is substantially higher than the trend growth rate in per-capita GDP for the period 1960-87 of 0.9%. On the other hand, the fall of 17% in the Real Exchange Rate has to be weighted against the fact that this relative price had reached in 1985 the highest historical value having more than doubled in the previous two years (Figure 13).

It seems apparent that real wages cannot continue raising much faster than per-capital GDP and that the Real Exchange Rate cannot continue falling if an acceptable balance of trade is to be maintained. This means that nominal wages will not be able to exceed inflation by more than productivity growth and that the rate of crawl should not significantly differ from inflation (corrected, of course, by foreign inflation).

While the indexation of wages may be an element in the maintenance of the inflationary dynamics, we have found no evidence of wage pressures contributing to generate inflation. In fact, there is no significant statistical relationship between inflation and the level of real wages. On the other hand, there is some evidence that high inflation tends to lower real wages, an indication that the indexation mechanism is less than complete. As reported in Table 5, current and and up to six months lagged real wages are unrelated to current inflation. On the other hand, past values of inflation are shown to affect negatively the level of the current real wage.

TABLE 5
INFLATION AND REAL WAGES

DEPENDENT VARIABLE	INFLATION	REAL WAGE
	============	============
Constant	4.741	102.67
	(2.12)	(19.4)
Coefficients of	Real Wages	Inflation
Lag 0	0.00647	0.0842
	(0.3)	(0.60)
Lag 1	0.00385	-0.000
	(0.26)	(-0.00)
Lag 2	0.00123	-0.0857
	(0.16)	(-0.78)
Lag 3	-0.0014	-0.1707
	(-0.42)	(-1.63)
Lag 4	-0.0040	-0.2557
	(-0.50)	(-2.37)
Lag 5	-0.0064	-0.3407
	(-0.44)	(-2.89)
Lag 6	-0.0092	-0.4257
	(-0.42)	(-3.18)
========================		
SUM of Lagged Coeff.	-0.00978	-1.1951
	(-0.42)	(-1.63)
AR(1)	0.280	0.938
	(3.86)	(33.0)
R2 Adj.=	0.068	0.868
SAMPLE =	1976.01/1989.12	1976.01/1989.12

Lagged coefficients were estimated using Linear Polynomial
Distributed Lags. T-Values in parenthesis.

FIGURE 12

AVERAGE REAL WAGE INDEX
(1975.01=100)

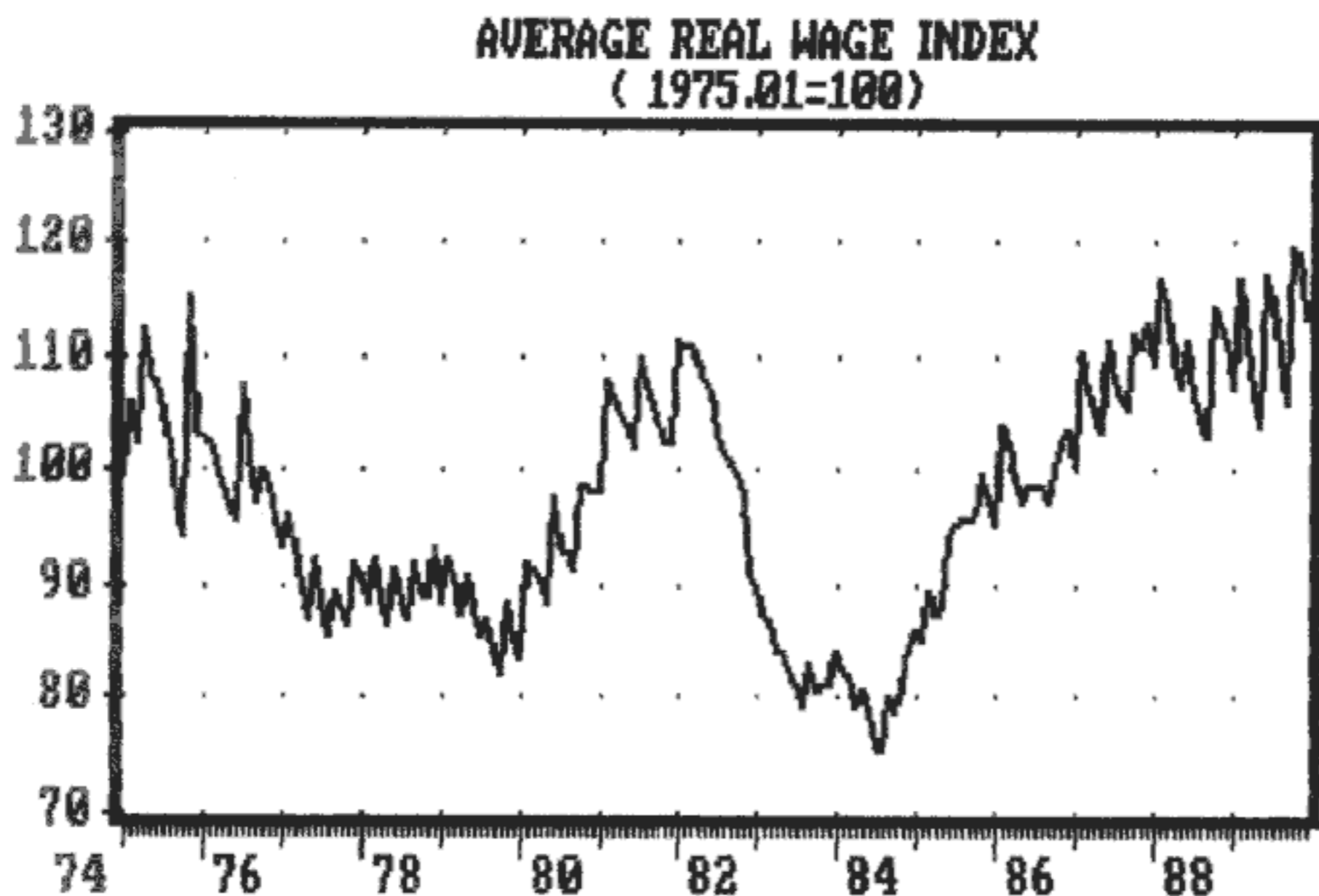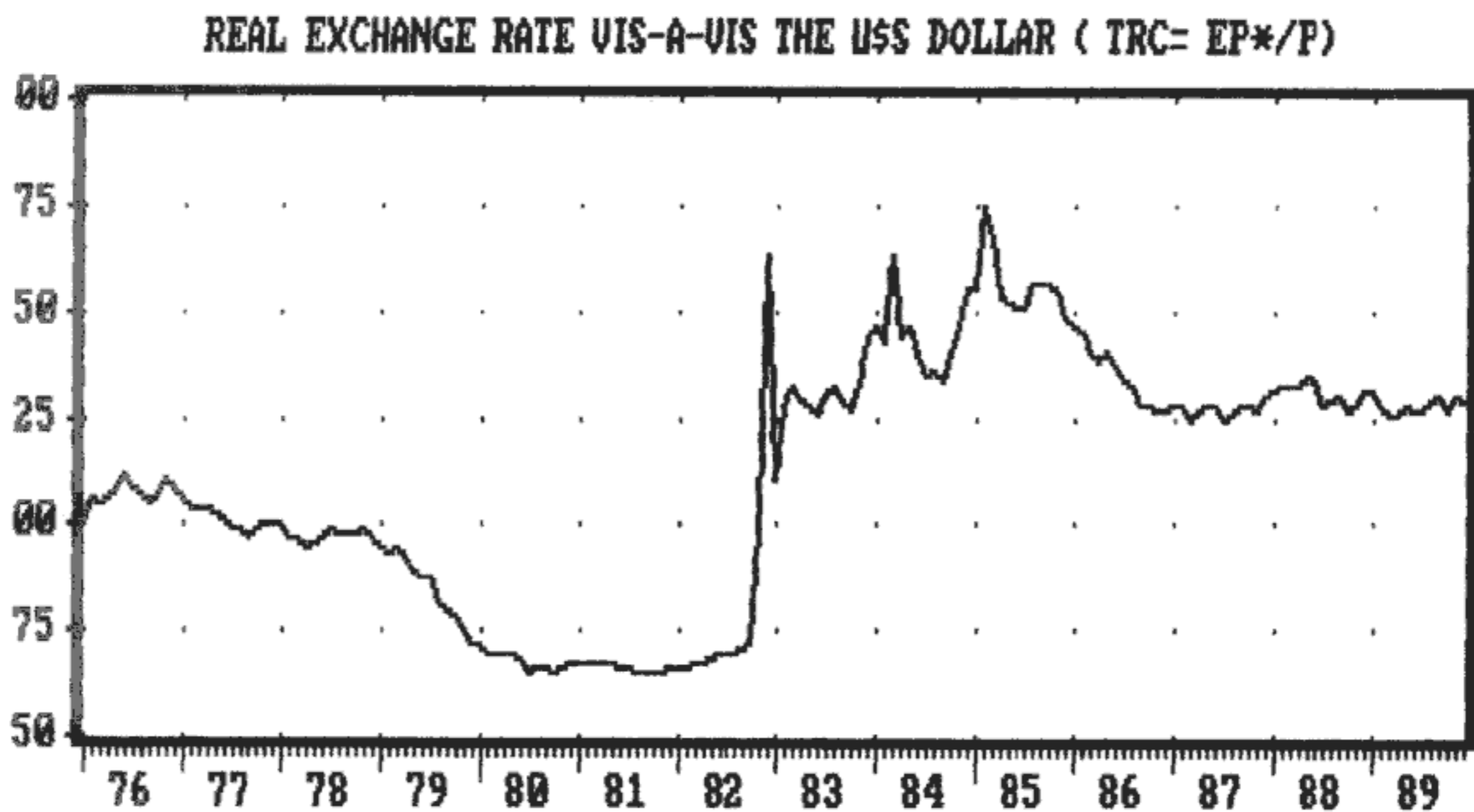FIGURE 13

REAL EXCHANGE RATE VIS-A-VIS THE US$ DOLLAR (TRC= EP*/P)

There are other real factors that may have either temporary or permanent effects on inflation in the event the monetary authorities follow a passive monetary policy. Beef prices and devaluations are usually blamed with setting up inflationary pressures that are compounded by the indexation mechanisms and eventually validated by the monetary authorities with a larger rate on money creation.

We have detected a strong short run correlation between inflation and the relative price of agricultural products (that includes beef as one of the main components). A 10% permanent increase in the relative price of agricultural products(in terms of the CPI) is associated with an increase in the inflation rate of 7.7% in the first quarter. After two quarters the effect on inflation of the still higher relative price is 14.7%. The raise in inflation continues for 6 quarters reaching a high rate of 34.1%. After six quarters, the inflation rate starts falling and at the end of the third year (12 quarters) the net effect of the higher relative price of agricultural products on inflation is zero. The magnitude of the coefficients of the relative price of agricultural products on inflation is shown in Table 6. Those coefficients were obtained from a regression of inflation on a Polynomial Distributed Lag structure on the logarithm of the relative price of agricultural products

From Table 6 we see that a permanent increase in the Log.of the relative price of agricultural products (LPAPC: logarithm of the wholesale level of agricultural prices deflated by CPI) has a negligible effect on inflation only after 12 quarters. Up to that point, however, the net effect is positive. Clearly this indicates that the monetary authorities tend to validate for quite some time the inflationary pressures derived from a change in agricultural prices (of which meat is a significant component). The accommodation is not permanent, however, as the inflationary effects of the higher relative price are shown to converge to zero after three years.

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TABLE 6: Relation between inflation and relative agricultural
prices.

INF = 3.81 + SUM(Ai*LPAPC(t-i))
      (0.9)
AR(1) : 0.14
R2 ADJ.:0.32
Sample Period: 1978.I-1989.II
Method of Estimation: OLS with a quadratic PDL on LPAPC.

Lag Distribution of LPAPC	Lag	Coef	S.E.	T-Stat
: *	0	0.77074	0.69021	1.11668
: *	1	0.70798	0.45472	1.55696
: *	2	0.62710	0.28308	2.21527
: *	3	0.52810	0.20026	2.63706
: *	4	0.41099	0.20695	1.98591
: *	5	0.27575	0.23872	1.15513
: *	6	0.12240	0.25256	0.48464
*:	7	-0.04907	0.23868	-0.20559
* :	8	-0.23866	0.20686	-1.15372
* :	9	-0.44636	0.20014	-2.23030
* :	10	-0.67219	0.28299	-2.37532
* :	11	-0.91613	0.45467	-2.01492
* :	12	-1.17819	0.69020	-1.70703
0	Sum	-0.05752	2.70293	-0.02128

Even a monetarist view of inflation cannot preclude the
existence of a dynamic relationship between inflation and a set
of relative prices. The reason, as discussed in Rodriguez 1984\1/
is that the Central Bank may decide to use the revenue from the
inflation tax to purchase one particular product and therefore to
raise its equilibrium relative price for as long the purchases
are maintained. The revenue from the inflation tax may be used to
finance a policy of higher wages in the public sector or just to
acquire reserves with which to service the external debt. In this
case we will observe a raise in inflation together with an
increase in either wages or the real exchange rate.

\1/ Rodriguez, Carlos A.: "Inflacion,Salario Real y Tipo Real de
Cambio", Cuadernos de Economia, Univ.Catolica de Chile, Dec.1984.

We have found a significant statistical relationship between inflation and the real exchange rate that is consistent with the arguments elaborated above: the government may have been using the inflation tax to purchase foreign exchange and therefore we observe higher real exchange rates being associated with higher inflation. Contrary to the case of agricultural prices, the relationship in this case seems to be of a permanent nature: as long as the real exchange rate remains at the higher level, inflation also does. This result is consistent with the hypothesis that the higher real exchange rate is due to a higher rate of purchases of reserves by the monetary authorities. On the other hand, the temporary nature of the link between inflation and relative agricultural prices may have more to do with the nature of the indexation schemes and some degree of validation of price raises by a partially passive monetary policy. As time goes by, however, the initial inflationary pressures end up being diluted and eventually inflation tends to go back to its initial level.

Table 7 shows the magnitude of the coefficients of a regression of inflation on the current and lagged values of the logarithm of the Real Exchange Rate (LTRC) using a linear PDL estimation method. It can be seen that the sum of the coefficients remains positive after three years (11 quarters lag) and is statistically different from zero at the 99% level. According to the regression results, a 10% increase in the real exchange rate has been associated with a 31.9% increase in the inflation rate.

Indexation with passive monetary policy or the fact that the government may use the proceeds from the inflation tax to actually purchase certain goods (labor or foreign exchange in particular) imply that there may be a relation between inflation and certain relative prices, among which the most commonly mentioned are the real wage, agricultural prices (or beef) and the real exchange rate. Increases in any of those three crucial relative prices are usually believed to generate increases in the inflation rate. From our statistical evidence we conclude that there is no causality going from real wages to inflation (actually the relation is the opposite from what would be expected: more inflation reduces the real wage), a short term causality going from agricultural prices to inflation (lasting up to three years) and a permanent trade off between inflation and the real exchange rate(probably due to the use of the inflation tax to acquire foreign exchange reserves).

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TABLE 7: Relation between inflation and the real exchange rate.

INF= -11.09 + SUM(Ai.LTRC(t-i))
     (-2.9)

AR(1)= 0.15
R2 Adj.:0.34
Sample Period: 1978.I-1989.II
Method of Estimation: OLS wth a linear PDL.

Lag Distribution of LTRC	Lag	Coef	S.E.	T-Stat
	0	0.54508	0.20637	2.64126
	1	0.49442	0.17262	2.86423
	2	0.44377	0.14004	3.16880
	3	0.39311	0.10969	3.58387
	4	0.34245	0.08400	4.07656
	5	0.29179	0.06847	4.26182
	6	0.24114	0.07017	3.43633
	7	0.19048	0.08813	2.16143
	8	0.13982	0.11495	1.21635
	9	0.08916	0.14583	0.61141
	10	0.03851	0.17868	0.21551
	11	-0.01215	0.21258	-0.05716
0	Sum	3.19758	0.80322	3.98096

(2) Persistent trend of dollarization

     A positive trend of dollarization implies a falling real
demand for money and therefore more pressures on inflation for
the same growth rate in nominal money supply. Apparently the
demand for M1 has stabilized at a lower level following the sharp
fall of 1983. Since then the real demand for Base money has not
showed any signs of falling nor increasing. In practice, all of
the increases in real asset demand of recent years have been
devoted to dollar assets rather than pesos, as it can be
appreciated from Figures 2 through 6. This means that demand for
pesos is not likely to increase as fast as economic activity and
therefore the inflationary effects of a constant fiscal deficit
as fraction of GDP are bound to increase though time.

(3) Increased supply of assets alternative to money holdings

Deficit financing with debt increases the supply of liquid
assets that are alternatives to money holdings and reduces its
demand. In consequence, as velocity increases, the inflationary
effects of any given deficit are also increased. If the real
interest rate paid on the new debt is positive and larger than
the growth rate of the economy, debt financing today, to be
served later by printing money implies more inflation than what
would be obtained if the deficit were to be directly financed
with money creation.

(4) Fiscal Deficits

Despite of all of the factors described above, the fiscal
deficit has been the main determining factor in the inflationary
process in Uruguay. The deficit sets inflation and dollarization
in motion and then the initial shock is compounded by the
indexation schemes and the parafiscal deficit resulting from the
higher nominal interest service on the public debt.

Table 8   reports the annual figures for the deficits of the
Non-Financial Public Sector(NFPS) and the estimated Parafiscal
Deficit(PFD). The PFD includes all interest expenses of the BCU
except interest paid on the deposits of the BROU under the
assumption that these deposits are automatically rolled over. No
adjustment is made for the amortization component of interest
service when there is inflation (local or foreign).

For 1989, the PFD is estimated to have reached 3.2% of GDP
and the deficit of the NFPS a similar amount of 3.2%. Of the 6.4%
total deficit, interest payments included amount to about 4.4% of
GDP (1.8% for the NFPS and 2.6 for the Central Bank), leaving a
Primary Deficit of 2% of GDP. Real interest payments can be
roughly calculated as follows: on the internal debt assume a real
interest rate of zero for 1989 while on the foreign debt of the
Public Sector of 4300 million dollars, a conservative 5% real
rate for 1989 would add 215 million dollars or an additional 2%
of GDP. The inflation adjusted deficit for the Consolidated
Public Sector is therefore estimated at around 4% of GDP.

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TABLE 8

DEFICIT AS % OF GDP
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	NFPS	PARAFISCAL	TOTAL	GDP (Million N$)
1955	1.30	0.80	2.11	4.6
1956	-0.04	1.25	1.21	5.16
1957	0.65	1.48	2.13	6.12
1958	1.36	1.31	2.67	6.62
1959	-0.68	3.34	2.66	8.86
1960	-0.22	0.61	0.39	13.58
1961	0.98	0.49	1.47	17.28
1962	3.77	0.41	4.18	18.84
1963	2.86	0.51	3.37	22.37
1964	2.06	0.61	2.67	32.59
1965	5.14	1.52	6.67	52.51
1966	1.30	1.91	3.22	99.63
1967	3.18	2.35	5.53	169.78
1968	0.48	2.11	2.59	374.53
1969	2.51	1.77	4.28	506.07
1970	1.76	1.31	3.08	601
1971	5.82	1.11	6.93	722
1972	2.58	3.62	6.20	1242
1973	1.41	1.09	2.50	2561
1974	4.44	0.68	5.12	4546
1975	4.45	1.11	5.56	8166
1976	2.58	2.91	5.49	12638
1977	1.21	2.10	3.31	19915
1978	1.30	1.74	3.04	30930
1979	-0.21	0.06	-0.15	57625
1980	0.40	1.17	1.57	92204
1981	0.86	2.34	3.20	122453
1982	9.06	5.53	14.59	128696
1983	4.04	3.45	7.50	185006
1984	4.67	3.38	8.06	294359
1985	2.89	2.99	5.88	528152
1986	1.15	2.72	3.87	981097
1987	1.26	2.62	3.87	1753861
1988	1.89	2.39	4.28	2855324
1989	3.20	3.20	6.40	5187000

Source: "Es el Deficit Fiscal Inflacionario?" by Ariel Banda,
unpublished paper, Research department, BCU, 1989.

If the real value of the stock of public debt is to remain
constant, the 4% of GDP inflation adjusted deficit should be
financed with the inflation tax. The empirical estimates of Table
4a indicate, however, that the maximum revenue from the inflation
tax stays at 3% for a growth rate of 4% annual and it requires
an annual inflation rate of 260%. In consequence, a 4% inflation
adjusted deficit cannot be financed with the inflation tax unless
an ever growing inflation rate is accepted (hyperinflation) and
even this option does not seem possible given the likely result
of a complete dollarization of the economy. According to our
calculations, reducing inflation to a level of 10% per year
requires bringing the inflation adjusted level of the deficit to a
level of about 0.7% of GDP.

The actual result of the continuing and growing deficits is
that in recent years the government has resorted to debt
financing at rates likely to be unsustainable. Figure 14 shows
the monthly evolution of the stock of internal public debt (IPD),
a measure of the stock of interest earning debt of the Treasury
and the Central Bank that is formed by the sum of the following
items:

(i)   Treasury Bonds denominated in dollars,
(ii)   Treasury Bills denominated in dollars,
(iii) Letras de Regulacion Monetaria denominated in N$,
(iv)   Interest Earning deposits of BROU at BCU denominated in
       dollars,
(v)   Interest earning deposits of BROU at BCU denominated in N$.

Since 1983 the items in IPD represent the available set of
debt instruments for the generation of cash for the financing of
the fiscal deficit. The stock of IPD grew from a level of 914
million dollars in November 1983 to 2480 million in November
1989. This represents an annual rate of growth of the internal
public debt of 18.1% annual during the last six years, a rate
that far exceeds the growth rate of dollar GDP during the same
six year period.

Under present circumstances it is felt there is not much
room for debt financing of the fiscal deficits of the
consolidated public sector. During 1989 alone, the foreign
exchange position of the BCU plus BROU deteriorated by 382
million dollars, indicating a growing weakness in the external
debt front. The fall in the joint BCU-BROU position in foreign
exchange has continued during the first four months of 1990. In
the case of Uruguay, the FEP of the BCU-BROU is a more relevant
measure of pressures against the currency than International
Reserves of the Central Bank for reasons that include:

(i) At the end of each month the BROU transfers to the BCU
dollar deposits that are systematically withdrawn a few days
later. The obvious purpose is to inflate the Reserve position of
the BCU, measured at the end of each month. The amount of
transfers involved in this operation is in the order of 120
million dollars. Consolidating the Reserve position of BCU and
BROU solves this accounting problem.

(ii) The Commercial Banks (including BROU) capture deposits
from the public and redeposit a significant fraction of them at
the BCU, part as reserve requirements and part voluntarily. Since
these deposits at the BCU represent liabilities with
residents(the commercial banks), they are not subtracted from
International Reserves but they are subtracted for the FEP of
the BCU.

FIGURE 14

DOLLAR VALUE OF INTERNAL DEBT (Millions)
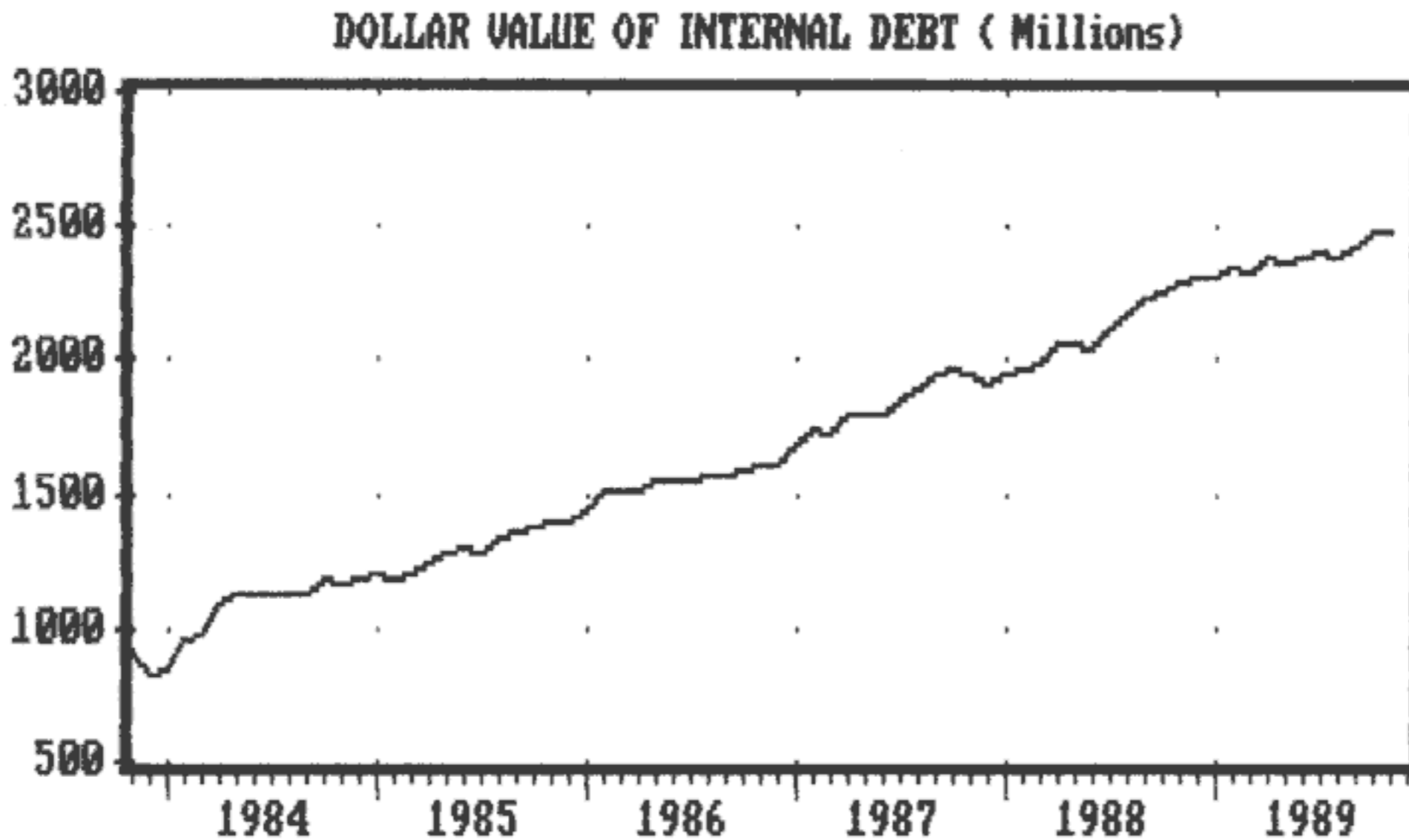
COMPOSITION OF THE STOCK OF INTERNAL DEBT
(In millions of dollars)

	Treasury Bonds (U$S)	Treasury Bills (U$S)	Let.Reg. Monetaria (N$)	Deposits BROU (N$)	Deposits BROU (U$S)	TOTAL DEBT
1983:11	407	263	10	128	105	914
1983:12	407	276	6	69	65	824
1984:1	407	288	15	67	73	851
1984:2	476	308	42	65	74	965
1984:3	470	336	39	130	11	985
1984:4	482	403	29	149	32	1095
1984:5	489	412	32	126	73	1132
1984:6	491	404	41	132	67	1135
1984:7	491	399	57	125	63	1135
1984:8	494	398	57	116	70	1134
1984:9	504	382	63	116	69	1134
1984:10	521	404	69	106	93	1193
1984:11	522	396	78	102	63	1160
1984:12	544	401	79	106	59	1190
1985:1	569	364	85	112	68	1198
1985:2	570	368	76	4	160	1178
1985:3	569	395	77	107	60	1209
1985:4	565	412	81	144	38	1240
1985:5	569	426	82	142	69	1288
1985:6	586	418	80	137	83	1304
1985:7	577	430	61	158	51	1277
1985:8	597	464	50	182	45	1338
1985:9	597	498	38	181	52	1365
1985:10	621	502	37	175	49	1384
1985:11	620	525	39	158	62	1403
1985:12	620	510	41	167	50	1388
1986:1	620	546	57	171	48	1441
1986:2	666	541	74	189	49	1519
1986:3	666	532	87	174	62	1521
1986:4	652	527	101	166	73	1520
1986:5	662	535	110	180	68	1556
1986:6	653	556	116	164	64	1552
1986:7	653	565	124	148	62	1552
1986:8	648	570	125	149	80	1571
1986:9	672	532	122	179	63	1567
1986:10	712	535	112	146	89	1594
1986:11	712	550	106	144	92	1603
1986:12	710	574	110	156	60	1611
1987:1	710	582	120	166	112	1689
1987:2	706	608	123	164	131	1732
1987:3	700	638	123	195	66	1722
1987:4	712	649	119	220	93	1793
1987:5	715	671	121	202	85	1793
1987:6	715	692	122	198	73	1800

1987:7	716	717	132	211	76	1852
1987:8	715	740	131	225	77	1888
1987:9	729	739	120	247	112	1947
1987:10	725	741	108	270	119	1962
1987:11	713	733	107	261	130	1945
1987:12	714	738	106	222	127	1907
1988:1	715	726	118	244	144	1946
1988:2	738	708	119	262	146	1973
1988:3	737	718	119	280	126	1980
1988:4	764	751	122	297	139	2073
1988:5	763	769	128	301	113	2074
1988:6	759	791	131	268	95	2044
1988:7	749	810	134	291	135	2121
1988:8	790	825	133	316	115	2179
1988:9	803	833	131	329	134	2231
1988:10	798	849	133	324	157	2262
1988:11	799	869	138	310	178	2294
1988:12	802	912	139	273	187	2312
1989:1	802	906	151	275	187	2321
1989:2	795	938	156	272	188	2348
1989:3	792	969	152	252	174	2339
1989:4	781	1010	157	265	169	2382
1989:5	822	992	150	282	131	2377
1989:6	822	977	150	236	196	2380
1989:7	815	977	137	271	212	2413
1989:8	844	962	132	269	175	2381
1989:9	841	966	126	310	191	2435
1989:10	846	961	127	304	244	2482
1989:11	844	953	119	305	258	2480

Source: Statistical Bulletin, BCU.

The fiscal deficit appears as the single most important factor in the determination of the inflation rate. The empirical relation is somehow obscured because in the short run deficits are also financed with debt(denominated in either N$ or dollars) rather than with money creation. The money creation only takes place later at the time of serving the interest of the debt and shows in the parafiscal deficit. The link between the fiscal deficit and the actual money creation is therefore much obscured by the complexities of the uruguayan financial system. Nevertheless, a significant statistical relationship does show up, as discussed in the paper by Banda cited above. 1/

Given the observed important deterioration in the Foreign Exchange Position of the monetary authorities, the continuation of the fiscal deficit at the rates of 1989 would very likely require that any further financing of the deficit be done with domestic money creation. The result may be a rapid expansion of liquidity that may generate a severe run against the peso since the possibilities of increasing the revenue from money creation are extremely limited in relation to the likely financing needs. It is therefore imperative that additional measures be taken to completely stop the process of increased indebtedness of the government, both in pesos and in dollars.

1/ A simple linear regression of inflation on past deficits yields the following results:

$$INF = 20.6 + 85.45 \cdot D67 + 0.31 \cdot DEF + 1.38 \cdot DEF(-1) + 2.45 \cdot DEF(-2) + 3.52 \cdot DEF(-$$
$$\quad (2.1) \quad (3.9) \qquad (0.3) \qquad (2.2) \qquad\qquad (4.1) \qquad\qquad (3.5)$$

SUM of DEF Coefficients: 7.69 (3.57)
R2 Adj.:0.49
MA(1): 0.26 (1.35)
DW : 1.93

D67 is a dummy variable equal to unity for 1967, a year when price controls where lifted in the context of a stabilization attempt.
DEF is the total government deficit as % of GDP.
INF is inflation in the CPI (Dec. to Dec.)

CONCLUSIONS

Inflation in Uruguay is a monetary phenomenon that defies an easy characterization because of peculiar aspects related to the specification of both the demand and the supply of money.

A predictable money demand function requires making allowance for the persistent dollarization trend that the economy experiences since 1974. In the case of M1 (non-interest bearing money) such dollarization shows as a once and for all fall in demand during the fist quater of 1983 (resulting from the collapse of the Tabla cambiaria) that cannot be explained by the conventional measures of the opportunity cost of holding money (inflation or interest rates) and has not reversed since then. We believe this fall in money demand was derived from an increase in the degree of dollarization of the economy that resulted in a larger number of transaction being carried in US dollars. After this fall, the demand for the remaining M1 can be explained by the conventional variables. However, we cannot rule out the possibility of any additional sudden fall in demand(equivalent to a new increase in the degree of dollarization) in the event of a large shock to the financial markets such as the one that took place at the end of 1982.

The real value of the interest earning component of the money supply denominated in pesos shows a gradual and persistent trend of decrease since 1981 (Figure 5). When dollar holdings of residents are added to the peso holdings, the total amount shows no signs of declining and actually it tends to grow at a rate even higher than that of real growth of the economy as captured by GDP (Figure 3). What is actually taking place is a gradual process of substitution of dollar holdings for interest earning peso holdings in an as yet unfinished process of currency substitution.

Other factors affecting the demand for money, additional to the rates of return, degree of dollarization and level of economic activity, is the increasing tendency of the government to finance its deficits by offering interest earning liquid assets that are highly competitive with monetary assets. The increased supply of these assets that are substitutes to monetary holdings is to reduce demand for money and therefore to increase the inflationary effects of any given monetary financing of a future deficit.

In addition to the factors that work for a reduction in the size of the demand for money, there are factors that work in favor of increasing the supply of money, namely the fiscal deficit and an apparent policy of passive money in the face of policies of wage and exchange rate indexation.

Inflation in Uruguay is the end result of all of the above mentioned forces of which, we feel, the fiscal deficit is the main leading factor. The existence of the deficit generated the base inflation that produced the need for indexation and induced the recurrent crisis that resulted in the currency substitution process being experienced since 1974. The link between inflation and the fiscal deficit is hidden by the tendency to finance deficits by issuing public debt (internal and external) and only resorting to the printing of money at the time of serving of the debt, giving raise to the denominated parafiscal deficit.

A typical example of an obscured fiscal origin for inflation is that of a fiscal deficit financed by external debt whose interest is served by purchasing dollars with newly printed money by the Central Bank. As the demand for dollars is increased by the Central Bank purchases, we observe a higher level for the real exchange rate (a real devaluation). Since the extra dollars are purchased by printing money, we also observe more inflation. One may therefore conclude that it has been the higher price of foreign exchange that induced the initially higher inflation rate that was later convalidated through the generalized indexation of prices. The true is, however, that the higher inflation had its origins in the fiscal deficit that gave raise to the external debt that later had to be served by printing money.

A permanent reduction of inflation in Uruguay requires reducing both the fiscal and parafiscal deficits as well as controling the factors that induce a passive monetary response to real shocks, such as in the case of movements in agricultural prices. Reserve purchases by the Central Bank should not exceed those allowed by the increased rate of monetization of the economy at the target inflation rate. Any additional rate of money creation is bound to be inflationary even if it is destined to the purchasing of foreign exchange. The policy of indexing the nominal exchange rate to the actual differential between domestic and foreign inflation should be revised to a policy of free floating of the currency or one of keeping an appropiately defined equilibrium level of the real exchange rate. Otherwise, a policy of devaluing in direct proportion to the rate of inflation may end up sustaining a higher than equilibrium level of the real exchange rate and force the Central Bank to print money in order to acquire the higher excess supply of foreign exchange induced by the disequilibrium real exchange rate.