Inflation and Stabilization in Yugoslavia

Roberto de Rezende Rocha

A successful stabilization program in Yugoslavia requires more
political resolve about wage indiscipline and loss-making enter-
prises than was observed in 1990. But the ultimate question is
whether stabilization can succeed without a comprehensive
privatization program.

Rocha examines the main reasons inflation
accelerated in Yugoslavia in the 1980s and
reviews past and current attempts at stabilization.

He shows that inflation in Yugoslavia shares
common elements with inflation in other highly
indebted countries, despite appearances other-
wise. These common elements include a large
transfer of resources abroad unmatched by an
internal adjustment, resulting in a large internal
redistribution of real resources through inflation.

Yugoslavia differs from other countries in
that these internal conditions are not transparent.
Instead of an open fiscal deficit, there were
complex interactions among enterprises, com-
mercial banks, and the central bank, involving,
among other things, the absorption and servicing
of a large stock of foreign exchange liabilities by
the central bank.

Other factors contributed to the sharp
acceleration of inflation at the end of the eighties
— especially a large real devaluation in mid-
1988, when an indexed economy drove inflation
to a much higher level. In 1989, a preemptive
explosion of real wages added fuel to inflation's
fire.

Rocha argues that the failure to correct
hidden losses in the economy was the main
reason various stabilization attempts failed in the
1980s. The 1990 program was the first to
recognize the existence of those hidden losses
and the need for fiscal correction — although it
also introduced other elements to cope with
inflationary inertia. The program succeeded in
eliminating the central bank's own deficit and

was initially successful in fighting inflation. But
it became clear in the course of the program that
other losses had not been removed. Pressures to
finance enterprises and avoid a liquidity crisis in
the financial system resulted in a relaxation of
monetary policy in mid-1990 and a revival of
inflationary pressures. Attempts to reimpose
monetary control met considerable difficulty at
the end of the year, including a bizarre episode
of expansion of central bank credits without the
board of governors' approval.

It also became clear that the fiscal compo-
nent was not consistent with other elements of
the program. It was clearly not enough to
finance a social program of the magnitude
required had loss-making enterprises really been
forced into bankruptcy and also to cover the
needs of the bank restructuring program. Seen
from this angle, the Yugoslav program of 1990
resembles other heterodox programs that had
initial success in reducing inflation but later
faltered because of the insufficiency of the fiscal
adjustment.

At the same time, the events in the second
half of 1990 also indicate that, for a stabilization
program to succeed in Yugoslavia, there must be
much greater political resolve to cope with wage
indiscipline and loss-making enterprises than
was observed in 1990. And the question
remains whether financial discipline can be
imposed in the system only at the macroeco-
nomic level and without introducing private
ownership of capital. The ultimate question may
be whether stabilization can succeed without a
comprehensive privatization program.

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Roberto de Rezende Rocha*

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1. Introduction.

The reversal of external financing flows during the 1980s forced Yugoslavia to undertake drastic measures to balance its external accounts. The external adjustment consisted primarily of large real exchange rate devaluations and, initially, quantitative restrictions on imports. Although these measures were able to generate increasing current account surpluses, economic activity stagnated and inflation accelerated almost continuously (figure 1 and table 1). Moreover, the absence of fiscal imbalances in the economy (figure 1) might suggest that the nature of inflation in Yugoslavia is entirely non fiscal.

Table 1

Annual Rates of Inflation (CPI) in Yugoslavia, 1980-90
(in %)

	80	81	82	83	84	85	86	87	88	89	90
Dec.	37	36	33	60	53	75	92	169	245	2685	120
Aver.	31	39	31	40	54	72	90	120	194	1240	588

Source: IFS

While it is true that many hyperinflation episodes are triggered by balance of payments difficulties and large exchange rate devaluations, the complete absence of fiscal imbalances from the overall picture in the case of Yugoslavia is intriguing. Indeed, even the "balance of payments view of inflation" recognizes the role of fiscal deficits in the determination of inflation, although such a role is assumed to be less central than under the "fiscal view of inflation". In the former, the exchange rate assumes the central role, while fiscal deficits contribute to inflation mostly through endogenous interactions with the exchange rate and the inflation rate itself (Dornbusch 1987; Dornbusch and Fischer 1986; Liviatan and Piterman 1986; and Montiel 1989).

Figure 1

Selected Macroeconomic Variables For Yugoslavia, 1977-89

Exports and Imports, 1977-89 (Billions of US$)

Real Exchange Rate, 1977-1989 (1980 = 100)

Current Account, 1977-89 (Billions of US$)

Inflation Rate (CPI Yearly Change in %)

Public Sector Surplus, 1977-89 (% of GSP)

Real GSP Growth, 1977-89 (In % p.a.)
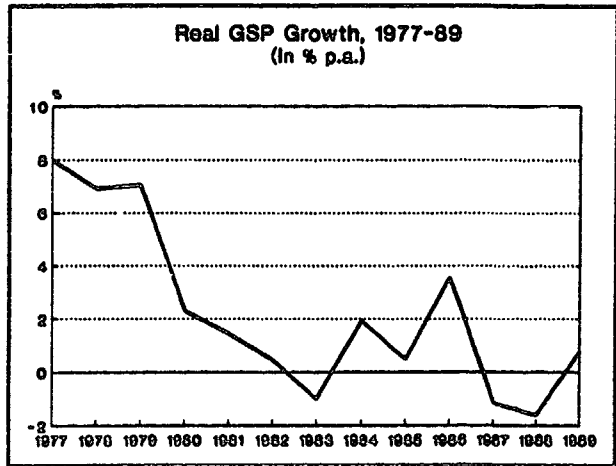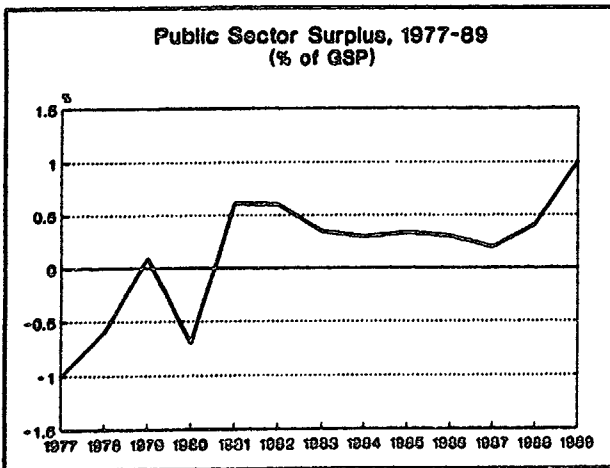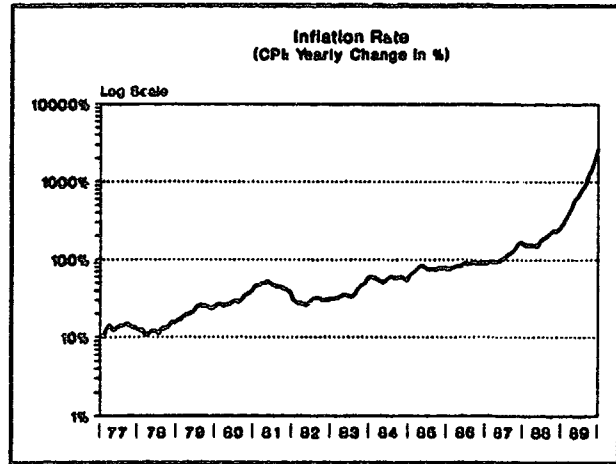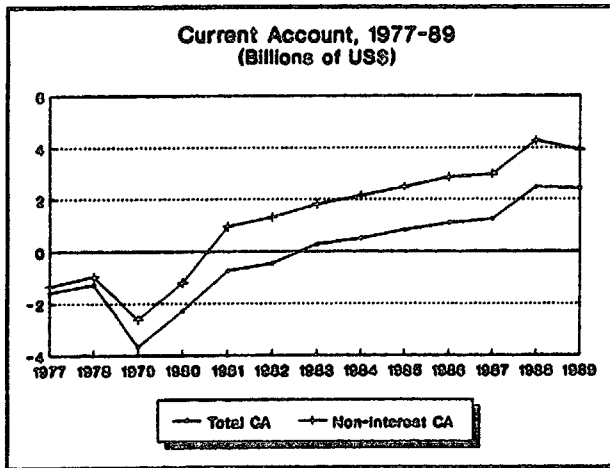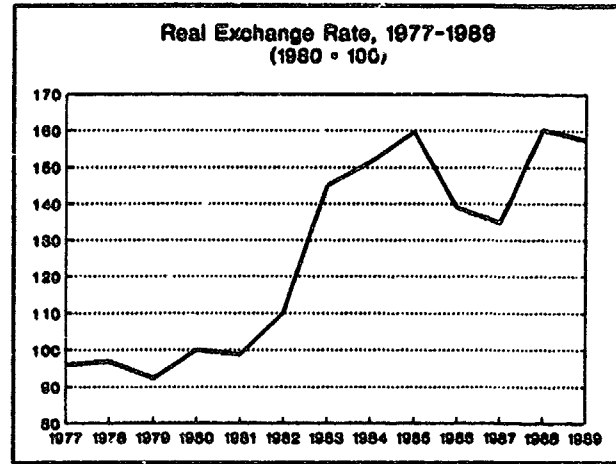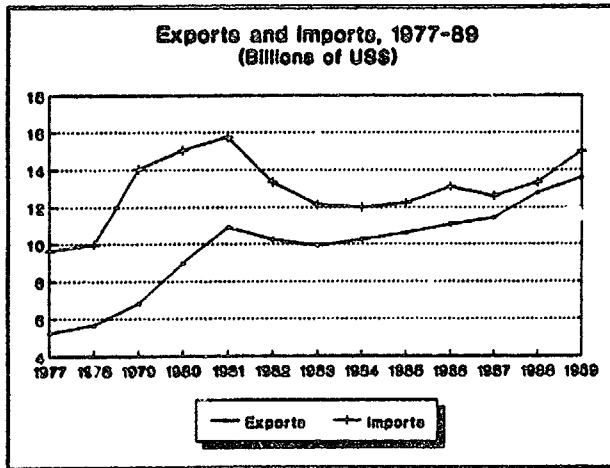
The paper shows that the acceleration of inflation in Yugoslavia after 1982 resembles in part the phenomenon of inflation in other high indebted countries, despite initial appearances. The resemblance lies on three common elements. The first is the adverse impact that large real devaluations had on the major holders of foreign liabilities--in the case of Yugoslavia, the enterprises and the central bank. The second element was the lack of internal adjustment by enterprises or the public sector to match the large transfer of resources abroad. Instead, enterprise losses increased through the 1980s, partly as a result of the real devaluations and increasing problems of overstaffing. The third element was the internal generation of resources through inflation.

Inflation in Yugoslavia seems to differ from this rather familiar story due to the lack of transparency of internal conditions. Instead of an open fiscal deficit, there were complex interactions between enterprises, commercial banks and the central bank, involving, among other things, the assumption of a share of debt service payments by the latter. The situation was further complicated by the existence of a large stock of foreign exchange deposits held by residents in the domestic financial system. The central bank also absorbed these deposits in order to protect the enterprises and commercial banks from greater financial difficulties, thus increasing further the level of its quasi-fiscal expenditures.

While the financing of hidden losses was a permanent source of monetary expansion and inflation through the 1980s, the paper also assesses the contribution of non-fiscal factors to the sharp acceleration of inflation at the very end of the decade--the rate of inflation increased more than tenfold between mid-1988 and end-1989. More specifically, the paper assesses the impact of a large real devaluation in mid-1988 in the context of an indexed economy, and also the impact of an explosion of real wages in the period preceding the stabilization program of 1990. The paper presents some econometric evidence indicating that these factors became indeed more important at the end of the

decade.[1]

Finally, the paper reviews the performance of stabilization programs in Yugoslavia, and assesses the perspectives of the stabilization program of January 1990, the first program that recognizes the existence of hidden losses in the economy and the need for a fiscal correction.

The paper is organized as follows. The second section examines the contribution of "fundamentals" to the acceleration of inflation in the 1980s. It examines the links between enterprises' financial imbalances, central bank deficits, and inflationary finance. The third section analyzes the relationship between exchange rates, wages and prices during the 1980s, paying particular attention to the two last years of the decade, when inflation accelerated very rapidly. The fourth section examines past and present attempts at stabilization, with focus on the 1990 program. Finally, the fifth section draws some conclusions.

2. Enterprise Losses, Central Bank Deficits and Inflation.

Other studies provide a detailed examination of the causes of enterprises' losses, and their distribution inside Yugoslavia (Knight 1984; Konovalov 1989; and Saldanha 1989). For the purposes of this paper highlighting the main findings of these studies is sufficient. Excessive personnel and the setting of wages by criteria completely divorced from productivity stand out as one of the major causes behind poor financial performance. Other X-inefficiencies in the use of material inputs are also a major cause[2]. The losses also reflect investment decisions made at very distorted relative prices and without any serious consideration about potential demand. These investments were undertaken mostly during the 1960s and 1970s, and financed in good part by foreign credits.

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[1] See Rocha (1989), for an analysis of the role played by the financial system in the Yugoslav inflation, Bole and Gaspari (1990) for a detailed analysis of policy regimes during the 1980s, and the earlier studies of Mates (1987), Mencinger (1987) and Gaspari (1988).

[2] For instance, Konovalov (1989) reports that energy requirements per unit of output were twice as high as in western enterprises.

Finally, the distorted tax system which prevailed in Yugoslavia was also as a cause of enterprise losses. For one, excessive payroll taxes increased significantly the cost of labor to the enterprises. Also, the base of the enterprise income tax was defined as the income before the payment of wages, and enterprises paid income taxes even if they generated net losses.

As shown in table 2, enterprise losses increased from around 2.0 percent of Gross Social Product (GSP) in the early 1980s, to approximately 6 percent of GSP in 1987-88 and 15 percent of GSP in 1989. These numbers are not indicative of cash losses, since they include non-cash expenditures such as depreciation, and revaluation of stock items. In addition, they are also affected by frequent changes in accounting rules, including the adoption of inflation-adjusted accounting in 1987. However, they indicate a deteriorating trend that is highly probable.

Table 2

Enterprise Losses as Shares of GSP, 1981-88

1981-84	1985	1986	1987	1988	1989
2.1	2.8	3.0	6.6	5.7	15.0

Source: Social Accounting Office.

The real exchange rate devaluations of the 1980s were one likely cause of the increase in enterprise losses shown in table 2. These real devaluations increased not only the real domestic cost of imported inputs, but also the real flows of interest payments on Yugoslavia's external debt, 80 percent of which was initially held by enterprises (the remaining 20 percent with the central bank).[3] Another major cause of increased enterprise losses is likely to have been the increasing problem of overstaffing observed during this period. While GSP growth rates declined from 7 percent in the 1970s to 0.7 percent in the 1980s, the rates of unemployment increased very slightly between the two decades-

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[3] The full impact of real devaluations on interest payments was, however, reduced by the transfer of some debt service payments to the central bank.

-from 12 to less than 14 percent. As a result, the amount of excess labor in Yugoslav enterprises is estimated to have increased to 20 percent of the labor force at the end of the 1980s (Mencinger 1989). The lack of adjustment of Yugoslav enterprises is further illustrated in figure 2, which shows the absence of a relationship between changes in the rate of unemployment and output growth rates (the Okun's law) in Yugoslavia, in contrast with the US and German cases (see Gordon 1984; Okun 1970)[4].

Finally, changes in the tax structure during the 1980s had a very adverse impact on enterprises, since they amounted to a shift from indirect taxes to heavier payroll and enterprise income taxes--the share of these two taxes in total tax revenues increased from 50 to 67 percent between 1983 and 1989 (Ding 1990 and Mates 1991). Thus, these changes increased the costs of excess labor in Yugoslav enterprises.

The existence of enterprise losses raises the question of how these losses were financed. During the 1980s there were two basic sources of financing. The first comprised various forms of inter-enterprise financing, including voluntary transfers from profit makers to loss makers inside the same industrial holding, and forced transfers under various forms--para-fiscal transfers and inter-enterprise credits and arrears. The second source of financing comprised bank credits at subsidized terms. Of course, the fact that the enterprise-controlled banks maintained the policy of credit subsidies was only sustained by the payment of even more negative real interest rates on domestic deposits (figure 3)[5]. Note that only at the end of the decade real interest rates became positive, due to the indexation of time deposits of three months and above. The consequences of this measure are examined in section 4.

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[4] Figure 3 shows simple OLS regression lines for the 1975-88 period for the three countries.

[5] Figure 3 show the monthly averages of realized real rates on one year time deposits, computed by $r_t = (1 + i_t)/(1 + \pi_{t+1})$, where r_t and i_t are the real and nominal interest rates at t and π_{t+1} the inflation rate between t and $t+1$.

Figure 2

Okun's Law in Selected Countries, 1975-88

UNITED STATES

Output Growth

Changes in the Unemployment Rate

GERMANY

Output Growth

Changes in the Unemployment Rate

YUGOSLAVIA

Output Growth

Changes in the Unemployment Rate

Figure 3

Average Real Rates on 1 Year Deposits
(Monthly Averages, in % p.a.)
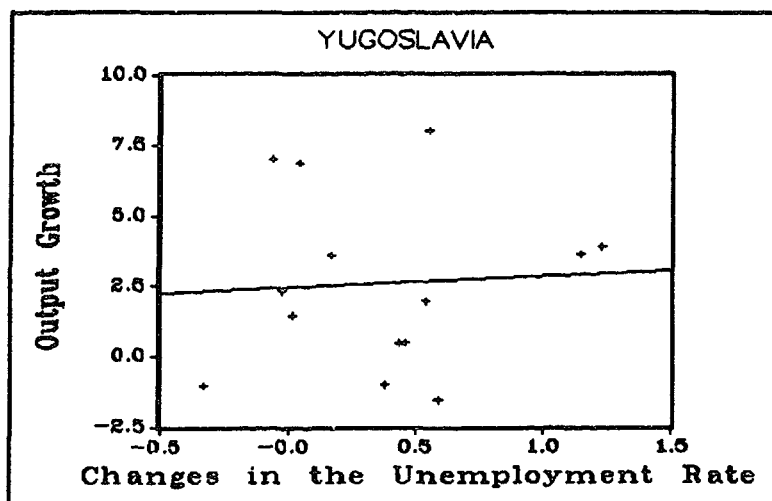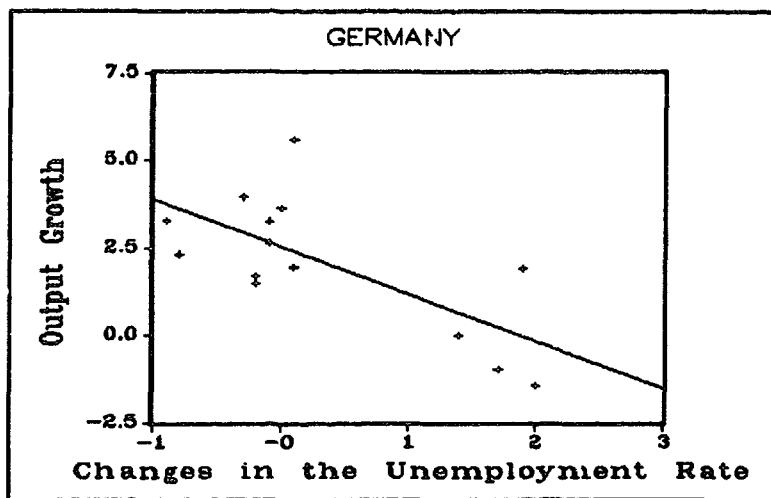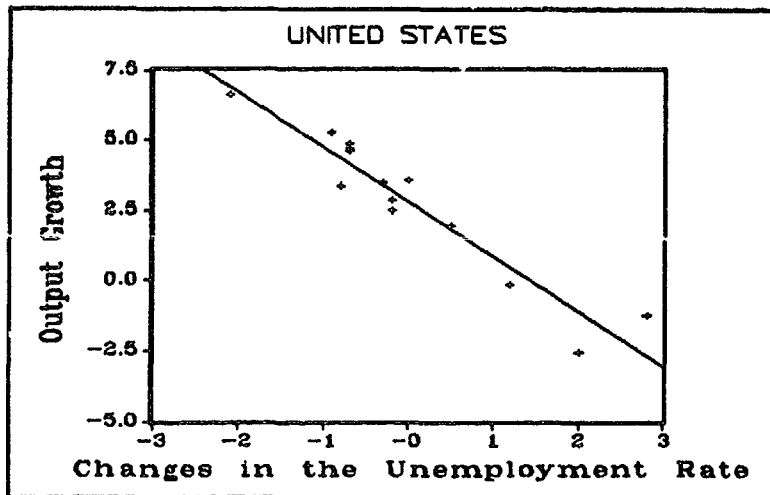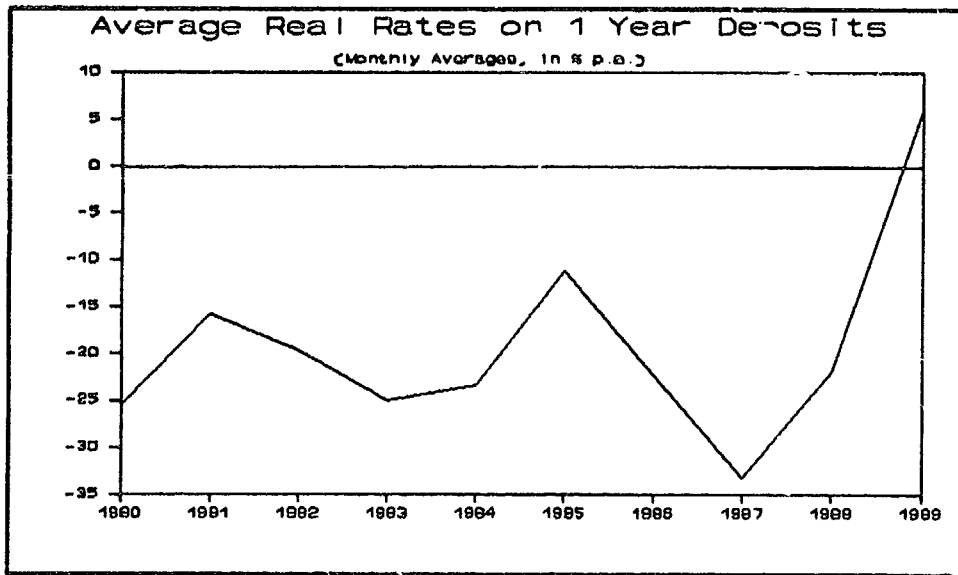
While the provision of bank credits at subsidized terms was instrumental in financing enterprises' imbalances, the stock of bank credits would not have grown at high rates without a commensurate rate of monetary expansion, most particularly of base money. Therefore, an examination of the primary sources of base money creation is in order.

The rapid expansion of base money during the 1980s did not result from direct financing of enterprise losses by the central bank. However, it resulted in great part from the central bank's attempts to protect enterprises and commercial banks from even greater financial problems. First, after 1982 the central bank increased the provision of selective rediscounts (exports, agriculture, equipment, etc.) at very subsidized terms. Second, the central bank absorbed and serviced a large volume of foreign liabilities previously held by the enterprises and the banks.

More specifically, after 1982 several enterprises experienced difficulties in servicing their foreign liabilities. As a result, the central bank assumed a share of enterprises' foreign liabilities, mostly of those located in less

developed regions. Second, the central bank also absorbed and serviced the whole stock of foreign exchange (FX) deposits in the commercial banks. These FX deposits are held mostly by residents, are not part of Yugoslavia's external debt (table 3), and accounted for two thirds of the central bank's foreign liabilities.

Table 3

External Debt and FX Deposits, 1980-89
(In % of GSP)

	1981	1983	1985	1986	1987	1988	1989
External Debt	30.0	32.1	44.1	33.0	30.7	32.1	25.0
FX Deposits	12.5	13.3	19.1	17.5	17.5	17.8	17.4

Source: National Bank of Yugoslavia.

The absorption of the stock was done through the introduction of a foreign exchange insurance scheme that involved the transfer of FX deposits to the central bank in exchange for an equivalent amount of low interest Dinar credits from the central bank. The purpose of the scheme was to shield commercial banks against foreign exchange losses, while also allowing them to keep granting subsidized credits to enterprises.

The fact that the central bank started servicing a large volume of foreign liabilities while charging negative real interest rates on all its credits generated a quasi-fiscal deficit that constituted an important source of monetary expansion. This problem can be examined in more detail by considering the summarized balance sheet identity of the central bank in first differences:

$$\dot{C} = \dot{H} + \dot{NFL} + \dot{NW} \tag{1}$$

Where C = central bank credits, H = base money (currency plus reserves), NFL = net foreign liabilities of the central bank and NW = the net worth of the central bank. The dots indicate time derivatives. Note that the central bank does not lend to the non-financial public sector. Note also that the variations

in net foreign liabilities include a variation in foreign currency and a capital loss term:

$$\dot{NFL} = \dot{NFL}^*E + NFL^*\dot{E} \tag{2}$$

Where the star superscript denotes a foreign exchange-denominated variable. The variations in the central banks' net worth are determined by the combination of its income statement and revaluation account:

$$\dot{NW} = i_cC - (i^* + \hat{E})NFL^*E - i_rR \tag{3}$$

Where i_c, and i_r are the interest rates on credits and bank reserves, respectively. The interest rate on all foreign-denominated assets and liabilities are assumed equal to i^* for simplicity. The hats indicate percentage changes[6]. The interest revenues or expenditures of foreign-denominated variables are adjusted for the exchange rate depreciation. They can actually be broken down between a cash and a capital loss terms[7].

Combining equations (1) and (3) and solving for the variations in base money yields:

$$\dot{H} = \dot{C} - \dot{NFL}^*E - i_cC + i^*NFL^*E + i_rR \tag{4}$$

Equation (4) indicates that base money is expanded when there is an increase in domestic credits or a decrease in net foreign liabilities, or when the central bank runs an excess of interest expenditures over revenues. Note that the capital gain/loss terms in equations (2) and (3) cancel out. A depreciation generates a capital loss on the stock of net foreign liabilities but has no immediate impact on base money creation. However, the capital loss is eventually realized through interest payments or a decrease in the stock.

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6 $\hat{E} = \dot{E}/E$.

7 $(i^* + \hat{E})NFL^*E = i^*NFL^*E + NFL^*\dot{E}$, where the first term is the central bank's cash expenditures and the second the capital loss on the stock resulting from the depreciations.

A much better insight can be gained by stating equation (4) in real terms, since the issue of real resource transfers becomes much more clear. Dividing both sides of the equation by the domestic price level, P, and the foreign-denominated stocks by the international price level, P^*, and splitting the nominal interest rates between the real rate and the inflation premium, $i = r + \pi$, where r is the associated real rate and π the rate of inflation, one obtains:

$$\dot{H}/P - i_r R/P = \dot{c} - nfl^* e - (r_c c - r^* nfl^* e) \tag{5}$$

Where the lowercase letter indicate real stocks[8]. The term on the left is the net seignorage revenues collected by the central bank, defined as gross seignorage minus the payment of interests on banks' reserves. The fact that the real interest rate charged on domestic credits, r_c, was always negative, while the real cost of foreign liabilities, r^*, was positive, implied a transfer of seignorage to the recipients of subsidized credits and the holders of foreign liabilities. Such transfer can be verified by two alternative ways. First, by examining the balance sheet of the central bank in real terms and, second, by estimating the terms on the right hand side of equation (5).

Consider first the real balance sheet of the central bank in figure 4. After 1982 the real stock of credits fell much faster than the real stock of base money. The decline in real base money reflects the decline in the real demand for financial assets, while the decline in real credits reflects not only this factor, but also two additional factors, namely, the loss associated with the real interest flows and the net repayments of foreign liabilities. This point can be clarified further by rearranging equation (5) and splitting seignorage between the inflation tax, πh, and the real changes in the stock, $\dot{h}$:

$$\dot{c} = \dot{h} + nfl^* e + (r_c c - r^* nfl^* e) + \pi h \tag{6}$$

Where the interests on reserves are disregarded for simplicity. Equation (6)

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$x = X/P$. Note also that $\dot{X}/P = \dot{x} + \pi x$

shows that real credits grow less than the real stock of base money when net foreign liabilities decrease or when the real interest flows are negative, and grow more than real base money the larger the revenues from the inflation tax. Of course, the two last terms capture the changes in the real net worth of the central bank. The inflation tax is a real source of revenue to the central bank and increases its real net worth, while the real interest losses decrease it. When the inflation tax is smaller (larger) than the real interest losses there is a decrease (increase) in the real net worth. A decrease in the real net worth will be reflected in a decline of real credits relative to base money, unless there is an increase in net foreign liabilities. If the real net worth increases, but the if the inflation tax is also used to finance the net repayment of foreign liabilities or the purchase of foreign assets, real credits also decline relative to base money.

Figure 4

Balance Sheet of the Central Bank
Real Values (Base Year 1980)
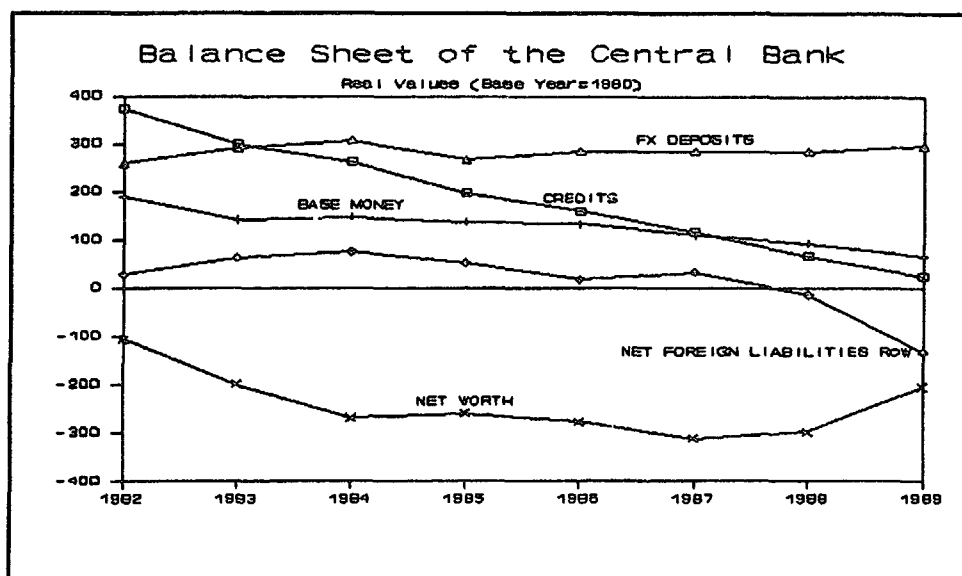
From a different angle, if the central bank makes large net purchases of foreign exchange from enterprises in the tradables sector in order to service its foreign liabilities (interest and principal) or accumulate foreign assets,

it is clear that credits will grow less than base money. Moreover, if the central bank forgoes interest revenues by charging highly negative real interest rates on its credits, that imposes an additional burden on its finances. The smaller the flow of revenues the higher has to be the rate of monetary expansion in order to achieve a certain credit target or to finance other operations.

That was essentially the situation faced by the central bank of Yugoslavia during the 1980s, although the dominant factors varied from year to year. During the mid-1980s the inflation tax was primarily used to finance the credit subsidies and the real interests on foreign liabilities, although the central bank also financed the net repayments of its foreign liabilities. Note that during this period its real net worth declined. In 1988 and 1989 the decrease in net foreign liabilities dominated the process of money creation. Note that in these last two years the real net worth increased[9].

Table 4 provides further information on the quasi-fiscal operations of the central bank. The first section of the table shows gross and net seignorage (gross seignorage was measured by yearly changes in the nominal stock of base money). The second section distributes seignorage among the three major sources of money expansion: the selective credits, the foreign exchange insurance scheme and the central bank's operations with the external sector. Each row shows the yearly changes in the stocks minus or plus the interest flows on the stocks[10]. The figures are expressed as shares of GSP and are estimates, calculated from

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[9] In figure 4, credits and base money were divided by the December CPIs, based in December 1980, while the foreign liabilities were converted into German Marks (the dominant currency) at the cross-currency rates of December 1980 and multiplied by the Dinar/German Mark rate of December 1980. The real net worth was calculated as a residual. This procedure is consistent with equation (5), and allows one to track the evolution of real foreign liabilities and the real net worth net of the impact of the real devaluations of the Dinar. If the net foreign liabilities had been simply divided by the price level, their increase in 1983 would have been more pronounced, and the decline in real net worth stronger.

[10] For instance, in the case of selective credits the table show the changes in selective credits minus the interest revenues on these credits, $\dot{c} - r_c c$. A similar procedure is applied in the case of the FX insurance scheme and the operations with the external sector.

information on the stocks and interest rates. A detailed description of the methodology used is provided in Rocha (1989).

Table 4

Seignorage Revenues on Base Money, 1981-88
(in % of GSP)

	1980-84	1985	1986	1987	1988	1989
Gross Seignorage	2.7	3.6	4.2	4.9	5.5	12.1
Interests on Reserves	0.1	0.1	0.1	0.1	0.1	1.0
Net Seignorage	2.6	3.5	4.1	4.8	5.4	11.1
Selective Credits	n.a	23%	12%	58%	14%	23%
FX Insurance Scheme	n.a	50%	45%	50%	26%	21%
Net Liabilities with RoW	n.a	27%	43%	-8%	60%	56%

Source: National Bank of Yugoslavia.

Table 4 shows that net seignorage increased through the 1980s to reach 11 percent of GSP in 1989. Regarding the main sources of monetary expansion, the table also indicates the existence of two distinct periods. During the first period (1985-87) the quasi-fiscal operations of the central bank were the dominant source of monetary expansion, with the foreign exchange insurance scheme absorbing roughly 50 percent of seignorage. During the second period (1988-89), there was an effort to increase interest rates on domestic credits to levels closer to inflation. During this period, the large accumulation of foreign assets (a decrease in net foreign liabilities) became the dominant source of base money creation. Thus, a large share of seignorage revenues was used to finance the build-up of foreign reserves that preceded the stabilization program. However, the volume of resources channelled to finance quasi-fiscal operations was also significant, especially in 1989, when it reached more than 4 percent of GSP.[11]

Although the above analysis shows that central bank deficits were an

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[11] These estimates are based on data on stocks and interest rates and are subject to some measurement errors. Thus, the objective of the exercise is to provide information on trends and orders of magnitude. Nevertheless, the findings are broadly in line with those provided by other authors (Bole and Gaspari 1990 and Mates 1991), which also show the increasing burden of real interest payments in 1985-87, followed by a period (1988-89) where the decrease in net foreign liabilities dominated the process of money creation.

important source of monetary expansion and inflation, it might also suggest that these deficits were only indirectly related to enterprise imbalances, and that the link between domestic imbalances and inflationary finance was limited to central bank operations. However, the whole volume of inflationary taxation was not limited to the collection of seignorage on base money. Since commercial banks paid negative real interest rates on all deposits through most of the 1980s, the total volume was much larger than that collected from base money alone. This point must be stressed, since it brings to the fore the distributional aspect of inflation in Yugoslavia, particularly the distribution of real resources from holders of Dinar assets towards enterprises. Indeed, the subsidies on domestic credits helped enterprises bear the burden of the external transfer and kept a large number of loss making enterprises afloat during the 1980s. Furthermore, the dependency of these enterprises on subsidized financing has always been a serious obstacle to successful stabilization in Yugoslavia.

An accurate calculation of the total resource transfers would require detailed information on interest rates and the maturity breakdown of domestic deposits and credits. The absence of critical pieces of information precludes the conduct of such exercise. However, the potential size of seignorage collected by the consolidated financial system can be appreciated by comparing the relative magnitudes of gross seignorage on base money and M1 in table 5.[12]

Table 5

Gross Seignorage on Base Money and M1, 1980-89
(In % of GSP)

	1980-84	1985	1986	1987	1988	1989
Base Money	2.7	3.6	4.2	4.9	5.5	12.1
M1	4.8	5.0	9.1	7.7	11.0	24.5

Sources: National Bank of Yugoslavia and International Financial Statistics.

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[12] Measured by yearly changes in the respective stocks, as shares of GSP.

Although these numbers may seem excessive, particularly in 1989, one has to consider a number of factors. First, although the shift out of domestic money was considerable (figure 5), the continuous increase in seignorage reflects in part ongoing portfolio adjustment to an inflation that also accelerated continuously. Second, two factors contributed to the unusually large seignorage revenues in 1989. For one, the very high inflation in 1989 was to some extent unexpected. Also, there was an unusually large expansion of credits and base money in December of that year. Finally, in the case of M1 one has to consider the fact that enterprises were also taxed, since they also held deposits. Thus, although they were the main beneficiaries from the inflationary transfers, their net gains were smaller than indicated in table 5.

Figure 5
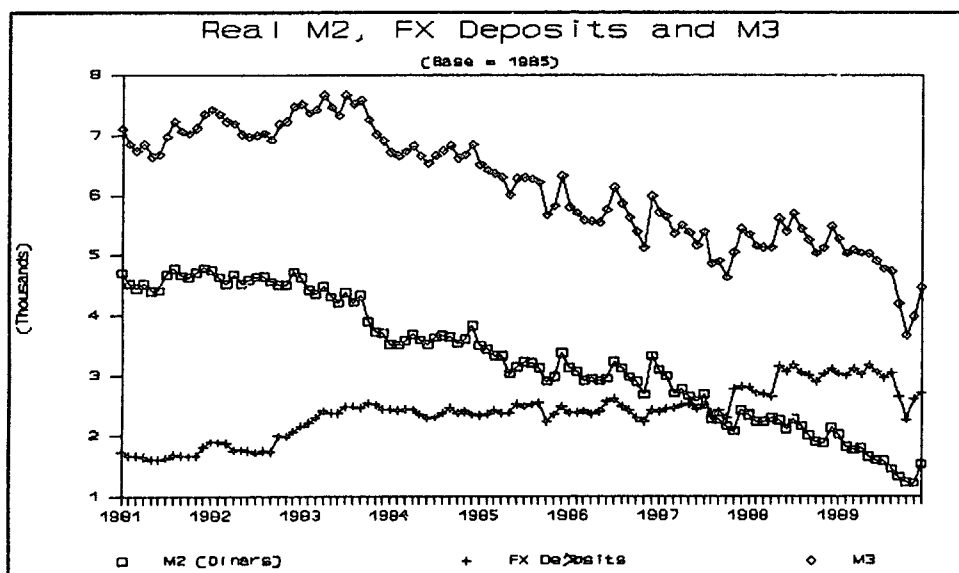
3. Exchange Rate, Wages and Prices.

The simultaneous occurrence of large real devaluations and increasing inflation raise the question of whether there were other channels of transmission of such exchange rate shocks. One popular model of inflation focuses on the

combination of real exchange rate targets, rigid real wages and monetary accommodation. It is actually a variant of a broad class of distributional conflict models of inflation and has been labeled the Pazos-Simonsen mechanism (e.g. Dornbusch 1986; Dornbusch and Simonsen 1987; and Pazos 1978). It is useful to review a basic version of the model in order to assess its relevance to Yugoslavia. To this end, assume that prices are determined by a mark-up over costs, including labor costs and the costs of intermediate inputs, as in equation (7):

$$P_t = a_L W_t + a_M E_t P_{Mt}^* \tag{7}$$

Where P is the price level, W is the nominal wage, E is the nominal exchange rate, P_M^* is the foreign price of the imported intermediate input, a_L and a_M are the unit labor and intermediate goods requirements, respectively, and the subscript t is the time period. The mark-up is set equal to zero for simplicity. The real exchange rate is defined by:

$$e_t = E_t P_t^* / P_t \tag{8}$$

Where e is the real exchange rate and P^* is the foreign currency price of the good competing with the country's exports in world markets. Substituting (8) into (7) and assuming that all international prices are equal to unity, a relationship between the real wage, w, and the real exchange rate is obtained:

$$w_t = W_t / P_t = 1/a_L - (a_M/a_L) e_t \tag{9}$$

Figure 6 illustrates the relationship between the real exchange rate and the real wage in Yugoslavia[13]. Note the two periods when there was a clear effort to maintain the real exchange rate at a targeted level: 1983 to mid-1986 and 1988 to mid-1989. In 1986-87 the real exchange rate target was partly abandoned and real wages were allowed to increase. The same happened in the

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[13] The real exchange rate was measured by a simple basket of two real, bilateral exchange rates (the Dinar/US$ and the Dinar/DM) with equal weights. The average real wage was measured by the average nominal personal income divided by the CPI.

second half of 1989. However, also note that even in these periods the real wage was usually below the levels of the 1970s.

Figure 6

Real Exchange Rate and Real Wages
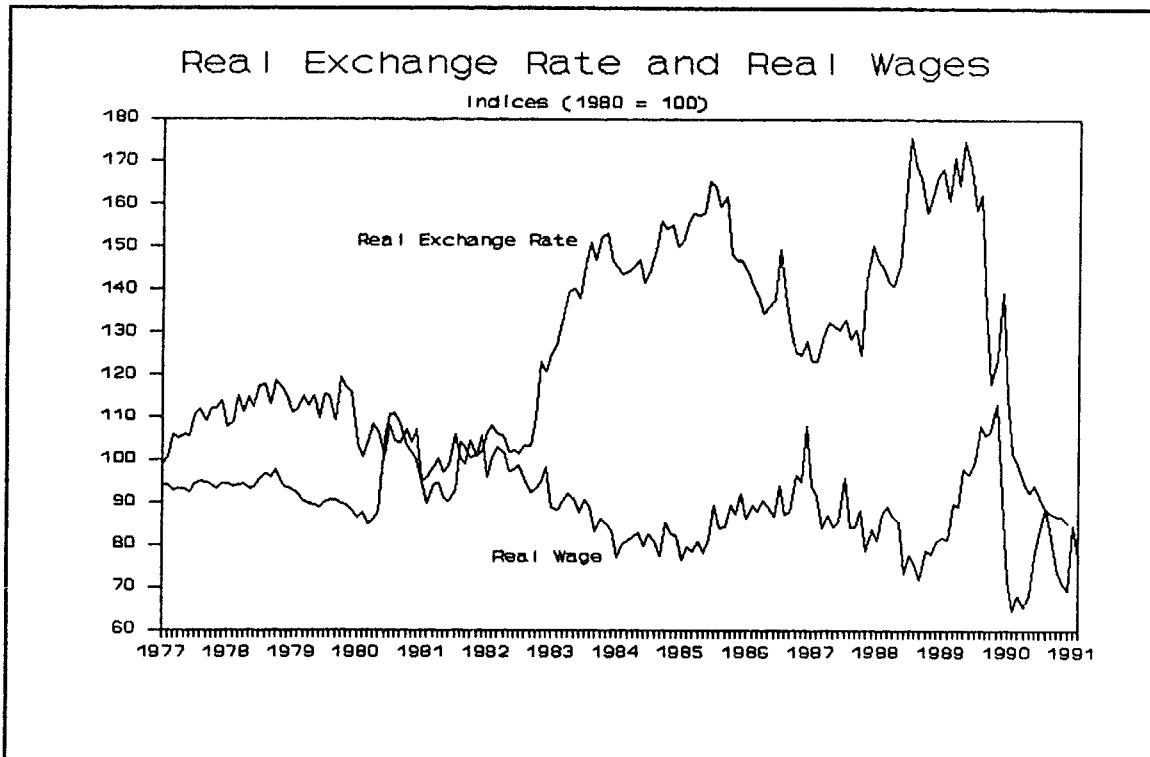
Of course, one has to bear in mind that unit labor costs decreased much less than real wages. For one, the overall decline in labor productivity offset in part the fall in real wages. Also, the imposition of heavier payroll taxes and other enterprise taxes also tended to increase unit labor costs. In the enterprises where the problem of excess labor was more severe, unit labor costs including taxes actually increased. Nevertheless, the figure does reveal the effort to drive down real wages and enforce a real devaluation.

The question is how the observed decrease in the real wage was obtained in Yugoslavia. The Pazos-Simonsen mechanism postulates that, under real wage rigidity, it takes an increase in inflation to engineer a decline in the real

wage. To understand this mechanism, assume that the adjustment of nominal wages follows the rule $W_t = cP_{t-1}$, that is, a backward indexation formula. Clearly, the parameter c is the peak real wage, that is, the level of the real wage immediately after the adjustment, while the effective real wage is $w_t = W_t/P_t$. It is easy to note that the extent to which the effective real wage falls below the peak depends on the rate of inflation between t-1 and t. The relationship between the real exchange rate and the rate of inflation, π_t, follows by a simple substitution:

$$w_t = \frac{c}{(1 + \pi_t)} = 1/a_L - (a_M/a_L)e_t \qquad (10)$$

The relevance of the Pazos-Simonsen mechanism for the Yugoslav case can be assessed by examining the rules governing the adjustment of nominal wages in the 1980s. The basic principle that was followed in Yugoslavia in the 1980s was the principle of relative performance. Any enterprise was allowed to pay higher than average wages if it could demonstrate that it had achieved a better than average performance. This principle was formulated as an attempt to avoid excessive wage payments and was made operational through a formula of "business performance" (Konovalov 1989; Saldanha 1989; and Vodopivec 1989). The implications of this principle for the short-run behavior of real wages are unclear, since there were no explicit rules for wage adjustments within the year.

In 1987, however, the government introduced an explicit formula for adjustments within the year. It divided total wage payments for each enterprise between two parts. The first part was considered as a basic labor cost, and subject to periodic adjustments within the year. The second part was determined by the relative performance of the enterprise, as discussed above. The first part was defined as 80 percent of enterprises' net operating income (revenues minus non-labor costs) in the previous year, adjusted for increases in the cost of living--a wage indexation rule.[14]

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[14] Bole and Gaspari (1990) also indicate that indexation became widespread after 1987.

The impact of the introduction of wage indexation in 1987 may be examined by inspecting the dynamic properties of the rate of inflation. Rewriting equation (7), (8) and the backward indexation rule in terms of growth rates:

$$\pi_t = \alpha_L \hat{W}_t + \alpha_M \hat{E}_t \tag{11}$$

$$\hat{E}_t = \pi_t + e_t \tag{12}$$

$$\hat{W}_t = \pi_{t-1} \tag{13}$$

Where α_L is the share of labor in total costs ($\alpha_L + \alpha_M = 1$), the hats indicate percentage changes and the foreign prices are again assumed to be constant for simplicity. If the nominal exchange rate is adjusted according to purchasing power parity, it follows that:

$$\pi_t = \pi_{t-1} \tag{14}$$

Therefore, under these conditions the inflation process is fully inertial. Of course, this crude version of the model assumes implicitly the existence of monetary accommodation. Indeed, the specification of the aggregate demand and the central bank's reaction function indicate that full inertia only results if there is also full monetary accommodation by the central bank (Cardoso 1981 and 1983; Barbosa and McNellis 1989; and Barbosa and Vals 1989).[15]

To examine whether the data supports the hypothesis of fully inertial inflation, the stochastic component of the inflationary process must still be specified. One possibility is simply to add a disturbance term to equation (14), thus modelling the rate of inflation as a random walk:

$$\pi_t = \pi_{t-1} + u_t \tag{15}$$

Where u_t is a white noise stochastic process. A second possibility is to model the rate of inflation as a local-level model, i.e., a random walk plus noise model (Harvey 1989). That assumes that inflation consists of an inertial

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[15] The model can also be extended in other directions, such as the non-synchronization of wage adjustments across different classes of workers, and the declining periodicity of wage adjustments (Simonsen 1989).

component, as in equation (15), plus a random noise (Barbosa and Vals 1989):

$$\pi_t = \pi^1_t + \epsilon_t \qquad (16)$$

$$\pi^1_t = \pi^1_{t-1} + u_t \qquad (17)$$

Where π^1 is the inertial component and ϵ_t is a white noise stochastic process. The reduced form of the local-level model is an ARIMA (0,1,1) (Harvey 1989), while the first model is an ARIMA (0,1,0). In either case we will be testing for the existence of unit roots in the inflation series. Table 6 reproduces the results of the augmented Dickey-Fuller test (Dickey and Fuller, 1979 and 1981; Dickey et al 1986; and Nelson and Plosser 1982) for the monthly rates of inflation (CPI) over successive sample periods, with the beginning of the sample fixed at January 1977. The recursive estimates of the lagged inflation coefficient are shown in figure 7.

The results indicate that during 1988 the nature of the stochastic process generating the inflation series changed. Until 1988 the hypothesis of a unit root in the inflation series is rejected at the 1 percent level of significance. At the same time, the trend coefficient is quite significant. Therefore, the inflation series seems to follow a trend-stationary (TS) process during this period, as opposed to a difference stationary (DS) process (Nelson and Plosser, 1982)[16]. In sum, the stochastic nature of the inflation series during this period does not suggest the existence of inertia.

When the sample is extended beyond 1988, however, the hypothesis of a unit root and a DS cannot be rejected. Moreover, figure 7 indicates that the structural break started in June 1988, following the real devaluation of the previous month and the maintenance of the real exchange rate at the new target. Note also that after the real devaluation of mid-1988, inflation rates stabilized on a higher plateau, while real wages fell initially (figure 8). Such behavior

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[16] The statistic associated with the lagged rate of inflation is compared against the Dickey-Fuller tables for the τ distribution (where the estimation includes the constant and the trend variable). The significance of the term in lagged differences is tested against a standard t-distribution. See also Harvey (1990).

Table 6

Augmented Dickey-Fuller Tests for the Monthly Rate of Inflation

Estimated Equation: $D(\pi_t) = a_0 + a_1 t + a_2 \pi_{t-1} + a_3 D(\pi_{t-1}) + e_t$

Sample	$\hat{a}_0$	$\hat{a}_1$	$\hat{a}_2$	$\hat{a}_3$
77.01-87.12	-0.01 (-1.87)	0.0004 (5.32)	-0.73 (-6.61)	-0.05 (-0.57)
77.01-88.06	-0.01 (-2.09)	0.0004 (5.73)	-0.82 (-6.76)	-0.03 (-0.29)
77.01-88.12	-0.01 (-2.14)	0.0003 (4.57)	-0.52 (-5.44)	-0.21 (-2.50)
77.01-89.06	-0.01 (-1.77)	0.0002 (2.69)	-0.18 (-2.22)	-0.40 (-4.70)
77.01-89.12	-0.01 (-1.0)	0.0002 (1.09)	0.06 (1.20)	-0.54 (-6.56)

Notes: D is the difference operator, $D(\pi_t) = \pi_t - \pi_{t-1}$
Computed t-statistics in parentheses

Figure 7

Recursive Estimates of the Lagged Inflation Coefficient
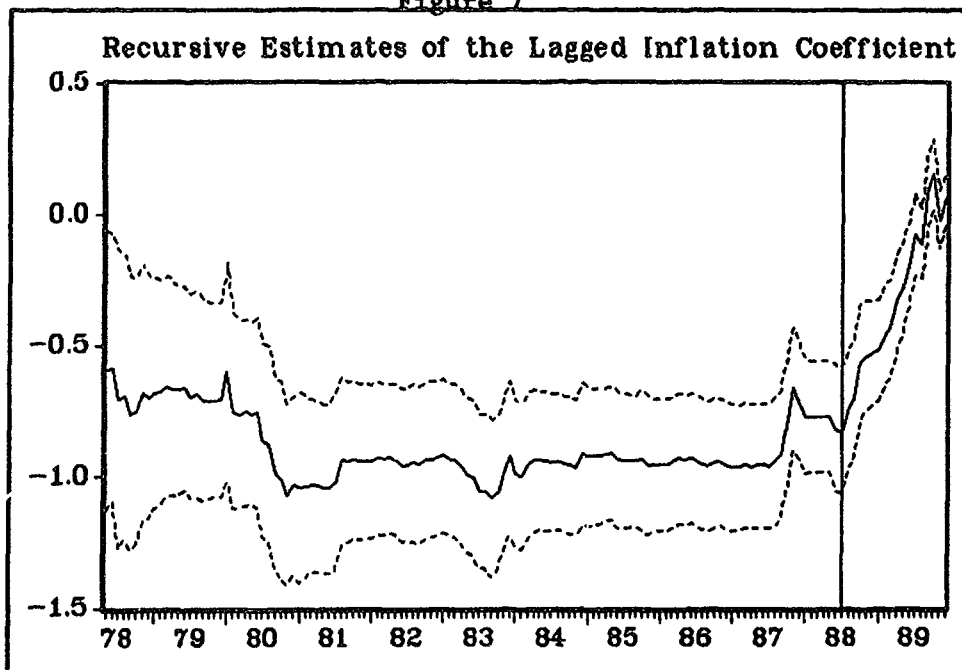
is consistent with the Pazos-Simonsen mechanism, although inflation did
accelerate later on.[17]

Although the acceleration of inflation in 1989 is partly associated with
the large build-up of foreign reserves by the central bank, the large increase
in real wages also stands out as a major cause (figure 8). Note also that such
increase in real wages was to a good extent forward looking--a preemptive action
against the expectation of a stabilization program and a wage freeze (see Helpman
and Leiderman 1990, for a model of inflation based on forward-looking wage
formation and monetary accommodation).

Figure 8
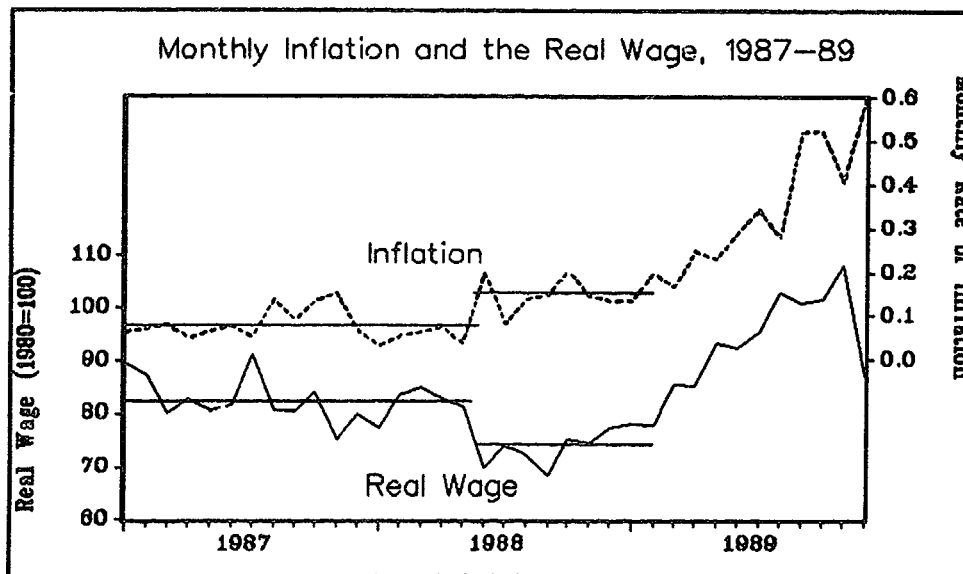
Two conclusions may be drawn from the analysis above. First, the second
experiment with real exchange rate targets had a much stronger impact on
inflation than the first, despite the smaller real devaluation. That reflects
the relatively low downward resistance of real wages in the early 1980s, and the
increased real wage rigid.ty at the end of the decade. Second, the lagged

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[17] The "blip" in the coefficient in late 1987 reflects the real devaluation
of that same period. Since that devaluation was not sustained (figure 6), the
coefficient declined during the first semester of 198C.

inflation coefficient kept increasing in 1989, despite the fact that wage formation shifted partly from backward to forward looking. Thus, although the test is capturing the increased importance of these non-fiscal factors at the end of the decade, the results also lend support to the observation made by other authors, namely, that such univariate tests are not sufficiently strong to differentiate backward-looking inertia from a forward-looking wage mechanism (Helpman and Leiderman 1988 and 1989).[18]

4. Past Stabilization Attempts and the 1990 Program.

The failure to correct the internal imbalances was the main reason behind the failure of various stabilization attempts in the mid-1980s, which relied mostly on wage-price controls. Particularly noteworthy was the stabilization attempt of mid-1988, which attempted to curb inflation through the imposition of progressively declining targets on the growth of money and wages, and the attempt to impose financial discipline on enterprises through increases in interest rates. To achieve that purpose, the authorities introduced indexation of time deposits above three months. No fiscal support to stabilization was envisaged in the 1988 program.

The inconsistencies of the mid-1988 program were aggravated by a real devaluation (figure 6) whose rationale was unclear, since the country was already running a large current account surplus and was also engaged in debt rescheduling negotiations with private foreign banks. As it happened, the real devaluation defeated one of the main purposes of the external debt rescheduling, which was to relieve the pressure of external debt payments on the domestic economy.

The attempt to maintain the real exchange rate undervalued in the context of formal wage indexation resulted in a strong acceleration of wages and prices, as shown above. The real devaluation also increased the burden of foreign interest payments, thus offsetting in part the benefits of the rescheduling of commercial debt. The pressure to finance hidden losses, particularly the central

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[18] However, Petrovic (1990) formulates and explicit model and concludes for the existence of inertia in the Yugoslav inflation.

bank's own deficit, led policy-makers to abandon the monetary targets soon after their implementation. Faced with higher real interest rates on bank credits several enterprises simply stopped paying, aggravating considerably the already severe problem of non-performing loans in the commercial banks.

The failure of the 1988 stabilization program showed the futility of implementing another program without addressing the fundamental domestic imbalances. Thus, during 1989, consensus was reached about the need to generate a surplus in the non-financial public sector in order to cover losses elsewhere in the economy, even though there was less certainty about the required magnitude of the fiscal adjustment, or the best strategy to deal with the loss-makers.

In the case of the central bank's own deficit, the solution was clear, and consisted basically in transferring the servicing of its foreign exchange liabilities, and its credit subsidies to favored sectors to the federal budget. In the case of enterprises and commercial banks, the situation was less clear. Although enterprise losses where regularly calculated, the magnitude of accounting problems decreased the reliance on the available figures. The situation of commercial banks was not fully transparent either. The share of non performing loans was known to be large, but the estimates were still tentative. In addition, the government had not completed the design of a well-defined strategy to deal with the loss-makers. For instance, there were still doubts of whether to provide a fiscal subsidy to loss-makers, while submitting them to restructuring programs (involving lay-offs, debt write-offs, selective improving investments, changes in management, and so on), or whether to let the Darwinian-Schumpeterian law of natural selection operate freely. In this case, the number of bankruptcies was expected to increase much more rapidly, and the fiscal resources would be directed towards social programs, as opposed to loss making enterprises. The final design of the program shows that policy-makers opted for the second approach.

The stabilization program of 1990 (actually launched in mid-December 1989) comprised a variety of measures in the areas of incomes, monetary, exchange, trade, and fiscal policies (see Coricelli and Rocha 1991 for much greater

detail). The program also included a 60-day tolerance limit for enterprise arrears, as a device to force inefficient enterprises into bankruptcy. The government could implement this measure due to the existence of a very centralized system of payments in Yugoslavia, and it was announced as one component of a future comprehensive program of restructuring and privatization of banks and enterprises.

Incomes policy comprised a 6-month freeze in the exchange rate, nominal wages, and a set of public sector prices accounting to 20 percent of the CPI. The exchange rate freeze was later extended to 1 year. The exchange rate and public sector prices were frozen after a series of adjustments in late 1989. However, the devaluations that preceded the freeze were rapidly eroded by the increase in prices that followed the implementation of the program, as shown in figure 6.

Monetary policy consisted basically of a freeze in the nominal stock of the central bank's net domestic assets, while allowing the central bank to monetize foreign exchange inflows. The exchange and trade policy components comprised a substantial relaxation of trade controls and the introduction of currency convertibility.

Fiscal policy, a critical component of the program, consisted of an expected fiscal adjustment of 5 percent of GSP designed to cover the central bank's deficit, to support a banking restructuring program, to finance a social program, and to cover some enterprise arrears. The envisaged increase in fiscal revenues was expected to come partly from exogenous increases in taxation (3.5 percent of GSP) and partly from the inverse Tanzi-Olivera effect (1.5 percent) (see Olivera 1967; Tanzi 1977).

The stabilization program of January 1990 achieved a sharp reduction in the rate of inflation during the first semester of 1990 without recourse to widespread price controls. As shown in figure 9, monthly rates of inflation (retail prices) were reduced from 60 percent in December 1989 to almost zero in May and June. A slowdown of economic activity also followed the implementation of the program, as indicated by the 10 percent decline in industrial production

during 1990. However, such a decline in activity had already started in the second half of 1989 (figure 9), and cannot be blamed entirely on the stabilization.

There are no indications that monetary policy was unduly restrictive in the first semester. Indeed, a large repatriation of foreign assets held abroad by exporting enterprises, and increased workers' remittances resulted in a US$3 billion increase in reserves in the first semester. That, in turn, resulted in a large increase in the real stocks of base money and M1 during the same period. In addition, the December monetary and credit "blips" (figure 9) also suggest that liquidity conditions were not excessively restrictive at the start of the program.
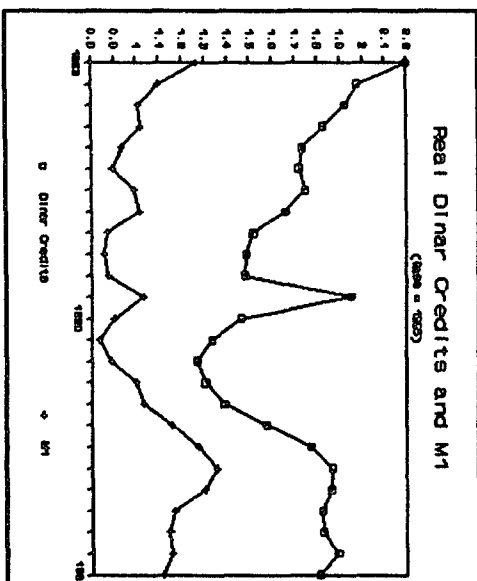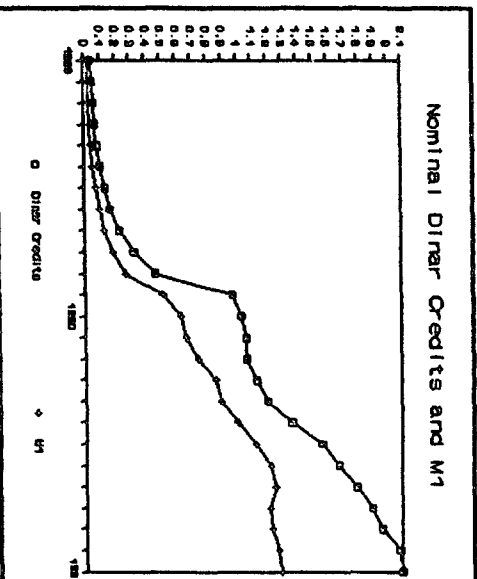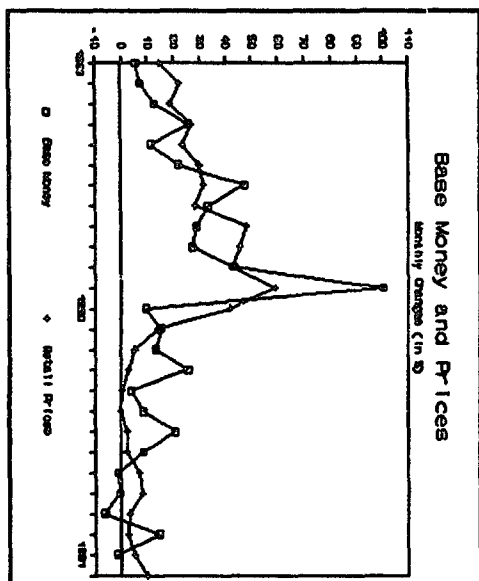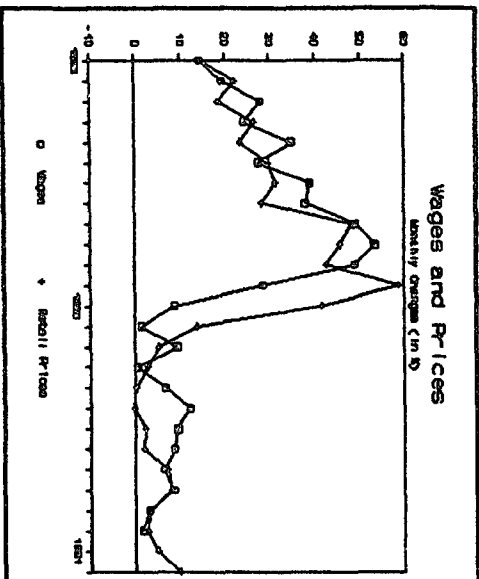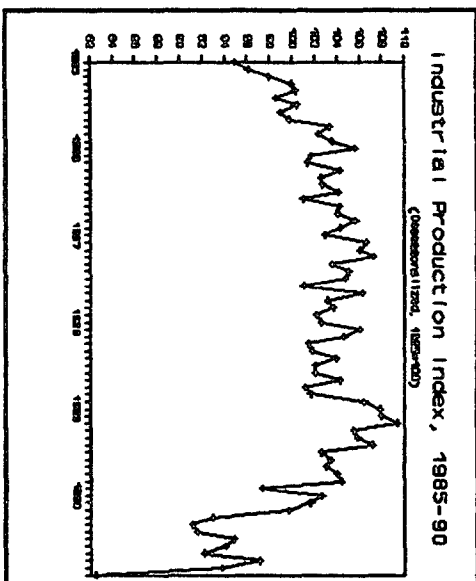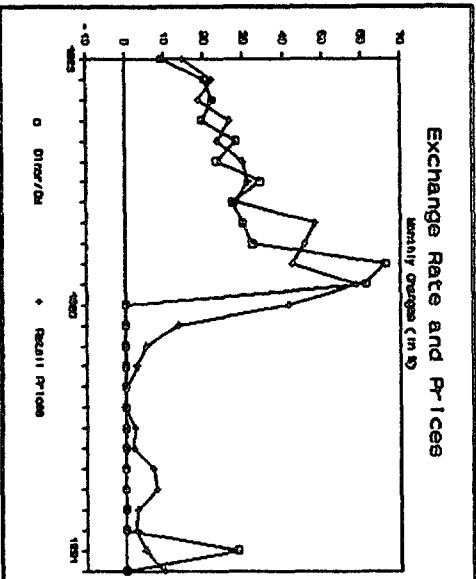
Even though monetary policy did not appear excessively restrictive, a large number of enterprises experienced severe difficulties in meeting their obligations during the first semester, revealing their high degree of dependency on bank credits. Out of 25,000 enterprises in the socialized sector, 7,000 enterprises had fallen behind their obligations by at least one day, 3,000 had accumulated arrears for 30 days and 350 were declared bankrupt, for having failed to meet payments for 60 days. A large number of enterprises interrupted wage payments in May, in order to postpone bankruptcy. The situation at the end of the first semester was very differentiated, with one group of enterprises increasing wages above the ceiling, and another group unable to make wage payments within the ceiling.

Pressures to relax monetary and credit policies mounted during the first semester, leading effectively to a relaxation at the end of the semester. Bank credits started growing very strongly after June, leading to further increases in wages and finally to an increase in the rate of inflation to levels above 8 percent in September and October (figure 9). The relaxation of monetary policy also aborted the expected shake-out of the industrial sector, by keeping loss making enterprises afloat, while also allowing them to resume wage payments.

Concern over the revival of inflation led the central bank to shift back to a restrictive monetary policy in early October. However, pressed by enterprises 'o continue lending, the banks avoided a contraction of credit by not complying with reserve requirements. The last indication of the difficulties

Figure 9

Selected Economic Variables

Nominal Dinar Credits and M1

□ Dinar Credits   ◆ M1

Wages and Prices
Monthly Changes (in %)

□ Wages   ◆ Retail Prices

Exchange Rate and Prices
Monthly Changes (in %)

□ Dinar/DM   ◆ Retail Prices

Real Dinar Credits and M1
(1985 = 100)

□ Dinar Credits   ◆ M1

Base Money and Prices
Monthly Changes (in %)

□ Base Money   ◆ Retail Prices

Industrial Production Index, 1985-90
(Seasonally Adjusted, 1985=100)

the central bank faced in conducting monetary policy was a bizarre episode in December 1990, when one of the regional branches of the central bank increased credits by US$1.8 billion equivalent of dinars, without prior notification to the board of governors, in order to finance loss making enterprises, pensions, and agricultural subsidies (The Economist, January 12, 1991).

The expansion in central bank credits did not result in a monetary expansion because of the large loss of foreign reserves that happened in the same period (more than US$ 3 billion in the last quarter). In fact, the situation in the last quarter was exactly the reverse of the first quarter, involving an expansion of domestic credits, a fall of foreign reserves and a nearly constant stock of M1 (figure 9). Although the open current and capital accounts prevented a further acceleration of inflation at the end of 1990, these episodes of monetary decontrol and the large loss of reserves raised obvious doubts about the sustainability of the stabilization program.

The recognition that the exchange rate had become severely appreciated led to a corrective 30 percent devaluation on January 1, 1991, as well as a the suspension of convertibility. These measures were unavoidable, given the large loss of reserves at the end of 1990. However, they also led to an increase in inflation in early 1991 (5 and 10 percent in January and February, respectively), despite the reimposition of wage controls and efforts to reassert control over monetary policy. Moreover, the erosion of the first devaluation led to a second corrective devaluation of 45 percent in April 1991. Therefore, the challenge faced by policy-makers in 1991 is to obtain the countrywide consensus that will allow the continuous enforcement of wage, monetary and fiscal policies which is required to prevent the reemergence of an exchange rate-wages-prices spiral.

5. Conclusions

The paper had two main objectives. First, to examine the main causes of the acceleration of inflation in Yugoslavia during the 1980s and, second, to review past and current attempts at stabilization. The paper showed that inflation in Yugoslavia shares common elements with inflation in other high indebted countries, despite initial appearances pointing otherwise. The common elements are a large transfer of resources abroad not matched by an internal

adjustment, and resulting in a large internal redistribution of real resources
through inflation. Yugoslavia seems to differ from other cases due to the lack
of transparency of internal conditions. Instead of an open fiscal deficit, there
were complex interactions among enterprises, commercial banks and the central
bank, involving, among other things, the absorption and servicing of a large
stock of foreign exchange liabilities by the latter. The paper also showed how
other factors contributed to the sharp acceleration of inflation at the end of
the decade. More specifically, a large real devaluation in mid-1988 in the
context of an indexed economy drove inflation to a much higher plateau. During
1989, a preemptive explosion of real wages became a major factor of acceleration
of inflation.

The paper argued that the failure to correct the hidden losses in the
economy was the main cause of the failure of the various attempts at
stabilization in the 1980s. The 1990 program was the first program to recognize
the existence of hidden losses and the need for a fiscal correction, although
it also introduced other elements to cope with inflationary inertia. The program
succeeded in eliminating the central bank's own deficit, and had initial success
in halting inflation. However, it became clear during the course of 1990 that
other losses had not been removed. Pressures to finance enterprises and avoid
a liquidity crisis in the financial system resulted in a relaxation of monetary
policy in mid-1990 and a revival of inflationary pressures in the second
semester. Attempts to reimpose monetary control met considerable difficulties
at the end of the year, including a bizarre episode of expansion of central bank
credits without approval by the board of governors.

It became also clear that the fiscal component was not consistent with
other elements of the program. In particular, it was clearly insufficient to
finance a social program of the magnitude that would be required, had loss making
enterprises really been forced into bankruptcy, and also to cover the needs of
the banking restructuring program. Seen from this angle, the Yugoslav program
of 1990 resembles other heterodox programs that had initial success in reducing
inflation, but later faltered due to the insufficiency of the fiscal adjustment.

At the same time, the events in the second half of 1990 also indicate that,
for a stabilization program to succeed in Yugoslavia, there must be much greater

political resolve in dealing with wage indiscipline and loss making enterprises than was observed during the course of 1990. It also brings the question of whether financial discipline can really be imposed in the system only at the macroeconomic level, and without the introduction of private ownership of capital. This finally brings us the related question of whether stabilization in Yugoslavia can ultimately succeed in the absence of a comprehensive privatization program.

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