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Suriname: A Case Study of High Inflation

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Abstract

Suriname recently went through a period of destabilizationthat that bordered on hyperinflation. The country's experience provides a good illustration to study the genesis and dynamics of high inflation and includes some unusual phenomena, such as a monetary overhang, an eight-tiered exchange rate, and inflationary gold purchases by the central bank. High inflation also had a significant impact on the real economy. This paper compares the experience of Suriname with other countries discussed in the recent stabilization literature. It finds strong evidence of intertemporal demand effects, which occurred as the public reacted to the temporary bout of high inflation.

Contents   Page

1. INTRODUCTION

During the 1980s, many Latin American countries were characterized by low growth, chronic inflation and excessive foreign debt. Not so Suriname. At a first glance, the small country on the Caribbean coast was able to steer through the "lost decade" with some success. Although growth was minimal (real GDP in 1990 was only 4 percent higher than in 1980), inflation remained low and the country was virtually free of foreign debt. However, just as the rest of the continent emerged from its economic woes in the early 1990s, Suriname fell victim to an intense bout of high inflation. Starting from single-digit numbers, inflation accelerated rapidly and peaked at 43 percent a month in November 1994, just falling short of the threshold for hyperinflation (50 percent per month).

The price level could be stabilized in late 1995, and the economy experienced a period of rapid growth. However, at the time of writing this paper (October 1999), a serious setback was underway. Large fiscal deficits re-emerged in 1997 and 1998, and a wide gap opened between the official and parallel market exchange rate. Another inflationary spiral was sparked by a large devaluation of the official exchange rate in January 1999. By mid-year, inflation has soared to 150 percent and the parallel exchange rate has depreciated by almost 300 percent.

An analysis of the past Surinamese inflation might provide some orientation for the present. And in addition, it allows to address some long-standing questions in monetary macroeconomics. Does the experience in Suriname support the conventional wisdom that high inflation is always a fiscal phenomenon? Section 2 discusses the country's recent economic history and argues that ultimately the conventional wisdom was correct. However, the link between the budget deficit and inflation was less than straightforward. Compared with other countries in the region, the two variables interacted in an interesting and quite unusual way. Certain aspects even recall experiences of Eastern European economies during transition. This makes Suriname an intriguing case for macroeconomists.
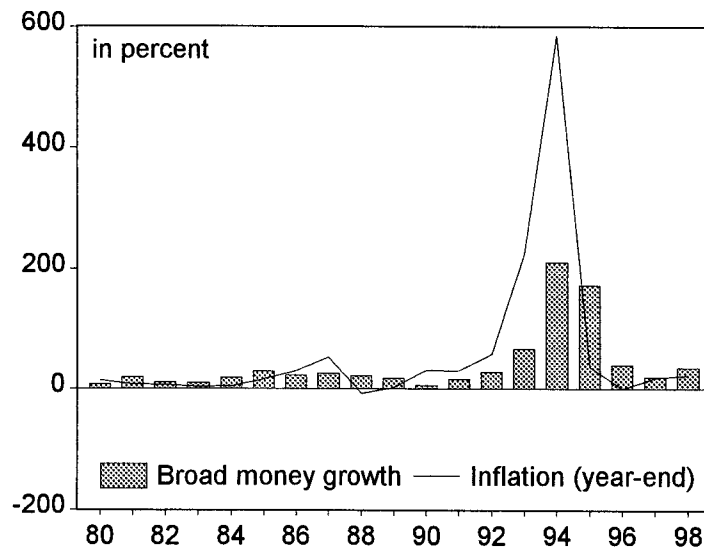

Figure 1. Inflation and money growth in Suriname 1980-96.

The second part of this paper deals with the impact of high inflation beyond the monetary and fiscal spheres. We focus on the period between 1992 and 1996. How were *real* variables affected? There is a sizeable literature on the relationship between money, inflation and growth, which is surveyed by Orphanides and Solow (1990). Probably the two most prominent strands of theory are represented by the *Phillips curve* and the *neutrality* proposition. The Phillips curve argues that an increase in inflation results in an *increase* in economic activity, inducing more consumption spending and a higher trade deficit.[1] Alternatively, if money is neutral, inflation has no effect on real variables. Sidrausky (1967) developed this point in an intertemporal optimizing model with money in the utility function. Textbooks often combine the two views and portray the positive effect of the Phillips curve as the short run and monetary neutrality as the long run.

However, as discussed by Orphanides and Solow, empirical studies often find *negative* effects of inflation on real activity. The stylized facts on Suriname's high inflation period 1992-96, which are presented in section 3, also point to contractionary effects. High inflation was accompanied by a demonetization of the economy, a decline in consumption, a real depreciation, a sharp decline in real wages and an improvement in the external accounts.

How can theory account for these patterns? Some important insights can be obtained from the literature on exchange-rate based stabilizations, which has been developed during the past 10 years to explain *disinflation* experiences in Latin America and elsewhere. These experiences strongly contradicted the conventional Phillips-curve wisdom that disinflation has contractionary effects. Calvo (1986) pioneered in modeling a negative correlation between inflation and aggregate demand, by using an intertemporal maximization approach.[2] Section 4 draws on this literature and develops an analytical model to provide economic rationale for the experience with inflation in Suriname. Technically, it follows the lines of Calvo and Végh (1993) and argues that the Surinamese public - which was used to price stability - regarded the high inflation bout as temporary. Money is assumed to facilitate transactions and to lower the cost of consumption. Since inflation acted as a tax on money holdings, households temporarily reduced their real balances and postponed consumption. We show that the model does a fair job in explaining the observed stylized facts in Suriname. Section 5 concludes and summarizes the main lessons from this case study.

2. THE CAUSES OF HIGH INFLATION

Suriname became independent from the Netherlands in 1975. It inherited a well functioning democratic system and relatively high standards of living, compared with other countries in the region. The Netherlands was interested in promoting its former colony as a model of stability and development. To ease the transition into full independence, it had agreed to provide significant budgetary and balance-of-payments support for the next several years. Over

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[1] In the context of neoclassical growth models, Tobin (1965) finds a positive effect of inflation on economic activity, as it encourages a portfolio shift from real balances to capital. This result depends critically on an exogenous savings rate.

[2] A survey can be found in Rebelo and Végh (1996).

the period of 1976-82, this support amounted to 9 percent of GDP and about 25 percent of public
sector revenues annually.

The emergence of large budget deficits

However, in 1980 a military-backed coup ousted the elected government, and political turmoil
ensued for several years. Dutch development aid was suspended in late 1982. At the same time,
world market prices for bauxite and aluminum plummeted. Bauxite and its derivatives account
for more than 80 percent of Suriname's exports and constitute a significant source of government
revenue. The drop in these revenues and the suspension of Dutch aid were serious blows to the
budget. The public sector, which had generated surpluses for most years since independence, was
suddenly facing a severe financial impasse.

As a first reaction, the government cut down on public investment. A large number of
development projects - most financed by Dutch aid - were stopped. Public sector investment
declined from around 9 percent of GDP in 1982 to less than 2 percent by 1987.

In line with a populist agenda, however, the government granted its employees massive
wage increases, expanded an already generous health care system and installed pervasive price
controls. Public enterprises and utilities were forced to price their products far below marginal
cost, and large transfers were needed to cover their losses. As a result, current expenditures
increased from around 29 percent of GDP in 1982 to over 52 percent in 1987.

In 1986, a surge in guerilla activity paralyzed the bauxite and palm oil industries. In
response, the government increased its military expenditures, which put additional strain on the
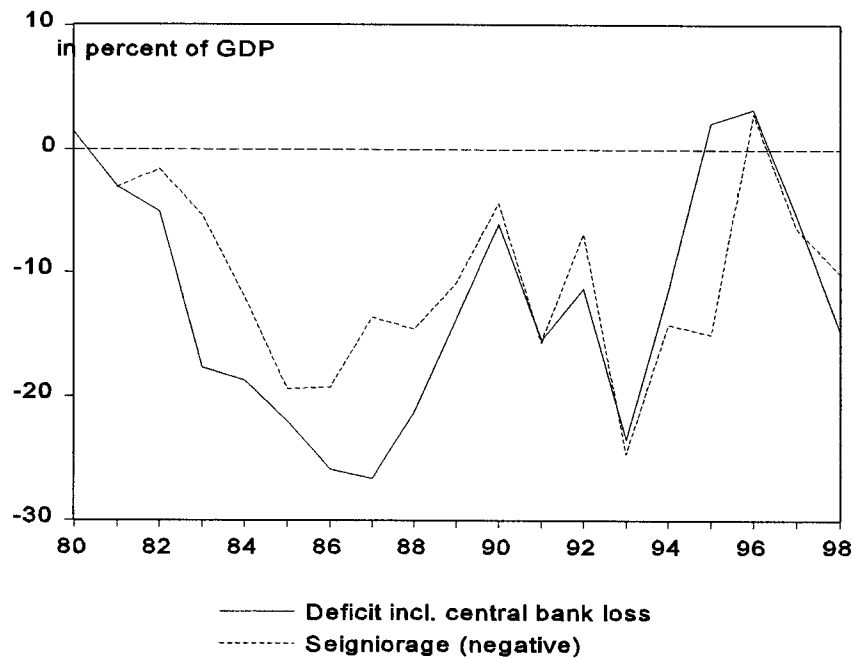budget.

Figure 2. Overall public sector deficits and (inverted) seigniorage revenues.

Table 1. Selected Fiscal Indicators, 1980-89

Year	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
in percent of GDP										
Revenues	35.5	33.5	33.1	29.0	28.3	27.8	29.3	27.5	30.2	33.6
o.w. grants	7.4	8.4	8.2	0.3	0.4	0.3	0.3	0.4	0.8	1.6
Expenditures	34.0	36.2	37.5	46.7	46.2	49.3	55.8	53.9	51.5	47.3
Current	27.3	27.6	28.6	40.9	41.5	46.2	53.6	52.0	49.7	45.7
Capital	6.7	8.7	9.0	5.8	4.7	3.1	2.2	1.9	1.8	3.2
Overall balance	1.4	-2.7	-4.4	-17.7	-17.8	-21.5	-26.6	-26.3	-21.3	-13.7
Seignorage	-0.3	3.1	1.6	5.3	12.0	19.5	19.2	13.6	14.6	10.8
annual percentage change, year-end										
Base money	-2.3	23.1	9.9	29.1	48.3	52.6	36.1	20.1	21.6	15.3
Inflation	13.9	7.3	6.5	3.9	4.5	15.8	30.0	52.2	-7.6	2.0

Sources: see data appendix.

In sum, a cutoff from Dutch aid and lower bauxite prices decreased revenues, whereas higher wages, transfers and military purchases boosted expenditures. As a result, Suriname's public sector deficit widened sharply after 1982, particularly during the years of 1986 and 1987 when it exceeded 26 percent of GDP.

Since the country had been increasingly isolated from world capital markets, the government could not hope to finance the deficits with foreign debt. It received only minor loans from Libya and Brazil. On the other hand, Suriname lacked a domestic capital market, which made internal debt financing difficult. The only option left to the government was printing money, and this option was thoroughly used: Seigniorage financed more than 80 percent of the deficits between 1980 and 1998. It accounted for up to 20 percent of GDP. Figure 2 shows the fiscal balance together with an estimate of seigniorage.[3]

The picture so far is very similar to high inflation periods in other Latin American countries. However, in Suriname loose fiscal policies did *not* result in immediate high inflation. The yearly inflation rate remained in the single-digits during most years until 1991. This unusual behavior of the price level is probably the most perplexing aspect of Suriname's case.

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[3] Seigniorage in percent of GDP was calculated as $S = \Delta M/PY$, where M denotes base money and PY denotes nominal GDP. High values in 1994 and 1995 will be explained below with gold purchases (1994) and a rapid remonetization of the economy (1995) after high inflation.

Monetary overhang

Cumulatively, the price level rose fourfold between 1982 and 1991. In contrast, base money rose ninefold over the same period of time. The large increase in real money holdings was a key to the government's success in obtaining seigniorage revenue. Figure 3 plots the extent of monetization of the Surinamese economy. M2 rose to levels above 130 percent of GDP during the late 1980s.

Compared to other countries in Latin America, this is a very high number. Most values for the M2/GDP ratio fall in a range between 20 and 30 percent. In 1996, Argentina recorded 21 percent, Brazil 27 percent, Mexico 28 percent and Venezuela 21 percent. Industrialized countries have somewhat higher ratios, mainly because of more established and deeper financial markets.
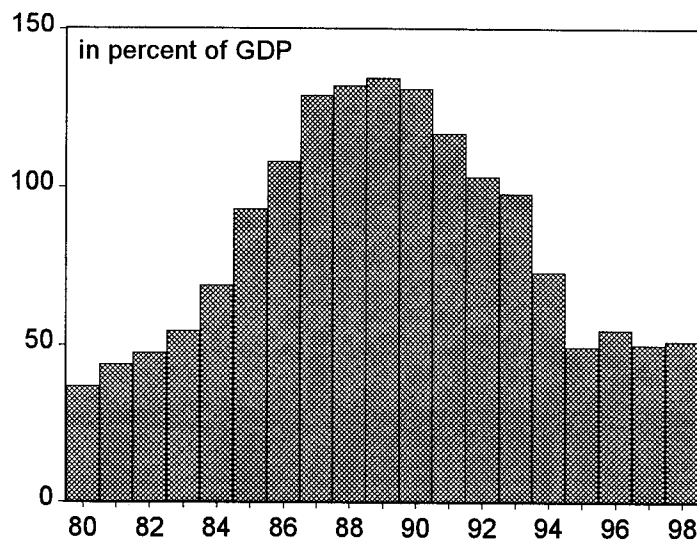

Figure 3. Ratio of M2 to GDP.

Figure 3 highlights the unusual "liquidity bubble" in Suriname during the late 1980s. It is strongly reminiscent of the "monetary overhang" phenomenon observed in some socialist economies in the past. Planned economies tended to have very high ratios of M2 to GDP. For 1988, one year before the Berlin wall came down, Caprio and Honohan (1991) report the following values: Hungary 47 percent, China 65 percent, Romania 72 percent, Bulgaria 105 percent and the People's Republic of Yemen 175 percent. Even by these standards, the "monetary overhang" in Suriname was quite substantial.

How could the country sustain so much liquidity? Why did the expansion in money supply not fuel into inflation sooner? As early as in 1982, the government had issued wide-ranging price controls. Prices were fixed for 80 percent of all goods and services. However, in very few countries have price controls ever been an effective means of containing inflation, because they are so difficult to enforce. Why did they appear to work in Suriname? A definitive answer

probably has to await future research. One factor might be the small size of the population and its concentration in two constricted urban centers, the Paramaribo/Wanica and the Nickerie districts. Most of the rest of the country is covered by tropical rain forest and sparsely inhabited. Non-compliance and black markets are more readily visible in such small urban areas, and easier to control. Also, the political system was playing a role. The military government acted in a very determined way to suffocate inflation. In 1984, it issued a decree which outlawed price increases on all goods and services. The sanctions were harsh and ranged from confiscating or closing a violator's businesses to several years of imprisonment. There is little information on how these sanctions were applied in practice, but the evidence suggests an important deterring effect.

More support for a role of the political system in sustaining the monetary overhang comes from events after 1991. In this year, free elections were organized and the previous opposition took over with the support of three parties and 54 percent of the vote. The new democratic regime was not in the same position as its military predecessor to enforce the controls. As a result, the mandated price freeze soon crumbled. Driven by the large monetary overhang, inflation picked up almost immediately after the elections. In 1992 it accelerated to 57 percent, despite modest growth in the monetary base of only 13 percent. The M2/GDP ratio rapidly fell below 100 percent.

Most Eastern European countries also experienced a spike of inflation after liberalizing prices. As in Suriname, this was the consequence of households correcting a monetary overhang. The M2/GDP ratio of Suriname was roughly 120 percent in 1991. In contrast, a ratio of 40 percent might be considered a likely equilibrium value, by judging from other Caribbean countries and figure 3. Therefore, an increase in the price level by a factor of 3 would have eliminated the monetary overhang (holding M2 and real GDP constant). In reality, however, the price level increased by a factor of 48 between 1991 and 1996. Eliminating a monetary overhang was thus not the only factor behind high inflation.

Multiple exchange rates

Alarming news came from the foreign exchange market. Suriname had pegged its currency, the Surinamese Guilder (SG), to the U.S. dollar since 1971, at a rate of SG 1.785 per U.S. dollar. The government had maintained this parity despite the monetizing of increasing fiscal deficits. Consequently, international reserves were almost exhausted by 1984. The government enacted severe trade restrictions and rationed essential imported goods. Several large international transactions were carried out in barter. Smuggling thrived, and the U.S. dollar sold at a high premium on the black market, especially after the transition to democratic rule. At the end of 1991, the parallel rate exceeded the official rate by a factor of 10, and continued to increase rapidly.

However, the government feared the political consequences of an outright devaluation. It installed a complicated system of eight parallel exchange rates, some of them more depreciated than others. The "official" exchange rate continued to be at SG 1.785 per U.S. dollar. Additional rates for bauxite, fuel, rice and banana transactions were fixed at seemingly arbitrary values and adjusted in random intervals. Others, like the interbank and auction rates, were allowed to move closer in line with the parallel market (see figure 4). The exchange rate system was so complex that the authorities soon lost control over it.
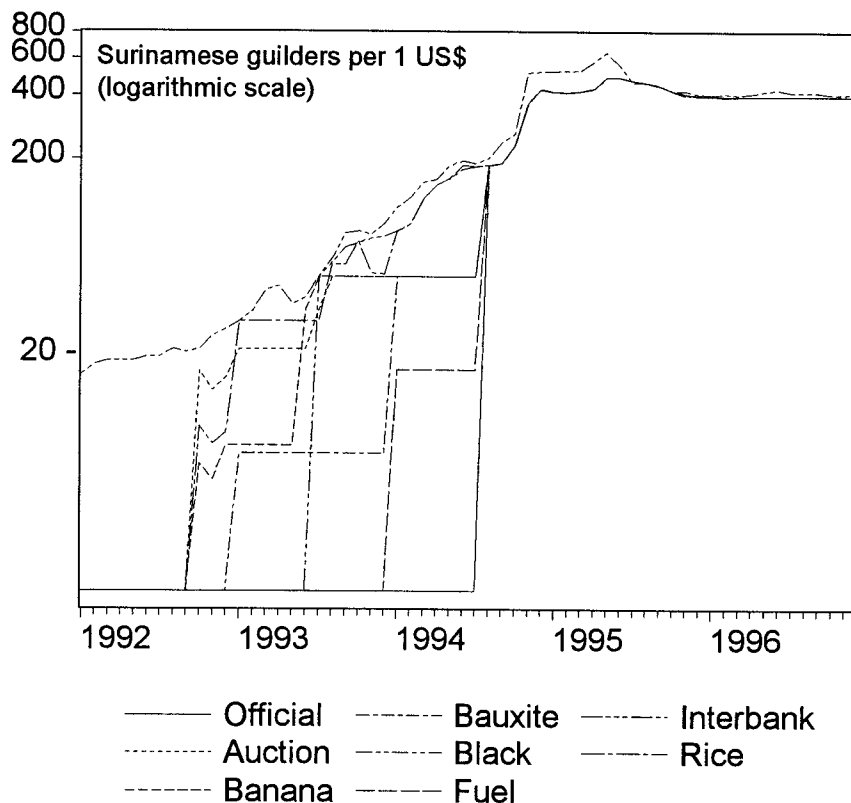
Figure 4. The complex system of multiple exchange rates in Suriname, 1992-94.

With eight different exchange rates, the system provided ample opportunities for arbitrage. Vast transfers of money occurred, usually at the expense of the central bank. Its quasi-fiscal deficit rose from 3 percent of GDP in 1992 to 13 percent in 1993 and 18 percent in 1994, adding to the negative balance of the government. As a result, the overall public sector deficit reached almost 24 percent of GDP in 1993.

To finance this deficit, the government once more resorted to printing money. In contrast to the 1980s, however, prices were no longer under effective official control. Inflation spiraled upwards and reached 586 percent at the end of 1994.

Gold purchases

In August 1994, the exchange rates were re-unified, and the losses of the central bank disappeared at once. However, inflation was far from dead. In contrast, it continued to accelerate and reached its peak monthly value in December 1994. Similarly, the parallel exchange rate rose from SG 203 per U.S. dollar in August 1994 to SG 515 by the end of the year and to SG 644 in July 1995.
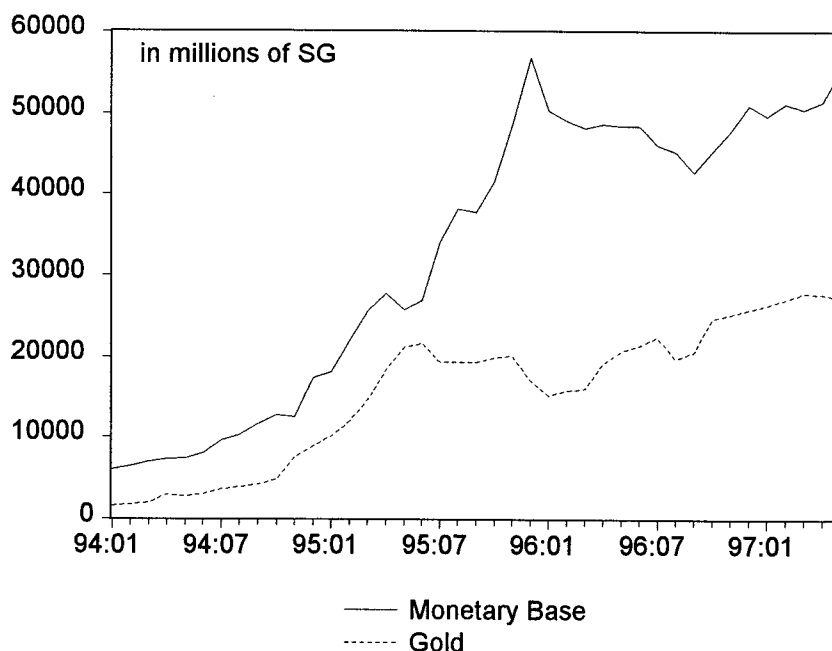
Figure 5. Gold purchases and the expansion of the monetary base in 1994/95.

Behind this final bout of inflation was a massive move by the central bank to stock up its gold reserves. Intended as a measure to strengthen the bank's credibility and commitment to future stabilization, it provoked the opposite effect in the short run. The central bank bought large amounts of gold from local diggers, who would have otherwise smuggled it out. It paid for the gold with freshly printed domestic currency, thus expanding the monetary base. Figure 5 shows parallel increase in gold reserves and base money in the period between August 1994 and July 1995.

Stabilization

The price level was finally stabilized in July 1995. Month-to-month inflation rates turned negative during the rest of the year, and the price level declined by another -0.8 percent on average in 1996. Real balances, which had been drastically reduced during high inflation, rebounded. Base money grew by 227 percent in 1995, compared with an inflation rate of only 37 percent. The economy was rapidly remonetizing. The M2/GDP ratio regained the value it used to have at the beginning of the 1980s, roughly 40 percent.

Stabilization was even more visible on the foreign exchange market. From its peak of SG 644.5 per U.S. dollar in May 1995, the parallel rate *appreciated* to SG 403 by November 1995 and converged with the official rate. In January 1996, the government fixed the guilder at a uniform rate of SG 406 per U.S. dollar. Ex post, the Surinamese strategy can be classified as an orthodox exchange-rate based stabilization which was supported by a massive fiscal adjustment.

The fiscal adjustment included three components. As noted above, a first major step was the unification of the multiple exchange rates in July of 1994. This eliminated the quasi-fiscal deficit of the central bank and reduced the effective expenditures of the public sector by 14 percentage points of GDP.

A second source of consolidation came through the adoption of several reforms in the tax and customs system. Most important was the elimination of a collection lag in income and consumption taxes. The Olivera-Tanzi effect had greatly eroded the real value of those taxes during high inflation. Between 1994 and 1996, tax revenues increased from 20 to 35 percent of GDP, without major increases in tax rates. Luckily, a boom in aluminum prices aided the stabilization: Higher demand on the world markets raised the price of aluminum by almost 60 percent between 1993 and 1995.

The third and most substantial factor was the resumption of Dutch aid in 1993. Its effect became fully visible after the end of the unfortunate experiment with multiple exchange rates, raising public sector revenues by 15 percent of GDP.

Table 2. Selected Fiscal Indicators, 1990-98

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998*
in percent of GDP									
Revenues	34.9	27.1	29.0	36.5	55.8	58.9	61.3	43.4	42.7
o.w. grants	1.8	1.6	7.7	22.6	23.8	17.2	21.6	11.0	7.7
Expenditures	40.7	45.3	40.1	60.1	67.2	56.8	58.0	48.8	57.5
Current	39.4	43.8	34.9	43.0	43.2	49.7	49.9	39.6	49.2
Capital	3.2	1.5	2.0	4.0	5.6	7.1	8.1	9.2	8.3
CB losses	...	...	3.2	13.1	18.4	...	...	...	...
Overall balance	-5.8	-18.2	-11.1	-23.6	-11.4	2.1	3.2	-5.4	-14.8
Seignorage	4.4	15.6	6.9	24.7	14.2	15.0	-2.9	6.4	10.1
annual percentage change, year-end									
Base money	5.8	26.9	12.6	70.0	207.8	227.0	-10.3	55.3	57.0
Inflation ·	31.6	30.0	57.4	225.0	586.5	36.9	0.5	18.3	22.4

*preliminary estimates. Sources: see data appendix.

Overall, the Surinamese adjustment was quite impressive. Within two years, the balance of the public sector improved by almost 26 percent of GDP. The budget was in surplus in both 1995 and 1996. The success of stabilization underscores the classical link between fiscal and monetary policy. As the country was running large budget deficits, it had no choice but to run the printing press, and eventually reaped high inflation. However, as Suriname regained control over its public finances, inflation disappeared.

Recent developments have shown that the victory over inflation did not last. Large fiscal deficits have re-emerged, and after a short period of impressive growth, the economy has ground to a halt in 1999. For lack of alternatives, the deficits are once more being financed by seignorage. In 1998, the exchange rate system split, and the parallel market depreciated rapidly. A large devaluation of the official rate in January 1999 sparked a new spiral of inflation. By mid-year, inflation has soared to 150 percent and the parallel exchange rate has depreciated by almost 300 percent. Sadly, Suriname is experiencing its second period of high inflation within less than a decade.

3. REAL EFFECTS OF HIGH INFLATION

Inflation has had a profound impact on the real economy in Suriname. Contrary to conventional beliefs, the high inflation episode 1992-96 was not accompanied by an expansion of aggregate demand, but by a contraction. This negative correlation between inflation and real activity reveals some parallels to exchange-rate based *stabilizations* in other countries. Rebelo and Végh (1996) document nine stylized facts from experiences in Latin America and Israel. These facts also suggest a negative correlation between inflation and aggregate demand, as *disinflation* led to booms in consumption and investment. Our experiment is to examine a similar set of variables for a period of *high inflation*. The Surinamese patterns should therefore be exactly opposite to the observations of Rebelo and Végh.[4] Section 4 presents a compact and tractable model which highlights the main economic forces at work.

Five stylized facts could be observed during high inflation in Suriname:

1. A demonetization of the economy. During high inflation, real balances fell to less than 1/7 of their maximum level of 1989 (figure 6, shaded area indicates inflation period). However, as we have argued in the last section, the level of 1989 is not an ideal benchmark, since it includes a large monetary overhang. A better comparison is the level of 1980, when inflation was low and the budget was in balance. Even so, the demonetization during high inflation was substantial. In 1995, real balances were reduced to less than a third of their value in 1980. After inflation ended, the economy remonetized quickly, and real balances bounced back towards their 1980 level. The decline in real money was the result of two effects: Higher opportunity costs of holding money (a substitution effect), and fewer consumption transactions (an income effect).

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[4] The lack of reliable data unfortunately prevents a complete examination of the list of variables in Rebelo and Végh (1996).
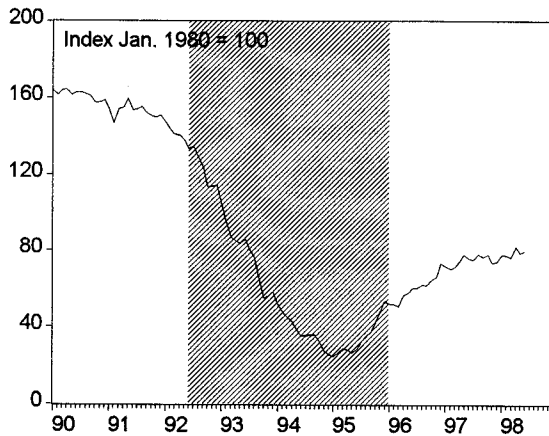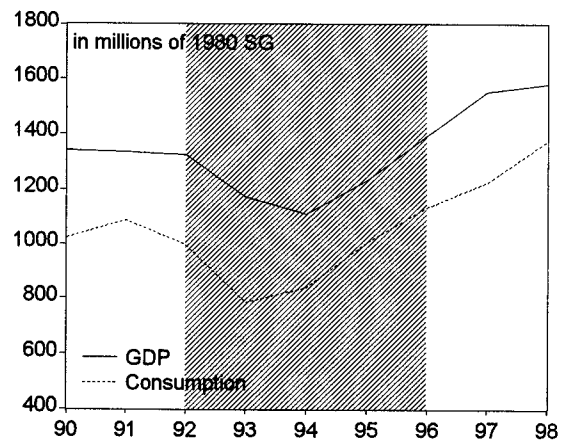
Figure 6. Real money balances (M2).

Figure 7. Real GDP and real consumption.

2. A decline in output and (even more) in real consumption. In contradiction to the traditional Phillips-curve analysis, high inflation led to a pronounced recession in Suriname. Real GDP fell by 16 percent in between 1991 and 1994, real consumption by 23 percent (or by 27 percent if the bottom of the recession is taken to be 1993, see figure 7). Among several possible explanations, the role of real balances in facilitating transactions deserves special attention. As inflation increased the opportunity costs of money, the Surinamese public reduced its holdings of real balances. This made transactions more inconvenient and raised the effective cost of consumption. Inflation acted like a temporary tax, inducing people to postpone some of their consumption. As inflation ended, Suriname experienced a consumption boom similar to other Latin American stabilizations in the late 1980s.[5]

3. A depreciation of the real exchange rate (a increase in the relative price of tradables). Figure 8 shows the evolution of the internal real exchange rate, as measured by the relative price of tradables versus nontradables in the CPI (an increase means a real depreciation).[6] The figure shows that the real exchange rate increased (depreciated) by 60 percent during the inflationary phase, meaning that tradable goods became more expensive in relative terms. Higher transaction costs reduced consumption demand, leaving an excess supply of non-tradables. A real

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[5] De Gregorio, Guidotti and Végh (1998) point out that most of the variation in consumption during stabilizations/high inflations stems from variations in durable goods. Unfortunately, the data on Suriname do not allow for a detailed analysis of the structure of total consumption.

[6] The internal real exchange rate was calculated as the ratio of tradable goods prices (food and clothing) in the CPI to non-tradable goods prices (housing and services.). This measure of the real exchange rate has several advantages. First it is closer to the theoretical concept used later, which defines the real exchange rate as a domestic relative price. Second, it is almost impossible in Suriname to calculate a "real effective exchange rate" according to standard IMF practices, due to the pervasive use of multiple exchange rates.

depreciation was needed to clear the market for non-traded goods, which by their nature cannot be exported. This made tradables relatively more expensive.[7]
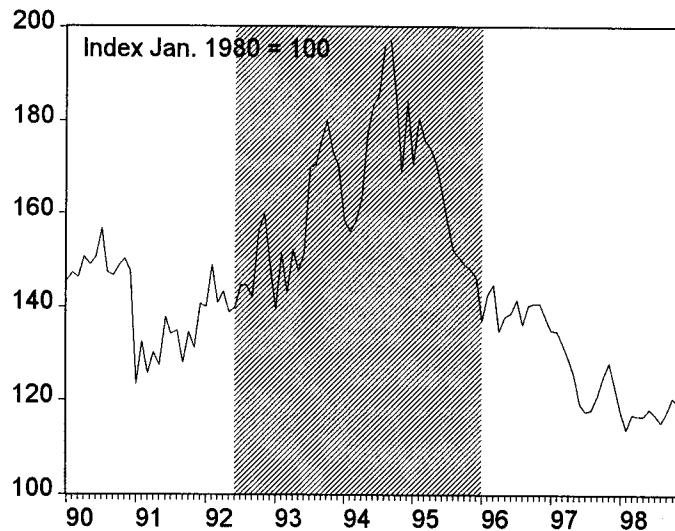

Figure 8. The internal real exchange rate (relative price of tradables). An increase means a real *depreciation.*

4. An improvement in the external accounts. Figure 9 shows that both the trade balance and the current account improved during the high inflation years. The improvement was substantial, considering that 100 million US dollars represent around 20 percent of GDP in 1996 (the only year without multiple exchange rates and reasonably stable currency). Also, 1990 must be considered an outlier, as exports profited from the highest aluminum prices in decades. As we argued before, high inflation induced households to postpone consumption, including consumption of tradable goods. On the other hand, manufacturers of tradable goods received an incentive to increase production, as a higher real exchange rate meant higher relative prices. The resulting excess supply of tradables was exported and improved the external accounts. A series of trade surpluses led then to an accumulation of foreign assets, and to higher interest earnings from abroad. Net interest earnings increased from US$ -13 million in 1993 to US$ +11 million in 1995. The positive swing in the service balance added to the trade surplus in improving the current account. In contrast, after stabilization the external accounts deteriorated sharply, as shown by figure 9.

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[7] Calvo, Reinhart and Végh (1995) show that the reverse causality applies to real exchange rate targeting. An attempt by the government to lower the real exchange rate in order to promote exports can result in accelerating inflation.
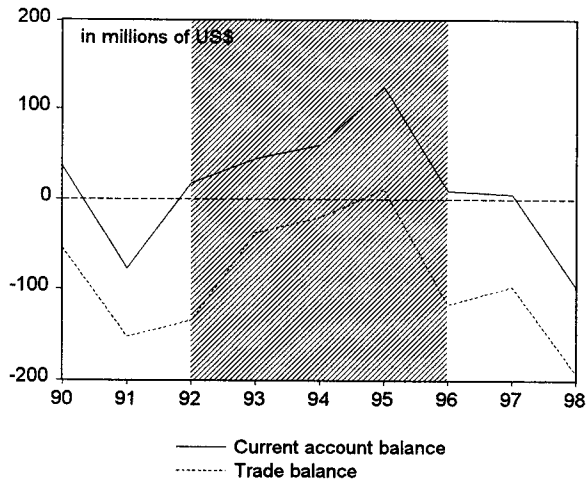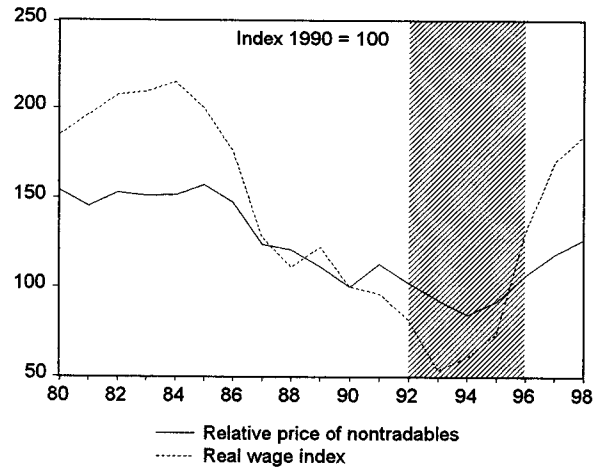
Figure 9. External Accounts.

Figure 10. Real wages and (inverse) real exchange rate.

5. A sharp reduction of real wages. Figure 10 shows that real wages in Suriname underwent dramatic fluctuations. They reached a maximum during the mid-1980s, which apparently was not sustainable. A constant erosion of purchasing power ensued, which greatly accelerated during the period of high inflation. Stabilization was followed by a sharp rebound in real wages. Figure 10 also shows the inverse of the real exchange rate, the relative price of nontradables. The movements of both variables appear to be closely correlated, with real wages amplifying the swings of the real exchange rate by a factor of roughly 2.

4. AN ANALYTICAL MODEL

In this section, we argue that the experience of Suriname between 1992 and 1996 can be explained by a simple model fashioned along the lines of the "temporariness" hypothesis, which was pioneered, among others, by Calvo (1986) and Calvo and Végh (1993). The "temporariness" hypothesis states that a change in inflation can have real effects on the economy if it is perceived to be temporary. The model focuses on the consumption decisions of optimizing households who need to hold money for transaction purposes. In this framework, inflation acts like a tax on consumption and induces agents to substitute future for present consumption. A rudimentary treatment of the supply side will reveal a focus on the short-run. This can be justified by the very short duration of the Surinamese high inflation and the desire to keep the model tractable. A more comprehensive treatment would include capital accumulation and factor substitution.[8]

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[8] Several authors have explored the supply-side effects of inflations and stabilizations. See e.g. Uribe (1997), Rebelo and Végh (1996) or Roldós (1995).

Households

The economy is inhabited by a large number of identical households. A typical household derives utility from the consumption of traded goods c_T and non-traded goods c_N. It maximizes lifetime utility, which is given by

$$U = \int_{t=0}^{\infty} u(c_{T,\,t}\,,\,c_{N,\,t})\,\exp(-\rho t)\,dt \tag{1}$$

where ρ is the rate of time preference. We assume a logarithmic instantaneous utility function:

$$u(c_T\,,\,c_N) = \ln c_T + \ln c_N \tag{2}$$

The economy is endowed with fixed amounts of tradable and non-tradable output, y_T and y_N, respectively. Clearly, this is not an adequate description of the Surinamese reality, but it helps to focus on the core of the argument. y_T is traded freely on the world markets, and subject to the law of one price. Tradables are taken as the numéraire, and their price in foreign currency is fixed at unity. The rate of depreciation ϵ is therefore equal to the inflation rate of traded good prices.

Individuals hold three different types of assets A: money M, domestic bonds B and foreign bonds F. Expressed in nominal terms and denoting the exchange rate by E:[9]

$$A = M + B + EF \tag{3}$$

Being a small open economy, the country faces constant world interest rates, r. Assuming perfect capital mobility, arbitrage ensures that r is also the real return on domestic bonds (expressed in terms of tradable goods).

Money is required for consumption transactions. Holding real balances allows an individual to save resources in transacting, and lowers the effective price of consumption. Denoting real quantities by lower-case letters, we assume the following technology for transaction costs v:

$$v = \frac{c}{m} \tag{4}$$

where $c = c_T + c_N/e$ is total consumption expressed in terms of tradables. The effective price of consumption consists of its market price (1 for tradables) plus the transaction costs v. If the

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[9] Following the macroeconomic convention, the exchange rate E is defined as the price of one unit of foreign currency in domestic terms. An increase in E means a devaluation of the currency.

economy is demonetized, transaction costs increase and raise the effective price of consumption $1 + v$.

Denoting lump-sum transfers from the government by τ, the budget constraint of a household reads

$$\dot{a} = ra + y_T + y_N/e + \tau - (1 + v) (c_T + c_N/e) - (r+\epsilon) m \qquad (5)$$

The problem of the household is to choose a path for its consumption of tradables, non-tradables and for real balances, so as to maximize lifetime utility (1) and satisfy the budget constraint (5). The current-value Hamiltonian of this problem can be written as

$$H_c = \ln c_T + \ln c_N + \lambda [ra + y_T + y_N/e + \tau - (1 + c/m) c - (r+\epsilon) m] \qquad (6)$$

Optimization yields the following first-order conditions for consumption of tradables and non-tradables

$$1/c_T = \lambda (1 + 2\sqrt{\rho+\epsilon}) \qquad (7)$$

$$e/c_N = \lambda (1 + 2\sqrt{\rho+\epsilon}) \qquad (8)$$

If the world interest rate is set to equal the rate of time preference $r = \rho$, the costate variable λ has no dynamics. In fact, the control variables c_T, c_N and m lack transition dynamics as well. After a shock, their values take discrete jumps and remain constant at the new level. From (7) and (8), an expression for the real exchange rate can be derived:

$$e = c_N/c_T \qquad (9)$$

The real exchange rate is determined solely by the relation of non-tradable to tradable consumption. The first-order condition for real balances yields the following money demand equation:

$$c/m = \sqrt{\rho+\epsilon} \qquad (10)$$

The functional form of the transaction technology results in an interest elasticity of $-1/2$ and an income elasticity of 1. Since money demand is derived from household optimization, consumption replaces output as a measure of income. An increase in inflation (i.e. in the rate of devaluation ϵ) leads to an increase in the opportunity cost of holding money, and to a reduction of real money balances. Lower real balances, however, increase transaction costs and lead to the intertemporal substitution of consumption.

Government

For the sake of simplicity, we shall assume that all transaction costs are paid to the government. The government in turn refunds them to the households via lump-sum transfers. This assumption helps us to isolate the intertemporal substitution effect of inflation, which is the main driving force of the non-neutralities. Without loss of generality, we can avoid wealth effects of transaction costs and considerably simplify the algebra.[10]

Besides transfers, the expenditures of the government include interest payments on domestic debt, rb. The government finances its expenditures by issuing new domestic debt, printing money, and collecting transaction costs. Thus, the public sector faces the budget constraint

$$rb + \tau = \dot{b} + \dot{m} + \epsilon m + vc \tag{11}$$

In what follows, we assume that the government has no outstanding domestic debt (b = 0) and refrains from issuing new debt. Also, it has no access to international capital markets. As section 2 has shown, this characterization is quite realistic for Suriname. The absence of transition dynamics results in discrete jumps of real money holdings m. This reduces the government budget constraint to

$$\tau = \epsilon m + vc \tag{12}$$

Finally, the market for non-traded goods has to clear domestically:

$$y_N = c_N \tag{13}$$

By using (11), (12) and (13) in equation (5), we can derive the economy-wide budget constraint, or current account equation:

$$\dot{f} = \rho f + y_T - c_T \tag{14}$$

We will make use of the following alternative presentation during the next few steps, which refers to an initial period t = 0:

$$f_0 + \frac{y_T}{\rho} = \int_{t=0}^{\infty} c_{T,t} \exp(-\rho t) \, dt \tag{15}$$

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[10] It would be more realistic to treat transaction costs as consumption of resources that does not yield utility. Introducing them into the non-traded goods equilibrium and the current account - equations (13) and (14) below - would not change the results of the model. For a complete characterization of the basic effects of inflation, see Rebelo and Végh (1996).

A temporary increase in inflation

Suppose that the government increases its transfer payments τ in period t = 0. To finance the higher level of expenditures and the resulting deficit, it prints money and increases the rate of devaluation from 0 to ϵ. The higher transfer payments could approximate for the effects of the multiple exchange rate system in Suriname.

The public is used to price stability and believes that an episode of high inflation cannot last very long. In the economic history of most countries and also of Suriname, inflationary phases were the exception rather than the rule. The belief that "inflation comes and goes like a tropical thunderstorm" is an apt description of the "temporariness" assumption, which was first employed by Calvo (1986). Suppose that the public expects the government returning to fiscal prudence at a time t* in the future. At this point, inflation falls back from ϵ to 0.

We must therefore distinguish three phases: Phase 0 is the initial steady state, before the government starts to inflate. Phase 1 is the time of inflation. Phase 2 is the time after the government returns to monetary and fiscal prudence. Since the model features no transition dynamics, the control variables c_T, c_N and m will display constant values during the three phases, but change in a step-wise manner from one phase to the next.

We start by calculating the behavior of tradable goods consumption c_T. Before inflation, this variable is constant at a level $c_{T,0}$. The relative magnitudes of tradable consumption during and after the inflationary phase ($c_{T,1}$ and $c_{T,2}$) can be calculated from

$$f_0 + \frac{y_T}{\rho} = \int_0^{t^*} c_{T,1} \, \exp(-\rho t) \, dt + \int_{t^*}^{\infty} c_{T,2} \, \exp(-\rho t) \, dt \tag{16}$$

and

$$\frac{c_{T,2}}{c_{T,1}} = \frac{1 + 2\sqrt{\rho + \epsilon}}{1 + 2\sqrt{\rho}} \tag{17}$$

Equation (17) makes use of the first order condition (7), assuming an inflation rate of ϵ from time 0 to t*, and an inflation rate of zero thereafter. The original level of consumption can be obtained by setting inflation at zero throughout. Integrating (16) and inserting (17), one obtains

$$\begin{aligned}
\rho f_0 + y_T &= c_{T,0} \\
&= c_{T,1} \, [(1-\gamma) + \gamma \, (1+2\sqrt{\rho+\epsilon})/(1+2\sqrt{\rho})] \\
&= c_{T,2} \, [(1-\gamma) \, (1+2\sqrt{\rho})/(1+2\sqrt{\rho+\epsilon}) + \gamma]
\end{aligned} \tag{18}$$

where $\gamma = \exp(-\rho t^*)$. The set of equations (18) can be used to derive the following relations:

$$c_{T,\,1}/c_{T,\,0} \quad < \quad 1$$
$$c_{T,\,2}/c_{T,\,1} \quad > \quad 1 \qquad\qquad (19)$$
$$c_{T,\,2}/c_{T,\,0} \quad > \quad 1$$

The behavior of tradable consumption is shown graphically in the first panel of figure 11. Higher inflation increases transaction costs and acts like a tax on consumption. Consumption during the high inflation period is expensive compared with consumption afterwards. Accordingly, households react by shifting some consumption into the future. This is the intertemporal substitution effect. The higher the rate of inflation and the shorter its duration, the stronger is this effect.

Whereas consumption of tradables c_T is reduced, production of tradables y_T remains constant. Thus, some tradables are exported, and the country runs a temporary trade surplus. This leads to the accumulation of foreign assets f, and to a steady increase in interest earnings ρf. The service balance and the current account report growing surpluses (figure 11, panel b). At the end of the inflation period, the country has a higher stock of foreign assets and can afford higher levels of tradable consumption than in the original steady state. A surplus in the service account (interest earnings) offsets a trade deficit, and the current account is once again in balance.

By increasing transaction costs, inflation also reduces the demand for non-traded goods. However, the output of nontraded goods is fixed and cannot be exported. The market for nontraded goods has to clear domestically by an adjustment of their relative price. Initial excess supply leads to a lower relative price of nontraded goods. The real exchange rate depreciates (see panel c of figure 11), and the rate of devaluation exceeds inflation for some time. Later on, as inflation is stopped in t*, the reverse happens: Transaction costs are reduced, and with foreign assets higher than before, demand for non-traded goods rises above its original level. The real exchange rate appreciates beyond its initial level.

Real balances evolve according to the money demand equation (10). During the inflationary phase, real balances are reduced via both the effects of higher interest rates, and of reduced consumption. The ratio m/c falls, and the economy demonetizes. Inflation exceeds the rate of money growth until the desired lower level of real balances is reached. After the end of inflation, this sequence is reversed as nominal interest rates fall and consumption rebounds. Demand for real balances rises quickly, and the economy is remonetized. For a short period of time, money aggregates grow faster than the price level and the exchange rate. Because of the increase in foreign assets, real balances are eventually higher than in the original steady state (panel d of figure 11). Remonetization has occurred in Suriname, but not to the extent predicted by the model. Money balances before inflation were only in part held voluntarily, but to a greater extent reflected a monetary overhang.
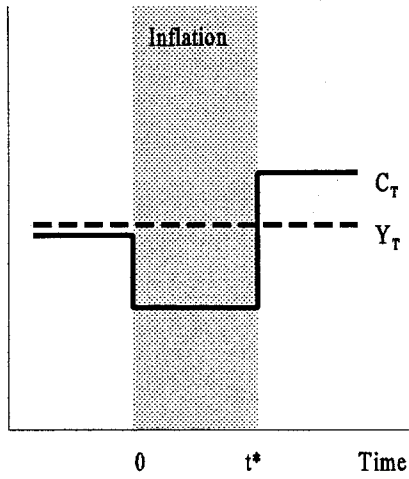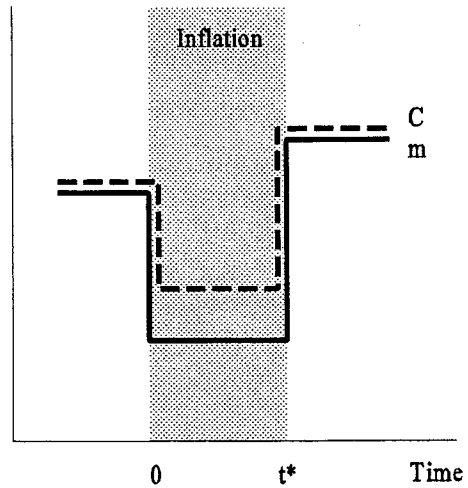
a) Tradable consumption and production
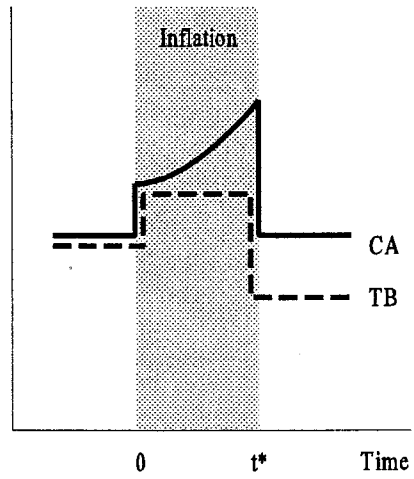
b) Current account (CA) and
Trade balance (TB)
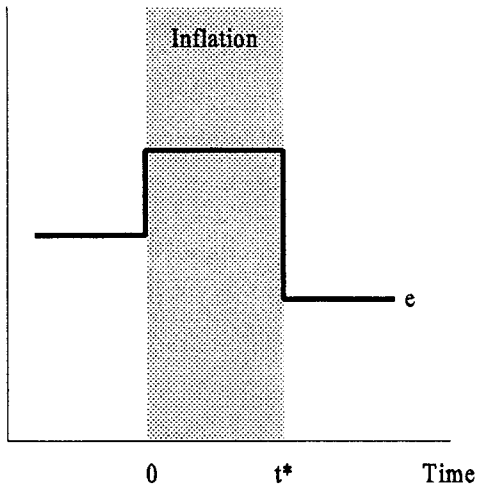
c) Real exchange rate

d) Real money and consumption

Figure 11. Dynamic effects of a temporary increase in the inflation rate.

The model thus successfully explains 4 of the 5 stylized facts observed in Suriname: the demonetization of the economy, the strong decline in consumption, the real depreciation, and the improvement in the external accounts. However, the structure is too simple to account for the stylized fact number 5, declining in real wages. The reason is that the supply side of the economy was treated in a very crude way by assuming fixed output levels. A more comprehensive approach would include two factors of production, labor and capital, and different technologies in the tradable and nontradable sector. We shall briefly outline what a more comprehensive model could accomplish in terms of explaining the pattern of real wages.

Assume that the tradable sector is capital intensive and the non-tradable sector is labor intensive. In Suriname, bauxite mining could represent the tradable sector and services the non-tradable sector. By using a Heckscher-Ohlin-Samuelson structure[11], the theorems of international trade theory apply.

The Stolper-Samuelson theorem states that a fall in the relative price of the *labor* intensive good leads to a fall in *real wages*. Furthermore, the fall in real wages *amplifies* the fall in relative prices. This is exactly what happens in figure 10 during the period of high inflation, provided the labor intensive good is non-tradable.

5. CONCLUSIONS

This paper has examined a recent period of high inflation in Suriname. Ultimately, the experience in this country lends support to the conventional wisdom that high inflation is a fiscal phenomenon. During the last 15 years, Suriname has almost continuously been plagued by very large budget deficits. Having little other choice, the government monetized most of these deficits. However, high inflation appeared only after a lag of roughly 10 years. We argue that the intense use of price and exchange controls was responsible for this delay, in the context of an authoritarian political regime. As history has shown, finally all controls collapsed. Price controls had to be abandoned after the transition to democracy, as the new government lacked the means to enforce them. Also, an imposition of multiple exchange rates to avoid runaway devaluation proved to be short-lived. It resulted in heavy quasi-fiscal losses, which had to be monetized. Large gold purchases by the central bank led to a final flash of money creation. At the end of 1994, inflation almost reached 600 percent. Only after comprehensive fiscal adjustment (and significant aid from the Netherlands) was the economy stabilized in 1996.

A perennial problem for the Surinamese government is its limited access to domestic and international capital markets. This situation has not changed fundamentally since the 1980s, which means that any future budget deficit is likely to be monetized again. The recent fiscal deterioration

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[11] For a description of this model, see e.g. the textbook by Markusen and Melvin (1990), and for a more thorough treatment of the algebra see Wong (1995). The recent stabilization literature, exemplified by Uribe (1997), Rebelo and Végh (1996) and Roldós (1995), frequently uses two-factor-two-sector models. However, these authors assume that capital is sector specific. Their production side is therefore similar to the Ricardo-Viner model and differs from the Heckscher-Ohlin-Samuelson structure sketched here.

has already resulted in faster monetary growth and a large devaluation. It remains to be seen to what extent it will translate into another bout of high inflation.

Inflation did have significant real effects, causing a severe recession in Suriname. Inflation raised the opportunity costs of holding money. By reducing real balances, it increased the inconvenience of carrying out transactions. In effect, the high inflation in 1992-95 acted like a temporary tax on consumption and induced households to postpone expenditures. The model in section 4 has shown how this effect was transmitted to the rest of the economy and resulted in a depreciation of the real exchange rate, falling real wages and an improvement of the external accounts.

DATA SOURCES

GDP data have long been unreliable in Suriname and represented a serious obstacle for our research. While on mission in Suriname in January 1999, one of the authors (Benedikt Braumann) used around 50 independent indicators of sectoral activity to estimate a consistent time series of real GDP, going back to 1990. Figure 7 and all ratios to GDP are based on these estimates. The method and its results are described in the IMF reports on the 1999 Article IV Consultation Mission to Suriname. Previous GDP data are taken from IMF country reports on Suriname.

The CPI, its components and real wages are obtained from the General Bureau of Statistics in Suriname.

Monetary data were obtained from the Central Bank of Suriname.

Fiscal data are taken from the IMF country database of Ruby Randall.

REFERENCES

Calvo, G. (1986): Temporary Stabilization: Predetermined Exchange Rates. *Journal of Political Economy*, 94, 1319-1329.

Calvo, G., Reinhardt, C., Végh, C. (1995): Targeting the Real Exchange Rate: Theory and Evidence. *Journal of Development Economics*, 47, 97-133.

Calvo, G., Végh, C. (1993): Exchange Rate Based Stabilization under Imperfect Credibility. In: *Open Economy Macroeconomics*, Frisch, H. and Worgotter, A. (eds.). London: McMillan.

Caprio, G., Honohan, P. (1991): Excess Liquidity and Monetary Overhangs. *World Bank Policy Research Working Paper WPS 796*.

De Gregorio, J., Guidotti, P. Végh, C. (1998): Inflation Stabilization and the Consumption of Durable Goods. *Economic Journal*, 108, 105-131.

Markusen, J., Melvin, J. (1988): The Theory of International Trade. New York: Harpers & Row.

Orphanides, A., Solow, R. (1990): Money, Inflation and Growth. In: *Handbook of Monetary Economics, Vol. 1,* Friedman, M., Hahn, F. (eds.). New York: Elsevier.

Rebelo, S., Végh, C. (1996): Real Effects of Exchange-Rate-Based Stabilization: An Analysis of Competing Theories. *NBER Macroeconomics Annual,* 125-174.

Roldós, J. (1995): Supply-Side Effects of Disinflation Programs. *IMF Staff Papers,* 42, 158-183.

Tobin, J. (1965): Money and Economic Growth. *Econometrica,* 33, 671-684.

Uribe, M. (1997): Exchange-Rate-Based Inflation Stabilization: The Initial Real Effects of Credible Plans. *Journal of Monetary Economics,* 39(2), 197-221.

Wong, K. (1995): International Trade in Goods and Factor Mobility. Cambridge, Mass.: MIT Press.