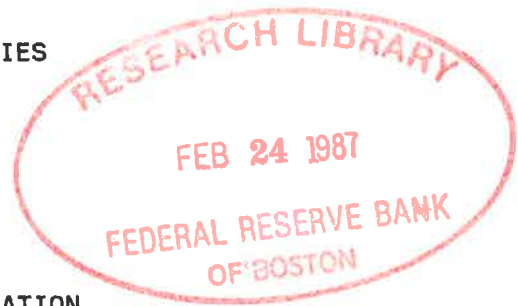NBER WORKING PAPER SERIES

THE BOLIVIAN HYPERINFLATION
AND STABILIZATION

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The Bolivian Hyperinflation and Stabilization

ABSTRACT

The inflation in Bolivia during 1984-85 was the most rapid in Latin American history, and one of the highest in world history. During the first half of 1985, the inflation reached an annual rate of 26,000 percent. Following a stabilization program introduced in August 1985, the hyperinflation was quickly ended, with inflation during February 1986 to October 1986 held to an annual rate of about 25 percent. The Bolivian experience sheds light on many of the perennial controversies in the discussions of hyperinflation, including: the role of budget deficits versus balance of payments deficits in generating hyperinflations; the importance of a "regime change" for a shift from hyperinflation to price stability; and the role for price controls in a stabilization package.

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The Bolivian Hyperinflation and Stabilization

I. Introduction

The inflation in Bolivia during 1984-1985 was the most rapid in Latin American history, and one of the highest in world history.[1] During the first half of 1985, the inflation surged to an annual rate of about 26,000 percent (approximately 60 percent per month), and it reached an annual rate of 60,000 percent during May-August 1985. As shown in Table 1, the inflation was brought under control in the second half of 1985. Between February 1986 and September 1986, the inflation rate has been held to an annual rate of only 26 percent. Since the Bolivian inflation is the only case in thirty five years of a "true" hyperinflation (by Cagan's classic definition[2]), it provides an important testing ground for alternative views of the dynamics of hyperinflation, and of the design of anti-inflation programs.

The Bolivian experience sheds light on many of the perennial controversies in the discussions of hyperinflation, relating to: (1) the role of budget deficits versus balance of payments deficits in generating hyperinflations; (2) the importance or lack of importance of a "regime change," á la Sargent, for ending a hyperinflation; (3) the role, if any, for price controls in the stabilization package; (4) the recessionary effects of the stabilization process; and (5) the management of exchange rates and interest rates in the stabilization period.

The empirical evidence described in this paper points to the following interpretation of the Bolivian experience. The proximate cause of the

Table 1:   Inflation in Bolivia, Various Periods

(a)   Annual Inflation Rates (year-to-year changes of annual average price levels)

Year	Rate	Year	Rate	Year	Rate	Year	Rate
1950	24.0	1955	80.0	1960	11.5	1965	2.9
1951	32.4	1956	178.8	1961	7.6	1966	6.9
1952	24.5	1957	115.1	1962	5.9	1967	11.2
1953	100.9	1958	3.1	1963	-0.7	1968	5.5
1954	124.4	1959	20.3	1964	10.2	1969	2.2
1970	3.9	1975	8.0	1980	47.2	1985	11857.1
1971	3.6	1976	4.5	1981	32.2		
1972	6.5	1977	8.1	1982	123.5		
1973	31.6	1978	10.4	1983	275.6		
1974	62.7	1979	19.6	1984	1282.4		

(b)   Quarterly Inflation Rates (final month of quarter over final month of previous quarter, at annual rates)

Quarter	Rate	Quarter	Rate	Quarter	Rate	Quarter	Rate
1982:I	176.8	1983:I	124.8	1984:I	618.3	1985:I	127612.8
II	125.0	II	133.0	II	3735.7	II	5265.2
III	757.1	III	588.8	III	661.4	III	35139.3
IV	365.9	IV	826.4	IV	12783.7	IV	95.7

Quarter	Rate
1986:I	325.6
II	41.4
III	20.6

(c)   Monthly Inflation Rates (at monthly rates)

	1984	1985	1986
January	9.6	68.9	33.0
February	23.0	182.8	8.0
March	21.2	24.9	0.1
April	63.0	11.8	3.6
May	47.2	35.7	1.0
June	4.1	78.5	4.3
July	5.2	66.3	1.8
August	15.0	16.5	0.7
September	37.4	56.5*	2.3
October	59.3	-1.9	
November	31.6	3.2	
December	61.1	16.8	

*September 1985 is the first month of the stabilization program. Note that prices actually stop rising by September 9, though because of rapid inflation in August and the first week of September, September's average price level is 56.5 percent higher than August's.

-2-

hyperinflation is the government's loss of international creditworthiness in the early 1980s. During the period 1975 to 1981, various Bolivian governments relied heavily on foreign borrowing to finance government expenditures. The combination of a large buildup of international debt with domestic political instability, poor macroeconomic management, a weak tax system, and poor export prospects, precluded the Bolivian government from obtaining new international loans after 1981. When the foreign capital inflows dried up in early 1982, the government did not raise taxes or cut expenditures, but rather substituted domestic credit expansion for capital inflows as the source of finance for the government. The rapid expansion of the money supply then set off the inflationary process. Thus the balance of payments played a critical role in the origin of the hyperinflation, but only insofar as it affected the rate of money creation. More evidence in support of this position is that after the beginning of stabilization, a massive deterioration of the Bolivian international terms of trade in 1986 did not reignite the hyperinflation, since under the new policy rules the terms of trade decline did not feed into the rate of domestic credit expansion to the public sector.

With respect to "regime changes," I suggest that a regime change is crucial for long-run success in stabilization, but interestingly, not for the initial success of halting inflation. Because of the political and economic chaos in Bolivia in 1985, it was necessary to end the hyperinflation before the government could credibly establish a new fiscal regime. Nonetheless, it proved possible to stabilize the exchange rate even before the public's confidence in medium-run price stability could be reestablished. Subsequent to the price stabilization, the government worked hard to undergird the

stabilization with fiscal reforms, which after one year have significantly raised the public's confidence in continued price stability.

The Bolivian program differs markedly from the "heterodox shocks" of neighboring Argentina, Brazil, and Peru, in that it eschewed price controls (and indeed lifted existing controls), and proceeded without a currency reform. Without judging the appropriateness of price controls or currency reforms in these other countries, it is clear that for Bolivia neither price controls nor currency reform was necessary for stabilization. The extremely high inflation rates in Bolivia (much higher than in the neighboring countries) had eliminated all vestiges of long-term nominal wage and debt contracts, which can pose difficulties in program of sudden disinflation, and which have the use of price controls and currency reforms in the other countries.[3] The Bolivian economy had effectively been dollarized by August 1985, in the sense that the U.S. dollar was the basic unit of account and store of value, though not generally the medium of exchange. Stabilizing the peso exchange rate was therefore sufficient to stop peso price increases almost immediately.

The evidence on the recessionary effect of the program are inconclusive, since during the year of the stabilization program the economy has been hit remarkably hard by a series of external shocks, whose overall effect has been a loss of export export earnings on the order of 10 percent of GNP. Such an enormous loss of export earnings would normally be enough to create a deep recession even in an economy starting from a position of macroeconomic stability. Moreover, during the period 1980-1985, measured real GNP had declined by percent, so that the undoubted continuing economic stagnation

and failing GNP in 1986 could not in any event be attributed easily to the stabilization program. It should be stressed in any event that the "austerity" fiscal actions undertaken in ending a hyperinflation are not necessarily contractionary on balance, since the contractionary effects of a rise in tax revenues are balanced by the expansionary effects of the elimination of the inflation tax. Basically, the stabilization program does not involve a rise in overall taxes, but rather a shift from one tax (the inflation tax) to other more efficient taxes.

One possible source of contractionary impulse from the stabilization program has been the high real interest rates in Bolivia since the beginning of the stabilization. As noted by Dornbusch and Fischer (1986), high ex post real rates have been present in the aftermaths of most hyperinflations. One school of thought holds that high interest rates follow a hyperinflation because of a scarcity of money in the face of a sharp rise in money demand that follows stabilization. This school of thought urges a generous expansion of credit following the end of the hyperinflation. Another school of thought argues that the high interest rates reflect lingering inflationary expectations, and that tight money is necessary to reduce further the inflationary expectations. The Bolivian experience gives some support to the second interpretation, though not conclusively.

Almost all of the measured high interest rates can be attributed to currency risk (mainly fear of depreciation), since dollar-denominated interest rates were low relative to peso-denominated rates after the beginning of stabilization. It is true that dollar interest rates have also been high during stabilization, though much of the spread between onshore and offshore

rates reflects country risk (particularly fears of capital controls), rather than tight monetary policies.

One interesting piece of evidence on monetary policy comes from an unintended "experiment" a few months after the onset of stabilization, in which the money supply was inadvertently raised in one large step. The step increase in the money supply caused a significant depreciation of the currency and a rise in prices, rather than a decline in interest rates.

The paper considers the Bolivian hyperinflation in the following steps. Section 2 gives a background to the hyperinflation, by outlining the nature of the economic and political organization of the country, and the events leading up to the hyperinflation. Section 3 discusses the dynamics of the inflation during mid-1981 to mid-1985. Special features of importance are: the response of tax collections to the hyperinflation; the successive failures of stabilization attempts; and the interactions of the official exchange rate, the black market rate, and the price level. Section 4 turns to the stabilization phase. Some simple analytical aspects of stabilization are demonstrated, to separate two aspects of stabilization: price stabilization through a pegging of the exchange rate, versus price stabilization via a restoration of confidence and an elimination of inflationary expectations. The timing aspects of stabilization are stressed. It is argued that it is inherent that inflation must be reduced before other long-term measures are instituted, and that the lag itself between stabilization and deeper reform is itself an explanation of many of the short-term costs of stabilization.

II. Background to the Hyperinflation

The Bolivian inflation is apparantly unique in the annals of hyperinflations, in that it is the only hyperinflation in the twentieth century that did not come in the aftermath of a foreign war, a civil war, or a political revolution.[4] Rather, at a fundamental level, the hyperinflation arose from a profound weakness of Bolivia's political institutions, which made it impossible for several governments in succession to arrest a process of growing government deficits and declining revenue collections. Several attempts were made during 1982 to 1985 to implement stabilization programs, but in each case these programs were overturned by public protest, by key constituencies of the government, or by the government's political opposition in the congress. The inflation tax, unlike other proposed spending or tax reform measures, did not provoke a specific and well-organized challenge to the government. At the core, the inflation tax, which is presumably highly regressive in view of the typical inelasticity of demand for money, forced the fiscal burden onto the poorer and least organized parts of the population, at the same time that powerful groups of constituents successfully defended their interests against cuts in public spending or increases in taxation in other areas.

The failure of several Bolivian governments during 1981-1985 to undertake a more effective response to the fiscal crisis must be understood in a broader context. With a per capita income of just $600, Bolivia is the second poorest country in Latin America, ahead only of Haiti. Landlocked, and with much of the country (the Altiplano) situated at about 4,000 meters in the Andes, the country has relied for centuries on the production and export of goods with

low transport costs per unit value: silver, tin, coca paste, etc. The
country is divided sharply by region (the highlands versus the lowlands), by
class, by ethnic groups (over half of the population is indigenous Indian,
with the remainder being mestizos and European stock), by language (Spanish is
spoken as the primary language by about half of the population, and Indian
languages by the rest), by economic sector, and by political sector (including
the division between military and civilian elites). Central governments have
been notoriously weak for almost two centuries, with more than 100 heads of
state in 160 years of independence. Weak central governments have rarely
been able to stand up to powerful interests of organized groups within the
society.

Modern Bolivian political history, outlined in Table 2, begins with the
National Revolution of 1952. This revolution, led by Dr. Victor Paz
Estenssoro (who is currently President, for the fourth time in the past thirty
years), mobilized large parts of the society that had previously been excluded
from the political process, especially workers and peasants. The heightened
political mobilization has strongly increased the claims by interest groups
for state support during the past thirty years, though it has done little to
increase the capacity of the state to generate tax revenues to satisfy those
claims. The disjunction of demands for state spending versus the low
political and administrative capacity of the state to raise taxes led to the
first high inflation in modern Bolivia, in the 1950s. Inflation rose to 178%
in 1956 (see Table 1) in the last year of Paz Estenssoro's first term.
President Siles Suazo, who succeeded Paz, presided over an IMF stabilization
program in 1957, which eliminated the inflation. The succeeding two decades

Table 2
Brief Political Chronology, 1952-1985

1952	Bolivian Revolution, carried out by Nationalist Revolutionary Movement (MNR), under leadership of Dr. Victor Paz Estenssoro
1952-1956	Presidency of Paz Estenssoro; sharp rise in inflation, to 178.8% in 1956
1956-1960	Presidency of Siles Zuazo (MNR); economic stabilization under U.S. and IMF supervision and finance.
1960-1964	Second presidency of Paz Estenssoro.
1964	Third presidency of Paz Estenssoro; Paz Estenssoro deposed in military coup led by Barrientos Ortuno.
1964-1966	Co-presidency of Ovando Candia and Barrientos Ortuno.
1966-1969	Civilian presidency of Barrientos (dies in plane crash, April 1969).
1969	Vice President Siles Salinas becomes president; deposed in coup by Ovando Candia.
1970	Ovando Candia deposed by Gen. Miranda. Miranda deposed by Gen. Juan Jose Torres.
1971	Torres rules left-wing radical government. Deposed in coup, jointly sponsored by military, FBS, and MNR.
1971-1973	General Hugo Banzer Suarez rules with MNR support.
1974-1978	Banzer presidency under military rule; MNR withdrawal from government in 1974.
1979	Pereda becomes president in election marked by accusation of fraud. Pereda deposed by Padilla, who calls for 1979 election.
1979	Election results in stalemate (no majority); Senate President Walter Guevara Arze serves as interim presidnet. Guevara deposed by Col. Natusch Busch; Busch resigns in 15 days. President of Chamber of Deputies, Lidia Gueiler, becomes interim president.
1980	Electoral stalemate. Gueiler deposed in coup by Maj. Gen. Luis Garcia Meza.
1981	Garcia Meza forced to resign in favor of Gen. Bernal. Gen. Bernal resigns in favor of Gen. Torrelio.
1982	Gen. Torrelio deposedin coup by Gen. Vildoso Calderon. Congress reconvenes; names Siles Suazo as president.
1985	Siles Suazo announces early elections. Paz Estenssoro becomes president. New economic policy declared on August 29, 1985.

were characterized by rather low inflation, though the inflation performance does not really reflect sound fiscal policies in the period. Rather, in the 1960s, the U.S. provided heavy subsidies to the Bolivian government (paying up to one quarter of government expenditures in some years), while in the 1970s, heavy foreign lending from commercial banks and foreign official credit agencies played the same role.

In 1964, the military followed the example of neighboring Brazil and launched a coup which put the military in power almost continuously for the next eighteen years. During 1971-78, the military President Hugo Banzar presided over a period of economic prosperity, which was fueled in large part by a favorable terms of trade for Bolivia's primary commodity exports, and by extensive international borrowing. Figure 1 shows the time series for the real price of tin on international markets, illustrating both the high price of the mid 1970s to late 1970s, and the stunning collapse of tin prices in late 1985. As in many other countries (e.g., Mexico, Nigeria), the favorable terms of trade proved a curse: the country borrowed heavily (and equally perversely, the banks lent heavily) on the basis of a temporary export boom. After devaluing the Bolivian peso in 1972, General Banzer's government refused to devalue again, relying instead on the favorable terms of trade and high capital inflows to maintain the exchange rate. Between 1973 and 1978, the 30 - 40 percent real exchange rate depreciation of 1972 was more than fully reversed. The Bolivian dictum holds that each government gets one chance to devalue, with dire political consequences if that limit is overstepped (this dictum is in line with Cooper's celebrated findings on the high political costs of devaluation[5]). Banzer therefore decided to wait out his term rather than to devalue once again.

Relative Price of Tin in World Markets
(1980 = 1.0)

□   Real Tin Price
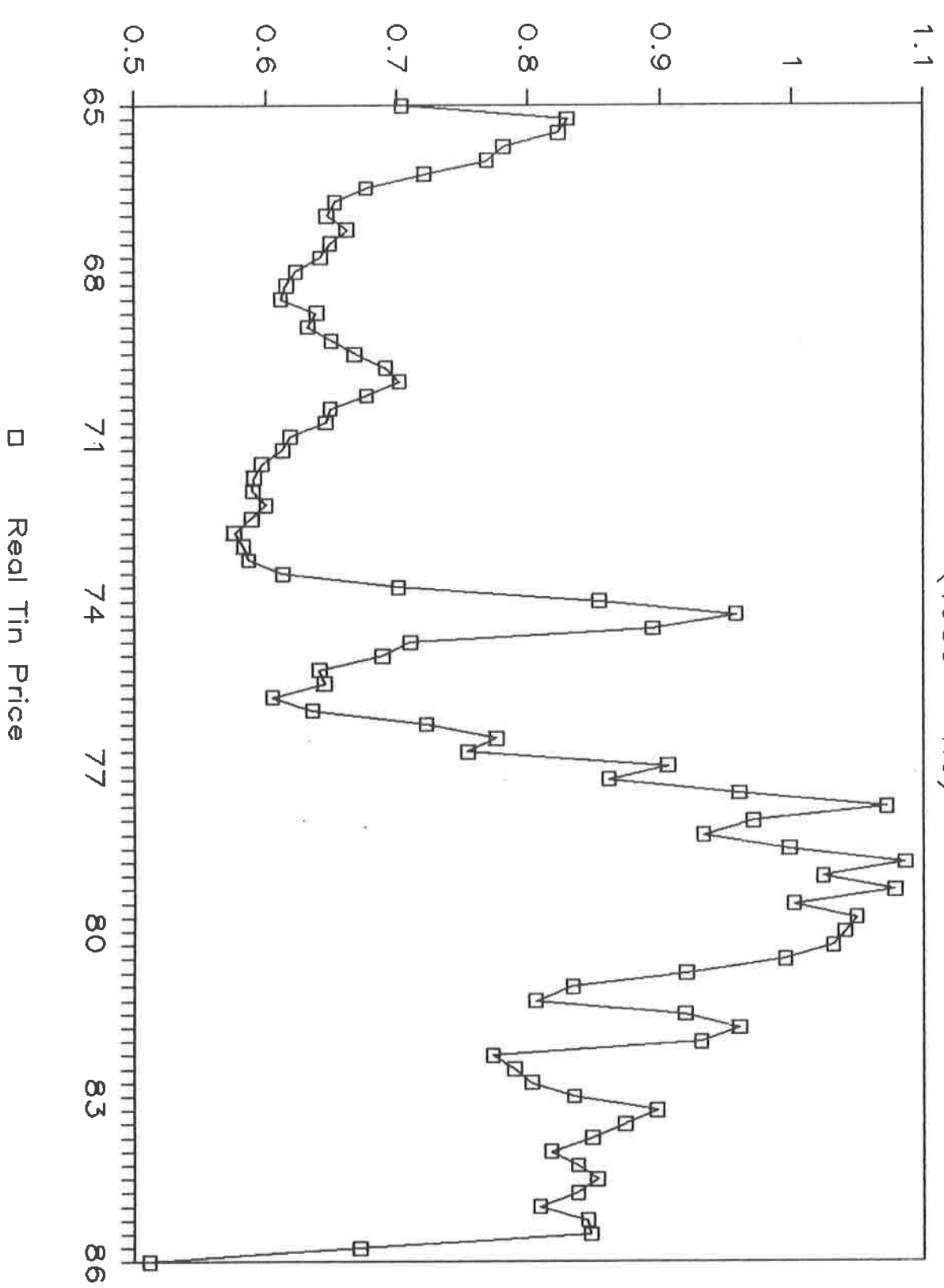
The prosperity of the Banzer years (with real GNP growth averaging 5.4 percent annually between 1971 and 1978) therefore hid several profound economic and political weakness. First, much of the prosperity in the 1970s was predicated on a temporary commodity boom and heavy foreign capital inflows. Once the inflows slowed, as was inevitable, the economy faced a sustained period of austerity. Moreover, the overvalued exchange rate during the 1970s prompted investment in the nontradeables sectors of the economy, and in capital flight, so that there was little basis laid for export-led growth in the 1980s in order to service the accumulated debts. (The key exception to this generalization is the investment in the late 1970s in natural gas exports, which now support an extensive portion of government spending and of the nation's imports.) Another weakness was the absence of a legitimate basis for political succession at the end of General Banzer's term.

In 1977 and 1978, General Banzer faced growing pressure from the Carter Administration for a return to democracy. An election was called, and Banzer's handpicked successor, Pareda, was named President in an election marked by massive fraud. When the results of the election were challenged, Banzer decided to remain in office, but was quickly ousted by Pareda himself. Pareda was in turn quickly deposed, and there ensued a four year period of intense political instability, with several interim presidents, coups, and stalemated elections. Just a listing of the heads of state captures the political instability of the period:

1979: Pereda (military), Padilla (military),
       Guevara (civilian), Busch (military), Gueiler (civilian)

1980: Garcia Meza (military)

1981: Garcia Meza (military), Bernal (military), Torrelio (military)

1982:   Torrelio (military), Vildoso (military), Siles (civilian)

The political nadir of the country was reached in 1980 and 1981, when General Garcia Meza deposed the interim president Lidia Gueiler. The Garcia Meza regime was deeply implicated in the burgeoning cocaine industry in the country, and therefore never received U.S. diplomatic recognition. The regime is nearly universally condemned for massive corruption and violence, and was internationally isolated, except for important support from the similarly corrupt and violent military regime in Argentina. Capital flight reached new highs in the period, with errors and omissions in the balance of payments of 1980 and 1981 totalling $590 million, or about 10 percent of 1980 GNP, a very high amount that probably understates the full extent of capital flight.[6] The commercial banks stopped all lending, and negotiated an emergency rescheduling agreement with Bolivia, upon which the regime soon defaulted. The diplomatic isolation also had important financial consequences: the multilateral creditor organizations, including the IMF, the World Bank, and the InterAmerican Development Bank, withdrew their support and new lending, leaving the country without any effective access to world capital markets. Incredibly, there were no World Bank loans for the economy during the period 1981-1985, despite Bolivia's eligibility for IDA concessional disbursements. Lending was resumed only after the beginning of the recent stabilization program.

By October 1982, the economy was in a sharp downward slide. Real GNP had declined by an estimated 0.9 percent in 1981 and 8.7 percent in 1982. The price level was 308 percent higher in October 1982 than October 1981. The

country was in deep arrears to commercial banks, after the breakdown of the rescheduling agreement. In these circumstances, as when economic choas increased elsewhere in Latin America, the military retreated to the barracks. Hernan Siles Suazo, who had been the President to preside over the 1957 IMF stabilization program, and who had received the plurality of votes in the stalemated 1980 elections, was called by a newly reconvened Congress to accept a four year term of office.

It is important to appreciate the political implications of Siles' accession to power. The new administration represented the first elected government in 18 years, so that pent-up social and economic aspirations were sure to boil over early in the term. Siles, moreover, represented the left wing of the National Revolutionary Movement, and governed in a coalition that included the Communist party, the left-wing MIR (Movimiento Izquierda Revolucionario), as well as two more centrist parties. In the early phase of the administration, the union movement gave strong support to the new government, but demanded large real wage increases in return. Ultimately, when successive wage increases did not keep ahead of the accelerating inflation, the unions turned sharply against the government. Indeed, labor unrest in 1984 and 1985 killed the final two stabilization attempts of the Siles administration.

It is not unusual for inflation to accelerate sharply upon the accession of leftist governments, particularly if the left has been denied power for many years. The same phenomenon occurred, to a lesser extent, in Bolivia in the 1950s, in Chile under Allende (1970-1973), and in Portugal in 1974 after the collapse of the right-wing regime in that year. The price explosion is

typically due to a rise in government spending in favor of the new
government's key constituencies (e.g. real wage increases for trade union
members, or increases in social spending), and to the inability of the
government to achieve a national consensus on raising taxes to cover such
spending (with the right-wing blocking tax increases). In the case of
Bolivia, though, it was not so much that the new government forced through
large increases of public spending, but rather that it was unable to reduce
the large deficit that it inherited from earlier governments. The coalition
members of the Siles government were never able to agree on policies to
restrain spending (the Communists, for example, rejected any kind of policy
that implied a drop in public sector employment or real wages), while the
government's opponents in the Bolivian Congress opposed all tax reform
proposals to stabilize or enlarge the shrinking tax base. By November 1984,
President Siles admitted defeat in his government's attempts to control
inflation and called for new elections in July 1985, one year before his term
was due to expire.

The Dynamics of the Hyperinflation

This section is devoted to a closer look at the dynamics of the
hyperinflation. To organize the discussion, we begin with the simple and
classic Cagan model. Real money balances are written as an exponential
function of expected inflation, and inflation expectations adjust adaptively:

(1) $m_t = m_t/p_t = a \exp[-b\pi^e(t)]$

$\dot{\pi}^e_t = \lambda(\pi_t - \pi^e_t)$

The government's reliance on seignorage taxation is denoted by $s \equiv \dot{M}/p$, which

may also be written as $\dot{m} + \pi m(\pi^e)$, with $m = M/\rho$. In the steady state, $s = \pi m(\pi)$, which as is well known can be satisfied by two inflation rates $\pi^{min} = \pi^{min}(s)$ and $\pi^{max} = \pi^{max}(s)$ for all $s \leqslant s^{max}$, the maximal seignorage rate. The maximal rate is achieved at the inflation rate $\pi = 1/b$, with $s^{max} = m(1/b)/b$. Given the relations in (1), and that $\dot{M}/P = s \leqslant s^{max}$, an economy starting at $t = 0$ will converge to $\pi^{min}(s)$ assuming that $\pi^e(0) \leqslant \pi^{max}(s)$ and that $1 > b\lambda$, two conditions which I will henceforth assume.

There are two useful properties of the Cagan model: that π is a rising function of s in the steady state; and that starting from a steady state with $\pi_0 = \pi^{min}(s_0)$, a permanent rise from s_0 to s_1 will lead to a jump in π on impact, and then to a steadily rising inflation rate until the new higher steady state $\pi^{min}(s_1)$ is reached. Thus, a period in which inflation is rising need not signify a rising financing need, but rather a lagged adjustment of the inflation rate to an earlier once-and-for-all increase in s.

These essential aspects of the model characterize the Bolivian experience (in a later paper I will treat the monetary dynamics econometrically; in this paper I settle for a more general characterization). Figure 2 shows the quarterly seignorage collection of the government as a percent of GNP for the period 1978 to the first half of 1986, as well as the year-over-year inflation rate. Seignorage is calculated simply as the change in reserve money from month to month, and is measured relative to an estimate of nominal GDP. Aside from seasonal spikes in seignorage in the fourth quarter of most of the years (for budgetary reasons associated with a Christmas wage bonus) there is basically one permanent step increase in the seignorage collection in 1982, which persists until the third quarter of 1985. During 1982-1985: III, Seignorage collection averages about 12 percent of GNP

Seignorage (% of GNP)
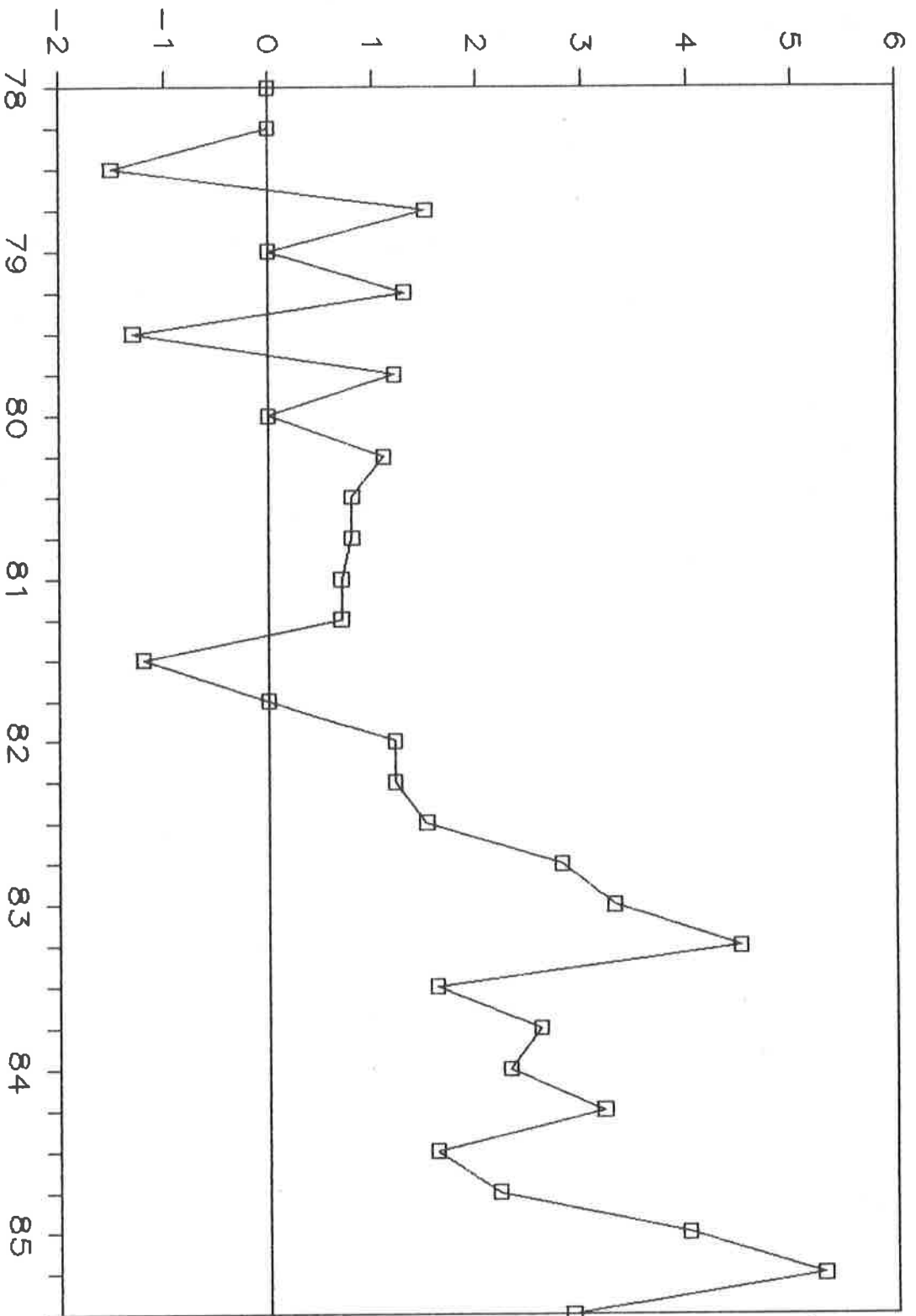
There is thus no evidence that the intensification of the inflation process involved a rise in seignorage collection after the first quarter of 1982. (The simple correlation of inflation with the level of seignorage is $r^2 = -0.001$ for the quarterly interval 1982:1 to 1985:3.

The jump in real seignorage collection took place in the first half of 1982, almost nine months before the Siles government takes office. Surprisingly, it is difficult even four years in retrospect to uncover precisely the causes for this jump in money creation, though the main culprit is almost surely a shift in the environment for foreign borrowing. The problem with nailing down a culprit lies with the dissarray of Bolivian fiscal data during this period. The following kinds of problems inhibit a clear assessment of the fiscal situation. First, most of the available data cover only the central government (the Tesoro General Nacional, or TGN), and not the consolidated government sector, including state enterprises, regional corporations, local government, state development banks, etc. This limited coverage is especially problematic during the hyperinflation, since there were large ad hoc transfers between the various parts of the government during the period.[7] Second, there is great difficulty in interpreting on an ex post basis the accounting of arrears on debt repayments during this period. Some accounting was done on an accrual basis, with arrears adding to the measured deficit (which was then "financed" by extraordinary means, i.e. by arrears), while at other times, only cash payments are actually included in the measured deficit. Third, there were (and remain) significant disagreements among the various parts of the goverment about the responsibility for parts of the foreign debt. At some points, for example, the central bank repaid foreign debts on behalf of the TGN, which the TGN refused to recognize.

With these limitations in mind, it is still possible to piece together a rough interpretation of the rise in seignorage in 1982. Key fiscal data for the central administration are shown in Table 3. Notice the important fact that the TGN deficit rises from an estimated 5.7 percent of GNP in 1981 to an estimated 22.3 percent of GNP in 1982. This increase just barely exceeds in magnitude the rise in expenditures on "internal and external debt". Most or all of the "internal debt" category in this period reflects Central Bank repayments of foreign debt on behalf of the TGN, so that the jump in debt repayments is almost exclusively related to foreign debt. At the same time that debt servicing jumps up, inflation starts to accelerate, with the result that real tax collections fall sharply, from approximately 9.4 percent of GNP in 1981 to 4.6 percent of GNP in 1982. This revenue shortfall is partially balanced by a simultaneous cut in the current and capital expenditures of the TGN. Notice that current expenditures on wages and salaries, goods and nonpersonal services, and fixed assets, fall by 2.9 percent of GNP.

The importance of enlarged net debt service payments for the burgeoning deficit in 1982 is also evident from the balance of payments data, which unfortunately cannot be matched exactly with the budget data. Key items with regard to debt servicing are shown in Table 4, for medium and long-term public and publicly guaranteed foreign debt. We see that for 1979 thru 1981, new net borrowing by the public sector well exceeded the level of interest payments on the public debt. In 1982, net new lending plummets, so that the resource transfer to Bolivia (net new loans minus interest payments) turns negative. As a percent of GNP, net resource transfers towards Bolivia shift from 4.2 percent in 1980, to 2.2 percent in 1981, and to -2.4 percent in

Table 3
Budget of the Central Government
(% of GNP)

	1979	1980	1981	1982	1983	1984	1985	1986
Revenues	9.4	9.6	9.4	4.6	2.6	2.6	1.3	10.3
Internal	3.6	3.1	3.0	1.8	1.4	0.7		
Tariffs	2.3	2.1	2.1	0.9	0.4	0.6		
Petroleum	0.1	1.4	1.7	1.1	0.5	0.2	0.1	7.5
Other	3.4	3.0	2.6	0.8	0.3	1.1		
Expenditure	14.3	16.0	15.1	26.9	20.1	33.2	6.1	7.7
Personnel	6.7	7.5	7.2	5.6	5.2	8.0	3.5	4.4
Other Services	0.7	0.7	0.7	0.4	0.3	0.5		
Materials	0.8	1.2	1.5	11.0	0.7	0.8		
Fixed Assets	0.4	1.0	1.0	0.4	0.4	0.5		
Internal Debt	1.7	1.4	1.8	10.4	0.3	0.4		
External Debt	0.4	2.1	1.3	7.7	10.8	2.2	0.1	0.6
Others	3.6	2.1	1.6	1.4	2.4	20.8[a]		
Deficit	4.9	6.4	5.7	22.3	17.5	30.6	4.8	-2.6

[a] Mainly central government transfers to state enterprises

Table 4: Bolivia's Debt Servicing of Medium and Long-Term
Public Sector Debt

	1980	1981	1982	1983	1984
Net Interest Payments	163.9	171.0	180.9	172.8	201.3
Official Creditors	42.8	50.3	66.2	64.7	166.2
Private Creditors	121.1	120.7	114.7	108.1	35.1
Net New Lending	341.9	263.2	88.6	-18.0	60.5
Official Creditors	191.0	163.9	103.0	13.5	63.3
Private Creditors	150.9	99.3	-14.4	-31.5	-2.9
Net Resource Transfer	178.0	92.1	-92.2	-190.8	-140.8
Official Creditors	148.2	113.6	36.8	-51.3	-102.9
Private creditors	29.8	-21.4	-129.1	-139.5	-37.9

Source: World Bank World Debt Tables, 1985-1986 Edition.

1982, and -5.6 percent of GNP in 1983. Were we to include the data on short-term debt, which is not collected by the World Bank in the case of Bolivia, the shift in net transfers would be even more dramatic, since an inflow of short-term balance of payments support in 1980 and 1981 was reversed in 1982. At the same time, arrears on amortization and interest payments start to mount rapidly, reaching more that $600 million by 1983, or almost 18 percent of GNP. The rescheduling process with the commercial banks started in 1980 completely broke down by 1983, so that the missed payments are not formally rescheduled, but simply added to a growing burden of debt in arrears.

Taxes and Expenditures during the Accelerating Inflation

As it turns out, real seignorage collection during 1982 to mid-1985 remains fairly constant, averaging about 12 percent of GNP each year. This does not reflect a stable path of government spending, taxes, and monetary emission during this period. Instead, the constant seignorage collections hide a process of adjustment in which tax revenue collections all but collapse, while government spending is cut back sharply over time in the vain attempt to catch up with the moving target of falling tax collections. Once again, data problems at this point preclude a comprehensive account of this process. While there are reasonably acceptable accounts for the central government, data on the consolidated public sector is not available. To illustrate the data problems, IMF data for the consolidated public sector indicate that the overall budget deficit of the consolidated public sector rises to 29.2 percent of GNP in 1984, with 26.7 percent of GNP financed internally. Such data are almost surely wildly incorrect, however, since

fiscal credit from the central bank is the only domestic source of budget financing for the year, and we know from the seignorage data that seignorage financing reaches only 13.1 percent of GNP.

Nonetheless, relying on the central administration accounts, we can see much of the process at work. The government relied on three main forms of taxes during the period: internal taxes (mainly sales and income taxes); taxes on trade (mainly tariff collections); and taxes on hydrocarbons and minerals (mainly paid by the two state enterprises Comibol (tin) and YPFB (oil and gas)). Each of these taxes falls sharply in real terms during the period, as shown in the graph in Figure 3, which records the collections from these taxes as a percent of GNP. Overall, revenues of the central administration fell from more than 9 percent of GNP in 1979 and 1980 to just 1.3 percent of GNP in the first nine months of 1985, before the new stabilization program went into effect (the pre-program period in 1985 is indicated by 1985.1 in the figure). Upon institution of the stabilization program, tax revenues of the central administration jumped almost immediately to more than 10 percent of GNP (shown as period 1985.2 in the figure), mainly through an increase in tax payments by the state oil company YPFB. (As I explain below, the increase in tax payments by YPFB reflects an enormous increase in pre-tax income of YPFB following the rise in internal prices of petroleum products). In view of the sharp decline in tax revenues, an increasing proportion of the central administration deficit was financed through fiscal credits from the central bank. The proportion of TGN expenditures covered by TGN revenues fell from 65.5 percent in 1979 to just 6.9 percent in the first nine months of 1985:

Tax Revenues as % of GNP
(by category of tax)

Legend:
□ All + Income ◇ Tariffs △ Petroleum
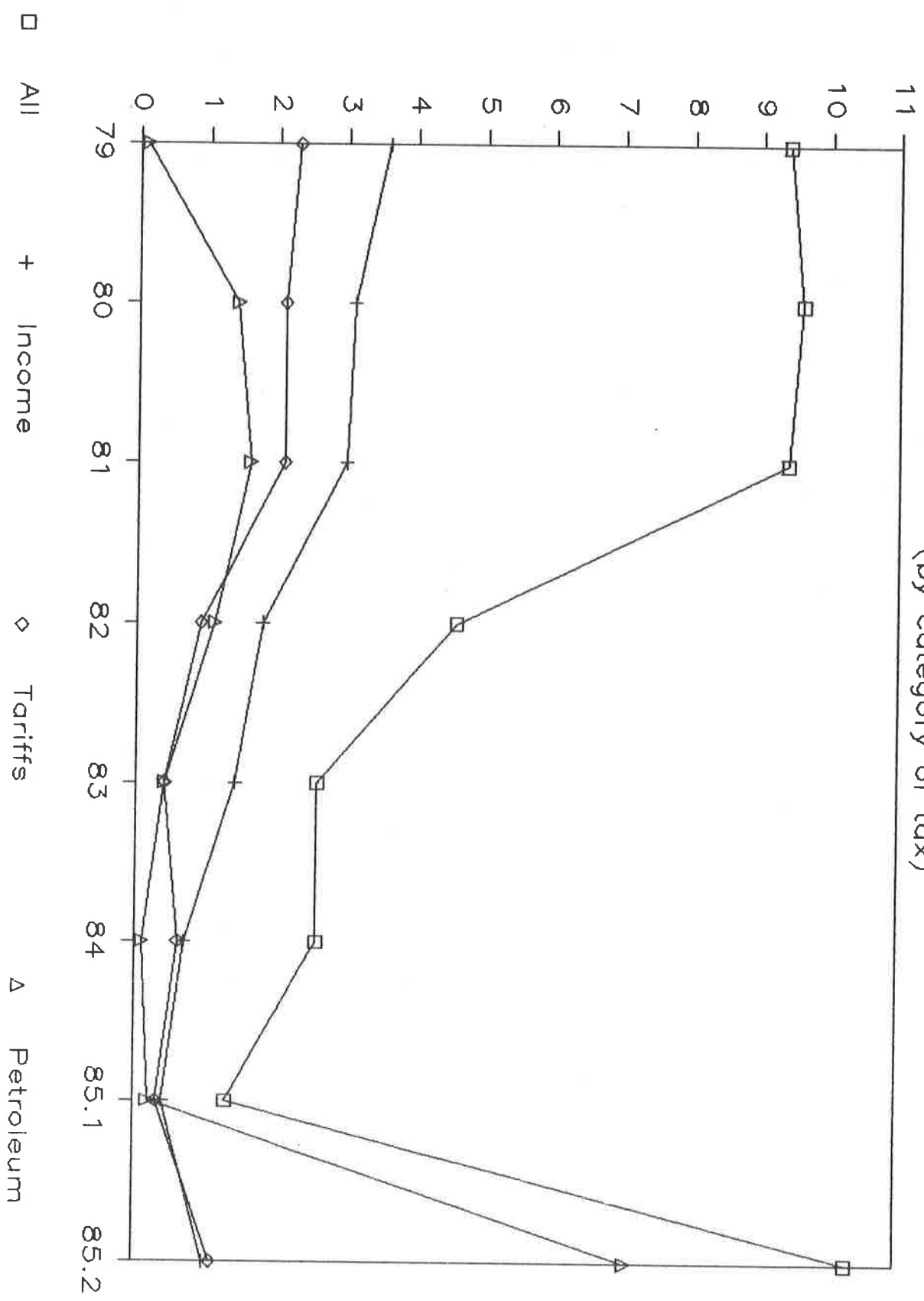
	79	80	81	82	83	84	85.1	85.2
Revenues/Expenditure (%, central gov.)	65	60	62	17	13	8	7	134

Note that the steep drop in revenues relative to expenditures in 1982 reflects the rise in expenditures on debt servicing in that year as well as the falling revenue collection.

The reasons differ for the declines in the various kinds of taxes, and these reasons are worth stressing, since they help to explain the nature of the stabilization policies finally undertaken in August 1985. The drop in internal taxes (mostly income and sales taxes) is most readily explained. Indexation of the income tax system was not even attempted until an administrative change in March 1985, so that lags in collection combined with high inflation reduced the real value of tax collections substantially, in the way familiar from Tanzi (1978) and others. Many sales taxes were set at specific, rather than ad valorem rates, and the specific rates were adjusted with very long lags, if at all, and certainly not fast enough to keep up with accelerating prices under a hyperinflation.

The decline in tariff revenues introduces some less conventional effects. Throughout the entire hyperinflation period, the official exchange rate was pegged by the central bank, and was adjusted in steps with long lags to the underlying inflation. As the government resorted increasingly to fiscal credit creation by the central bank in order to fund expenditures, there was a constant pressure on foreign exchange reserves at the official exchange rate. Rather than maintaining a steadily depreciating but unified price of foreign

exchange, the government maintained the official parity for long intervals, and rationed foreign exchange. The persistent excess demand for foreign exchange at the official exchange rate of course resulted in an enormous premium for foreign exchange in an unofficial, illegal, but semi-tolerated black market. Table 5 shows the average premium on the black market relative to the official rate on a quarterly basis for 1980:1 through 1986:2. In the month before the stabilization program, the premium was on the order of 1400 percent! Since the stabilization program began, the exchange rate has been unified, with a small and declining deviation (which remains because of minor legal and administrative factors) between the official rate and a now-legal parallel market rate.

With foreign exchange rationing at the central bank, progressively fewer import transactions went through legal channels, and more imports came into the country via smuggling, outside of tariff control altogether. The effect worked as follows. Under Bolivian law, all exporters are required to sell the foreign exchange from export earnings to the central bank at the official exchange rate. In sectors where smuggling was possible, the sharp divergence of the official and black market exchange rates made smuggling a highly attractive option (the smuggler converts the foreign exchange earnings from exports in the black market, where the number of pesos per dollar is much greater than at the official rate). A trenchant illustration is provided by the example of Peru, which, despite the absence of tin mines, became a tin exporter in 1983-85 on the basis of Bolivia's smuggled tin. As dollar export earnings sold to the central bank at the official rate shrank markedly, the central bank therefore had a diminished supply of dollars to sell to

Table 5: Percentage Gap Between Official and Black Market Exchange Rate, 1980-1986 (quarterly average)

1980:	I	0.0	
	II	0.0	
	III	0.0	
	IV	0.0	
1981:	I	0.0	
	II	0.0	
	III	45.5	
	IV	68.3	
1982:	I	57.0	
	II	3.5	
	III	4.8	
	IV	22.0	
1983:	I	116.3	
	II	105.1	
	III	241.8	
	IV	225.4	
1984:	I	327.4	
	II	69.8	
	III	309.7	
	IV	302.7	
1985:	I	330.9	
	II	321.0	
	III	798.1	
	IV	8.0	Stabilization begins
1986	I	5.8	
	II	2.1	
	III	0.5	

importers, who progressively turned to the black market in order to pay for their imports. The overall result was that a very high and apparently growing proportion of imports in the economy went unrecorded, and therefore largely untaxed, during the hyperinflation period.

The story with YPFB tax collections is related. Just as the official price of foreign exchange lagged the domestic price inflation, so too the government altered the domestic price of petroleum products with a significant lag. Indeed, petroleum prices were typically changed at the same times that the official exchange rate was devalued. As an example, consider the domestic price of a liter of gasoline, converted to $U.S. using the black market exchange rate (the rate earned, incidentally, by smugglers who carried cheap petroleum from Bolivia to Peru across Lake Titicaca). During this period, the world market price was between $0.25 and $0.28 per liter, but the domestic price was as follows:

March 1985	$0.09	
April	0.07	
May	0.06	
June	0.05	
July	0.03	
August	0.04	
September	0.28	(beginning of stabilization)
October	0.27	
November	0.23	
December	0.23	

Thus, on the eve of the stabilization program (which raised the internal petroleum prices to world levels), the internal price of petroleum was about one sixth to one seventh of the world market price. The state oil company was obligated throughout the hyperinflation period to pay taxes to the central government on a percentage of its revenues from internal sales and from

external sales. With internal prices so depressed, the taxes on internal sales were also severely depressed. Moreover, because its profits on internal sales were so limited by the price ceilings on its output, YPFB also refused to pay taxes on its external sales, arguing that the revenues were necessary to meet operating expenses.

It is much more difficult to offer a comprehensive account of expenditure behavior during the hyperinflation, for reasons already alluded to. As a rough estimate, however, it appears that as government revenues diminished, real expenditures fell more or less in tandem, to preserve a large but fairly constant deficit, since we know that the inflation tax, which was financing almost 100 percent of the cash flow deficit, did not rise markedly above 12 percent of GDP during 1982 to mid-1985. It appears that the main casualties of the reduction in real spending were capital investment by the public sector, and current central government expenditures on personnel and non-personnel services and materials. After mid-1984, interest payments on the foreign debt also diminished sharply, as the government built up large interest arrears. Public investment spending fell, according to the IMF, in the following manner:

Public Investment (percent of GNP)	80	81	82	83	84	85
Central Administration	2.9	3.1	1.9	1.8	1.5	1.8
State Enterprises			4.6	3.0	2.6	1.4
Total			6.5	4.8	4.1	3.2

Current spending by the TGN evolved in a similar way, with overall spending on services and materials falling from 9.4 percent of GNP in 1980 to 6.8 percent in the first part of 1985:

	80	81	82	83	84	85.1	85.2
Current Expenditure on services and materials	9.4	9.3	7.0	6.2	9.3	6.8	5.5

(1985.1 indicates the pre-stabilization period of 1985: January-August, while 1985.2 denotes September-December.)

The spike in expenditures in 1984 is due mainly to a sharp rise in real public sector wages granted during the year. This increase was eroded by inflation at the end of 1984 and early 1985, so that expenditure levels fell once again by 1985. Note also that after the implementation of the stabilization program, expenditures fell more, as a result mainly of the public-sector wage freeze that was imposed at the outset of the stabilization program (described below).

Price and Exchange Rate Dynamics

The simple model of monetary and price dynamics introduced earlier must be modified in one important respect in the case of Bolivia. We have seen that throughout the hyperinflation period, foreign exchange was rationed at the official exchange rate, so that a large black market premium was present throughout the period. In order to understand the dynamics of prices with a black market exchange rate, it is necessary to alter the purchasing power parity relationship to reflect the fact that the black market exchange rate, rather than the official rate, best reflects the marginal cost of foreign exchange for most imports during the period. For a limited subset of "necessary" imports, official foreign exchange was available from the central bank without rationing. The official exchange rate applied, for most of the

period, to newsprint and pharmaceutical imports, for example. For all other goods, limited amounts of imports were purchased at the official exchange rate, but on the margin the cost of foreign exchange was dictated by the black market price rather than by the official price. As a result, we should expect that the price level would be a weighted average of the official (E) and black market ($\tilde{E}$) price of foreign exchange, so that

$$(2) \qquad P_t = E_t^{\gamma} \tilde{E}_t^{(1-\gamma)} P_t^{\star}$$

As before, monetary equilibrium requires $M/P = m(\pi^e, Q)$. Using the convenient Cagan form for money demand used earlier, assuming adaptive expectations for inflation, and taking the logs of both sides of (2), we can write:

$$(3) \qquad m_t - \gamma e_t - (1 - \gamma)\tilde{e}_t = a(1 - \sigma) - (1 - \sigma)b\pi_t + \sigma(m_{t-1} - p_{t-1})$$

where b is the semi-elasticity of demand for money with respect to inflation, and σ is the parameter of adaptive expectations. By rearranging, we get an estimable equation for the black market premium ($\tilde{e} - e$) as an increasing function of (m - e), as well as a rising function of inflation and a negative function of (log) real balances lagged one period:

$$(4) \qquad (\tilde{e}_t - e_t) = a(1 - \sigma)/(1 - \gamma) + [1/(1 - \gamma)](m - e)$$

$$+ [(1 - \sigma)/(1 - \gamma)]\pi_t - [\sigma/(1 - \gamma)](m_{t-1} - p_{t-1})$$

An estimate of this equation on monthly data for January 1982 to September 1985 is strongly supportive of this monetary interpretation of the black market premium. The estimated equation is:[8]

$$(5) \quad (\tilde{e}_t - e_t) = 3.03 + 1.10(m - e)$$
$$\quad\quad\quad\quad\quad (0.24) \quad (0.08)$$

$$+ 0.57\,\pi_t - 0.58(m_{-1} - p_{-1})$$
$$(0.17) \quad\quad (0.10)$$

$$R = 0.84$$
$$d.w. = 1.26$$
$$s.e. = 0.27$$

The point estimate on (m - e) of 1.10 suggests that the black market exchange rate gets a weight of 0.9 in determining the price level. This high weight is broadly consistent with direct estimates for prices, to which I now turn.

The microdynamics of wages, prices, and exchange rates changed markedly over the course of the inflation. During the early 1980s, nominal wages were changed only a few times a year, and the presence of staggered nominal wage settlements gave inertia to the wage-price process. As inflation accelerated, wage contracts were renegotiated on a more frequent basis, until by the end of the hyperinflation nominal wages were being reset on a weekly or biweekly schedule. As for prices, an increasing proportion of transactions became dollar linked, in the sense that traders quoted prices in dollars, converting such prices into pesos (at the parallel exchange rate) at the time of the transactions. It was illegal during this period to use dollars for transactions or even to quote items in dollars, so that in most parts of the country (with the important exception of the Santa Cruz region), dollarization stopped short of actual transactions in U.S. dollars.

A precise specification of price-exchange rate linkages would open up a number of econometric and conceptual issues better left to another study. Here, the process of encroaching "dollarization" is shown more simply, in an

equation linking monthly inflation to: a one month lag of inflation, the change in the black market exchange rate, and the change in the official exchange rate. The equation to be estimated is:

$$(6) \quad (p_t - p_{t-1}) = a_0 + a_1(p_{t-1} - p_{t-2}) + a_2(e_t - e_{t-1})$$
$$+ a_3(\hat{e}_t - \tilde{e}_{t-1})$$

All variables are expressed as monthly averages, where the monthly average exchange rates for month t are proxied by the geometric weighted averages of end-of-the-month rates for months t-1 and t.

There are two maintained hypotheses: (1) as inflation accelerates, the weight of the exchange rates in the price equations increases relative to the weight of the previous month's inflation; and (2) as inflation accelerates, and as the black market premium increases (see Table   ), the black market exchange rate increases in importance relative to the official exchange rate. Thus, we expect that $a_1/(a_1+a_2+a_3)$ and $a_2/(a_2+a_3)$ will both fall as the hyperinflation intensifies.

Estimates of (6) are shown in Table 4a, first under an unrestricted estimation of the parameters, and then under the restriction $a_1+a_2+a_3 = 1$. The hypotheses are supported in each case. The average monthly inflation rates for the three intervals are: 1983, 13.2; 1984, 31.4; 1985, 66.9. We see clearly that as we move from 1983 to 1985 the weight of lagged inflation (even at a one-month lag!) disappears, while the weight of the black market exchange rate grows in importance. In the final eight months of the hyperinflation, price change is basically equiproportional to change of the black market exchange rate.

Table 4a: Price Inflation Equations

$$(P_t - P_{t-1}) = a_0 + a_1(P_{t-1} - P_{t-2}) + a_2(e_t - e_{t-1}) + a_3(\breve{e}_t - \breve{e}_{t-1})$$

1. Unconstrained Estimation (monthly)

Date	a_1	a_2	a_3	$a_1/(a_1+a_2+a_3)$	$a_2/(a_2+a_3)$
1983:1-1983:12	.33 (.27)	.18 (.11)	.20 (.15)	.46	.47
	$\overline{R}^2$ = .42 d.w. = 1.76				
1984:1-1984:12	.13 (.52)	.32 (.11)	.52 (.19)	.13	.38
	$\overline{R}^2$ = .58 d.w. = 2.80				
1985:1-1985:9	-.18 (.17)	.17 (.13)	1.04 (.160	-.17	.14
	$\overline{R}^2$ = .87 d.w. = 2.20				

2. Constrained Estimation

Date	a_1	a_2	a_3	$a_1/(a_1+a_2+a_3)$	$a_2/(a_2+a_3)$
1983:1-1983:12	.57	.16 (.11)	.27 (.13)	.57	.37
	$\overline{R}^2$ = .42 d.w. = 1.97				
1984:1-1984:12	.16	.31 (.10)	.53 (.11)	.16	.37
	$\overline{R}^2$ = .71 d.w. = 2.82				
1985:1-1985:8	-.20	.17 (.11)	1.03 (.10)	-.20	.14
	$\overline{R}^2$ = .94 d.w. = 2.18				

The combination of equations ($_5$) and ($_6$) illustrate the utter futility of the government's policy of maintaining an overvalued official exchange rate under conditions of rapid money creation. The government's resistance to devaluation was ostensibly the fear of provoking even higher inflation, but is clear that money creation fed through into prices <u>even in the absence of devaluation</u>, through the mechanism of depreciation of the black market exchange rate. The maintenance of an overvalued official exchange rate did nothing to stop inflation. On the contrary, it not only created large distortions in the economy (particularly by acting as a tax on legal exports), but almost surely <u>raised</u> inflation by increasing the government deficit via its negative effects on tariff collections.

The End of the Hyperinflation

As with many other hyperinflations, the end did not come on the first try, but only after several attempts at stabilization had failed. Stabilization programs were launched in November 1982, November 1983, April 1984, August 1984, November 1984, and February 1985. The most ambitious programs were those of November 1982 and April 1984. Notably, the April 1984 package represented a comprehensive, fairly orthodox approach to stabilization, that in some ways matched the steps taken successfully in the following year. There was a very large devaluation of the official exchange rate; an announcement of tax reform; a major increase in public sector prices; and a new initiative to renegotiate the external public sector debt. In the event, the trade unions exploded in a furious opposition to the program, and a month later, the government acceded to demands for a large wage increase to compensate for the devaluation. At the same time, the government reversed

itself under the presure of the trade unions and a unilateral moratorium on further servicing of the external commercial banks debt, and gave up further attempts to negotiate a package of debt rescheduling.

The complete breakdown of the April 1984 package eliminated any remaining hopes of the public that the Siles government would prove able to stabilize the economy. In November 1984, President Siles was compelled to announce elections in July 1985, one year ahead of schedule. A final attempt at stabilization came in February 1985, with a program that prompted a domestic march to La Paz, and month-long sit-in, of 10,000 miners. Again, the government capitulated to popular demands, after which it gave up even the pretense of attempting to stabilize before the arrival of a new government in August.

The successful stabilization program was carried out by the newly elected center-right government of President Victor Paz Estenssoro. The government came to power in rather inauspicious circumstances. National elections in July 1985 proved inconclusive, as they had in 1978, 1979, and 1980. Once again, no candidate received a majority of votes, with the public deeply divided among candidates of the left, center and right. Banzer received the plurality of votes, though Paz was voted in by the newly elected Bolivian Congress on August 4, 1986. Three weeks later, on August 29, the new government unveiled a remarkably wide ranging, and in many ways radical program, which encompassed not only plans for macroeconomic stabilization, but also for trade liberalization, administrative and tax reform, and deregulation of the domestic markets. The main elements of the overall program, and the state of implementation are described in Table 6. The scope of the proposed

Table 6

Outline of Major Policy Initiatives

Policy Area	Key Policy Initiatives	Implementation
Exchange Rate	Unification of exchange rate on current and capital account; free convertibility of foreign exchange	Complete, since September 1985
Public Sector Pricing	Public sector prices (most importantly energy and food) raised to world levels	Complete, since September 1985
Consolidated Public Sector Budget	Target deficit of 6.3 percent GNP, of which 5.3 percent to be externally financed	Budget approved by Congress May 1986
Import Regulations	Unification of tariffs to flat 20 percent rate. Elimination of trade quotas and non-tariff barriers	Quotas eliminated immediately Tariff reform: Aug., '86
Private Sector Salaries and Employment	Elimination of government restrictions covering private wages, except for national minimum wage. Removal of restrictions on hiring and firing	Complete, since September 1985
Private Sector Pricing	Elimination of all price controls, except for public transportation and public utilities; elimination of previous monopolies in intercity transport	Complete, since September 1985
Public Sector Salaries and Employment	Successive wage freezes (with one-step wage increases between freeze periods) during August-December, 1985 December-June, 1986; June-December, 1986	In effect
	Employment reductions in state enterprises and central administration	Not yet implemented

Table 6 (cont.)

Outline of Major Policy Initiatives

Policy Area	Key Policy Initiatives	Implementation
Public Enterprises	Decentralization of major state enterprises	Most actions not yet taken
Taxation	Increases in taxes paid by YPFB	In effect
	Major consolidation and reform of internal taxes: establishment of VAT, patrimongy taxes, and uniform income taxes	Approved by Congress in May 1986
International Financial Organizations	Negotiation of IMG Standley Agreement	Approved by IMF June 1986
	Reestablishment of credit-worthiness with World Bank and IDB	Current on all obligations
Foreign Creditors	Negotiation of Paris Club Rescheduling	Terms of Agreement Approved June 1986
	Commercial bank debt	Negotiations pending
Interest Rates	Elimination of restrictions on commercial bank interest rates	Complete, since September 1985

program is remarkable in that it attempts to address deep and politically sensitive structural issues in the economy at the same time that it battles against the hyperinflation.

On the macroeconomic side, the program contained four basic elements, two of which were to be implemented immediately and two of which were slated for implementation in the months following the beginning of the program. First, the government committed itself to a policy of a unified exchange rate, without capital controls or exchange controls. The exchange rate was initially floated, though with a maximum value of the peso beyond which peso appreciation would not be permitted, and then was managed in a dirty float during the following year. Second, the fiscal deficit was immediately reduced through a combination of: (a) public sector price increases, especially for petroleum products; (b) a public sector wage freeze; (c) a further reduction in spending on public investment; and (d) budget austerities in other areas, such as subsidized credits to the private sector. Third, the program called for a tax reform to reestablish and broaden the tax base. The reform was enacted by the Congress nine months after the start of the program, after a bruising political fight. Implementation of the reform began about one year after the start of stabilization. Fourth, the government announced its intentions of reestablishing the country's creditworthiness with the official international financial institutions, especially the IMF, the World Bank, and the InterAmerican Developement Bank. Renewed creditworthiness required the government to eliminate arrears on its debt servicing obligations to these institutions, and to negotiate an IMF standby agreement, which it did by June 1986.

To appreciate the drama of the end of the hyperinflation, consider the situation on the eve of the new program. During August 1985, the official exchange rate stood at 67,000 pesos per dollar, while the black market exchange rate was approximately 1.1 million pesos per dollar, for a percentage gap of some 1600 percent (in fact, after averaging 1.1 million for most of the month, the black market rate shot up to 1.5 million pesos on the eve of the program announcement). The internal price of petroleum was about 3 cents per liter, compared with a world price of 28 cents per liter. Inflation in the weeks leading up to the program was (at weekly rates):

        August 5 - August 11:   18.4
        August 12- August 18:   8.6
        August 19- August 25:   6.1
        August 26- September 1:   19.9

As the program began the exchange rate was allowed to depreciate freely, before a new de facto peg was set. The market set the new unified rate at an opening level of about 1.1 million, giving a one day depreciation of 1600 percent relative to the previous official rate. Internal oil prices were immediately raised to 28 cents per liter, or by 833 percent. All other price controls in the economy were lifted by the decree of August 29, 1985.

These enormous changes took only 10 daysto work through the price system. Prices jumped immediately following the devaluation and increase in internal energy prices, but then inflation immediately ended:

        September 2-September 8:   36.8
        September 9-September 15:   -4.6
        September 16-September22:   -0.8
        September 23-September29:   -2.5
        September 30-October 6:   0.7

These data are reproduced in Figure 4, where the remarkable break in the inflation from the second week of the program onward is clearly evident. The

inflation rate has remained at relatively low levels during the following year, with the exception of a jump in prices during December 1985 and January 1986, following policy mistakes in monetary management at the end of the past year (which resulted in a cabinet reschuffling and a reinforcement of the fiscal austerity measures).

The leading trade union organization, which had opposed and mobilized against similar--indeed less dramatic--policy packages in the past, called for a general strike in opposition to the program. But after three years of accelerating inflation, and the near chaos of early 1985, the new government clearly had the upper hand. A state of siege was declared (as a temporary and constitutional emergency procedure) and the strike was quickly disbanded after which the state of siege was eliminated. The action, and its effects on public opinion, was not unlike President Reagan's stand against the PATCO workers in 1981.

The stabilization of the exchange rate at the new depreciated level of 1.1 million pesos per dollar caused a gradual rebuilding of the public's real money balances. One of the central policy issues at the end of a hyperinflation is how that increase in real money demand should be accomodated: through domestic credit expansion to the public sector, or to the private sector (e.g. via rediscounting of private paper), or through foreign reserve inflows through the balance of payments (i.e. central bank purchases of foreign exchange at a pegged rate or in a dirty float). The Bolivian government chose the third, and clearly most conservative strategy, of relying on the balance of payments. It was felt that with large Bolivian hoards of U.S. dollars, both in Bolivia and abroad, there was sufficient availability of

Weekly Inflation Rates
(week 0 = 8/26 – 9/1)

percent change per week

week of program
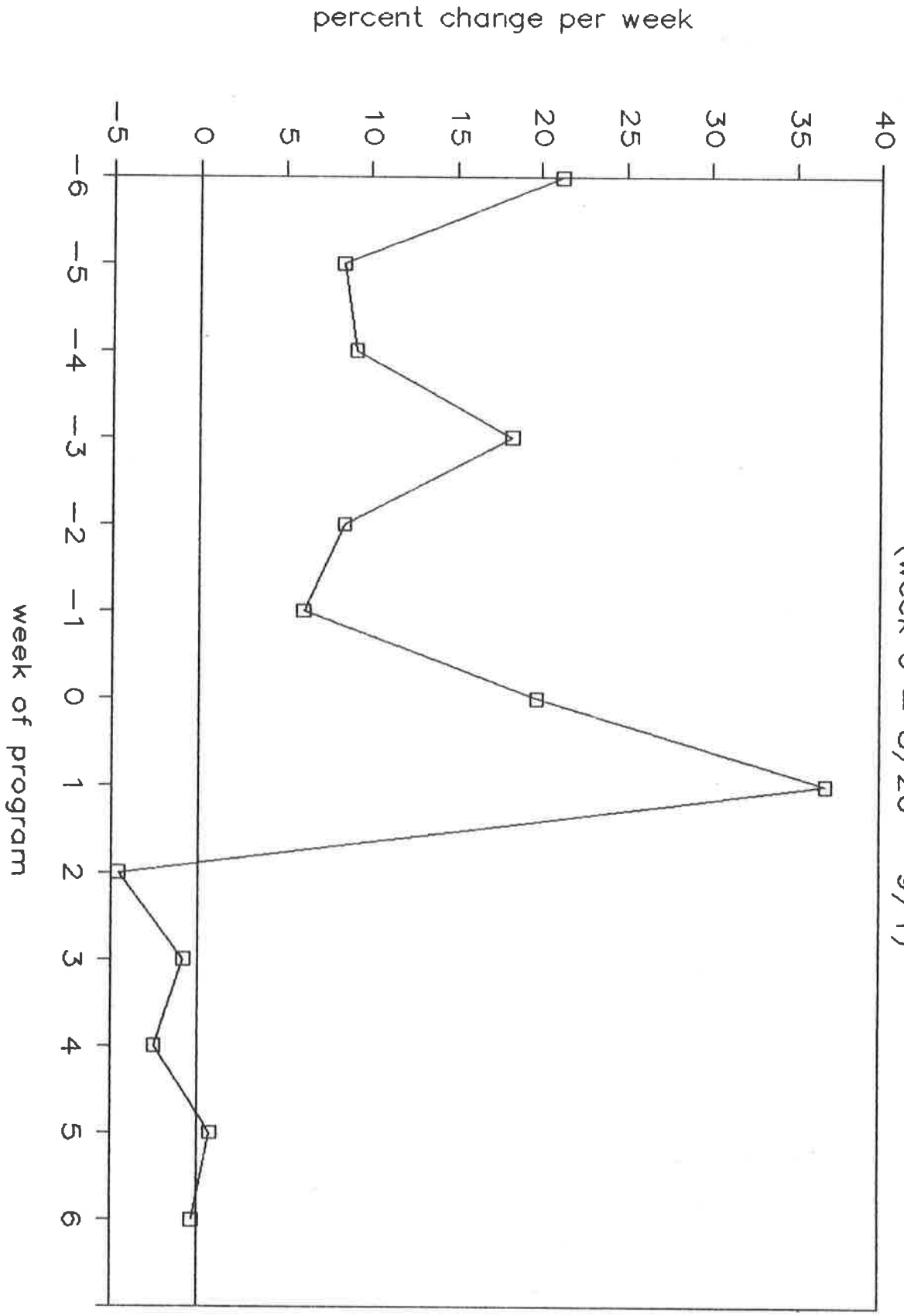
foreign exchange holdings in private sector hands to provide the basis for the needed expansion of the domestic money supply. Moreover, with confidence in the peso likely to be a rising function of the extent of foreign reserve backing of the domestic money base, the conservative approach was felt to be the most consistent with a restoration of confidence in the new exchange rate and monetary regime. Net reserves climbed from approximately $63 million at the end of August 1985 to about $150 million by the end of December, exceeding the rise in the money base from $64 million in August to $112 million at the end of the year.

We have already noted the sharp rise in government revenue collection as soon as the program starts (see Figure 3). The rise in domestic oil prices, plus the renewed YPFB tax payments on export earnings, alone raised the rate of central government tax collection by about 7 percent of GNP. Adding in a small recovery of internal taxes and tariff collections, government revenues rose from about 1.3 percent of GNP during January-September 1985, to 10.3 percent of GNP during the remainder of the year. Overall, the central administration moved into a cash flow surplus during October-December 1985. With a virtual elimination of domestic credit expansion to the fiscal sector, seignorage dropped off sharply after the program begins (as was evident in Figure 2). Expressed as a percentage of GNP, the evolution of seignorage on a quarterly basis is:

1985:1	2.9 percent of GNP
1985:2	3.6
1985:3	3.4
1985:4	1.9
1986:1	0.1
1986:2	0.8

In the year following the beginning of the program, the public authorities have faced two major challenges. The first has been to implement

many of the reforms called for in the decree of August 1985, which were not posible to implement immediately. The most important of these reforms are in the areas of: tax administration (where a major reform program was passed by the Bolivian Congress in May 1986, and is just now starting to be implemented); a reform and reduction in scale of the state enterprises, and especially the state tin mining company Comibol; a reform of the trade regime, which aims at elimination of mosts barriers to international trade and the implementation of a flat tarriff schedule (the enabling decree was implemented in August 1986, a year after the beginning of the program); reform of international financial relations, including an IMF standby arrangement (approved by the IMF, after extended delays, in June 1986), a Paris Club rescheduling (which followed the IMF agreement, also in June 1986), and a normalization of relations with the commercial banks (negotiations are still pending).

The second challenge to the public authorities was the stunning and coincidental shocks to the external sector that Bolivia experienced in the first year of the stabilization program. Bolivian exports have depended heavily on three items in recent years. Tin and natural gas have constituted about 90 percent of Bolivia's measured and legal exports, while processed coca leaf, destined to become cocaine, has represented the third (illegal and unrecorded) export. The rough estimates for Bolivian exports in 1985 are:

Tin	$150 million
Other metals	$ 81 million
Natural gas	$377 million
Others	$ 22 million
Coca based	$600 million
Total	$1230 million (30 percent of GNP)

Once the stabilization program got started, there were profound disruptions in all three of the major markets. The price of tin collapsed by 60 percent at

the end of October 1985, as the worldwide tin cartel collapsed in financial distress. Three months later, hydrocarbon prices collapsed, forcing a renegotiation of Bolivia's natural gas contracts with Argentina, and resulting in a loss of dollar earnings on the order of $75 to $100 million (the exact value is difficult to compute because of a complicated barter arrangement between the two countries as part of the gas agreement). Finally, the Bolivian government began a major interdiction effort against narcotics trafficking in the summer of 1986, disrupting the smuggling of coca-based products from the country. A very conservative estimate would put the export revenue loss from these shocks at $350 - $400 million ($100 million tin; $75 million gas; $175 million coca), or a loss of 10-15 percent of GNP in one year! (The loss from coca could be considerably higher if recent reports are correct that the drug trafficking has been completely disrupted). Moreover, each of these disturbances appears to be a permanent rather than temporary shortfall.

The shortfall in export earnings has threatened the stabilization program in several ways. Most importantly, the export shortfall has resulted in a sharp contraction in living standards, which is attributed to a significant extent within Bolivia to the effects of the stabilization program itself. With great weakness in the domestic demand for nontradeable goods as a result of the decline in national income, there is enormous political pressure to revive government spending, increase public wages, and "reactivate" the economy. Second, each episode of export shortfall has provoked public expectations of a devaluation, and has helped to maintain high short-term nominal peso interest rates as a result of continued speculation against the

exchange rate. After the tin price collapse in October 1985 the exchange rate
was in fact allowed to depreciate, by almost 50 percent over a period of two
months. After the collapse of world petroleum prices, the authorities pegged
the peso exchange rate, despite scepticism of the public, which speculated
heavily on a depreciation. Similarly, after the start of the drug
interdiction effort in the summer of 1986, the public again speculated heavily
against the peso, pushing up short-term peso interest rates once more, and
converting domestic currency holdings into dollars at the rate pegged by the
central bank. Once again the authorities resisted a currency devaluation, but
at the expense of further months of high ex post real interest rates.

Interpreting the Success at Price Stabilization

In his rightly celebrated and influential analysis of the ends of four
hyperinflations, Sargent (1982) stressed that hyperinflations end when
governments "change the rules of the game" regarding budget deficits and money
creation. Sargent argues that:

> In each case we that we have studied, once it became widely
> understood that the government would not rely on the central
> bank for its finances, the inflation terminated and the
> exchanges stabilized. (p.89)

> The changes that ended the hyperinflations were not isolated
> restrictive actions within a given set of rules of the game
> or general policy. Earlier attempts to stabilize the
> exchanges in Hungary under Hegedus, and also in Germany,
> failed precisely because they did not change the rules of the
> game under which fiscal policy had to be conducted. (p.90)

How does the Bolivian experience fit into this schema?

At a trivial level, Sargent is certainly correct that without a change in
budget practices, no noninflationary exchange rate management would have been

successful for long in Bolivia. Sargent's real assertion is much deeper, however, in suggesting that the end of the hyperinflation occurs suddenly not just because the inflationary budget or monetary practices change, but also because the public expects and understand that these changes will persist. In other words, the rapid end of the hyperinflation is a signal of a restoration of confidence. At this level, I believe that the Bolivian experience is not strongly supportive of Sargent's view, in that the evidence suggests that stabilization proceeded well ahead of a complete restoration of public confidence.

To give a precise meaning to my interpretation, let us consider briefly an analytical model in which a hyperinflation is ended suddenly despite the perfect foresight that it will soon resume in an even more virulent form. Suppose for example, that the government has a real primary deficit in the amount (g-t), and holds an internationally denominated bond, earning real interest rate r, in the amount b. The government flow budget deficit is then:

$$g - t - rb$$

which I will assume is financed completely by domestic credit expansion by the central bank. Let $d = (1/P) (dD/dt)$ be the real rate of domestic credit expansion, where D measures the central bank holdings of claims against the central government. Thus,

(7) $\quad d = g - t - rb$

The public's holdings of real money balance m are assumed to be a function of the instantaneous rate of inflation, so that $m = M/P = m(\pi)$. Prices, in

turn, are given by the purchasing power parity relationship $P = EP*$. Holding $P*$ constant, the rate of inflation is equal to the rate of currency depreciation.

By the central bank identity that changes in base money are equal to changes in domestic credit expansion plus changes in the book value of international reserves, we have:

$$(8) \qquad (1/P)(dM/dt) = d + db/dt$$

Under a pure float, $db/dt = 0$, while under a fixed exchange rate dM/dt will be zero, so that $db/dt = -d$.

We suppose that the economy begins under an inflationary floating exchange rate regime, with initial reserve holdings b_0. In the initial equilibrium, the inflation rate will be determined as the rate just sufficient to finance the budget deficit d, so that:

$$(9) \qquad \pi_0 m(\pi_0) = g - t - rb_0$$

I assume that $g-t-rb_0$ is greater than zero, so that the government must resort to positive inflationary finance. Now, let us suppose that the monetary authorities attempt to end the inflation by fixing the exchange rate, but contrary to Sargent, they make no change in the underlying fundamental levels of g and t, and the public understands that g and t will remain unchanged. The public believes one key thing: that the central bank is willing to let b_0 run down to a lower level b_1 before abandoning the attempt at exchange rate fixing. In other words, the fixed exchange rate will be held until and when international reserves drop down to a minimum acceptable level

b_1, with $b_1 < b_0$, at which point the fixed exchange rate will be permitted to collapse, and the floating rate regime will be restored.

What will happen in this case, given that the public has no restoration of confidence, and that no fundamental rules of the game have been changed? Surprisingly, the hyperinflation will nonetheless end instantaneously, although temporarily, as soon as the exchange rate fixing begins. Prices will stop rising, and as a false "sign" of the public's confidence, the central bank's reserves will actually rise discretely on impact, as households convert their foreign assets to domestic currency. Soon enough, the program will collapse, with reserves falling once again and inflation returning to an even higher rate. Nonetheless, even with the public having perfect foresight about the eventual collapse, the public will act for a while as though their confidence has been restored. Let us see the mechanics of this process.

At the time of the eventual collapse, inflation will reach a new level π_1, such that:

(10) $\pi_1 m(\pi_1) = g - t - rb_1$

Assuming that the economy always operates at inflation rates for which seignorage is an increasing function of inflation, it is clear that $\pi_1 > \pi_0$ since $b_1 < b_0$. At the inflation rate π_1, we can find the demand for real money balances, $m(\pi_1)$, and the demand for nominal money balances M as a function of the price level: $M = P * m(\pi_1)$.

During the period in which the exchange rate is pegged (assuming, as we now show, that the fixed rate is viable for a limited period), the inflation rate will be zero, and money demand will be given by $m(0)$. Nominal money

holding will be $M_0 = E_0 * m(0)$, where E_0 is the level at which the exchange rate is pegged. As long as the exchange rate is being held fixed, the government's official reserve holdings will fall at the rate $db/dt = -(g-t-rb)$. Starting from any level of reserves for which $g - t - rb > 0$, it is clear that b_1 will be reached in finite time. Since the public knows that, it will choose to make a speculative attack against the fixed exchange rate at a point before b_1 is actually reached. When will the speculative attack occur? Following the approach of Krugman (1979), the speculative attack will occur at the moment when central bank reserves are such that a speculative attack will exactly drain the central bank's reserves to the minimum level b_1 and leave the public with nominal cash balances equal to $E_0 m(\pi_i)$. Note that there is no discrete jump in the exchange rate at the time of the speculative attack; rather, there is a discrete jump in the rate of change of the exchange rate, from $(dE/dt)(1/E) = 0$ to $(dE/dt)(1/E) = \pi_i$.

Since the floating rate period starts with the nominal exchange rate at E_0, we know that money demand at the outset of the floating rate period is given by $M^+ = E_0 * m(\pi_1)$, where M^+ denotes the demand for money balances at the instant after the speculative attack occurs. A moment before the speculative attack, money balances will be given by money market equilibrium under fixed rates: $M^- = E_0 * m(0)$. The difference $M^+ - M^- < 0$ is equal to the drop in reserves of the central bank at the moment of the speculative attack. In other words, with obvious notation, $(b^+ - b^-)E_0 = (M^+ - M^-)$. Since b^- is equal to b_1 by assumption, we see that the speculative attack occurs as soon as the central bank's reserves fall to the level:

(11) $b^- = b_1 + (M^- - M^+)/E_0$

or, substituting for M^- and M^+ :

(12) $b^- = b_1 + [m(0) - m(\pi_1)]$

Now, we can return to the initiation of the fixed exchange rate period. Starting from an inflation of π_0, the authorities peg the exchange rate. Because prices are set according to purchasing power parity, inflation immediately stops. Since demand for real money balances rise as inflation stops, we see reserve holdings of the central bank jump by the amount $[m(0) - m(\pi_0)]$ at the moment of stabilization. Let b_0^+ be the amount of reserve holdings after this jump in reserves takes place. Assuming that $g - t - rb_0^+ > 0$, then reserve holdings will start to decline during the fixed exchange rate phase, after their initial jump. As long as reserves remain above b^- in (12), however, the fixed exchange rate will remain viable. Once the reserve level b^- is reached, then a speculative attack will occur, reserves will be depleted instantly to the level b_1, and inflation will rise to π_1, even higher than the pre-stabilization rate. The time path of inflation and foreign exchange reserves are depicted in Figure 5.

According to this model, then, fixing the exchange rate is a sufficient condition for a short-run stabilization, while budget reform is the key to long-run stabilization. Moreover, the exchange rate is viable in the short run as long as the central bank is willing to commit at least some international reserves to pegging the exchange rate in the short term. The policy can be thought of as an intertemporal reallocation of the government's

Figure 5. Temporary Stabilization without Budget Reform

t_0 = date of exchange rate fixing
t_1 = date of speculative attack
against exchange rate

International
Reserves

b_0

b_1

t_0

t_1

time

Inflation

π_1

π_0

0

t_0

t_1

time
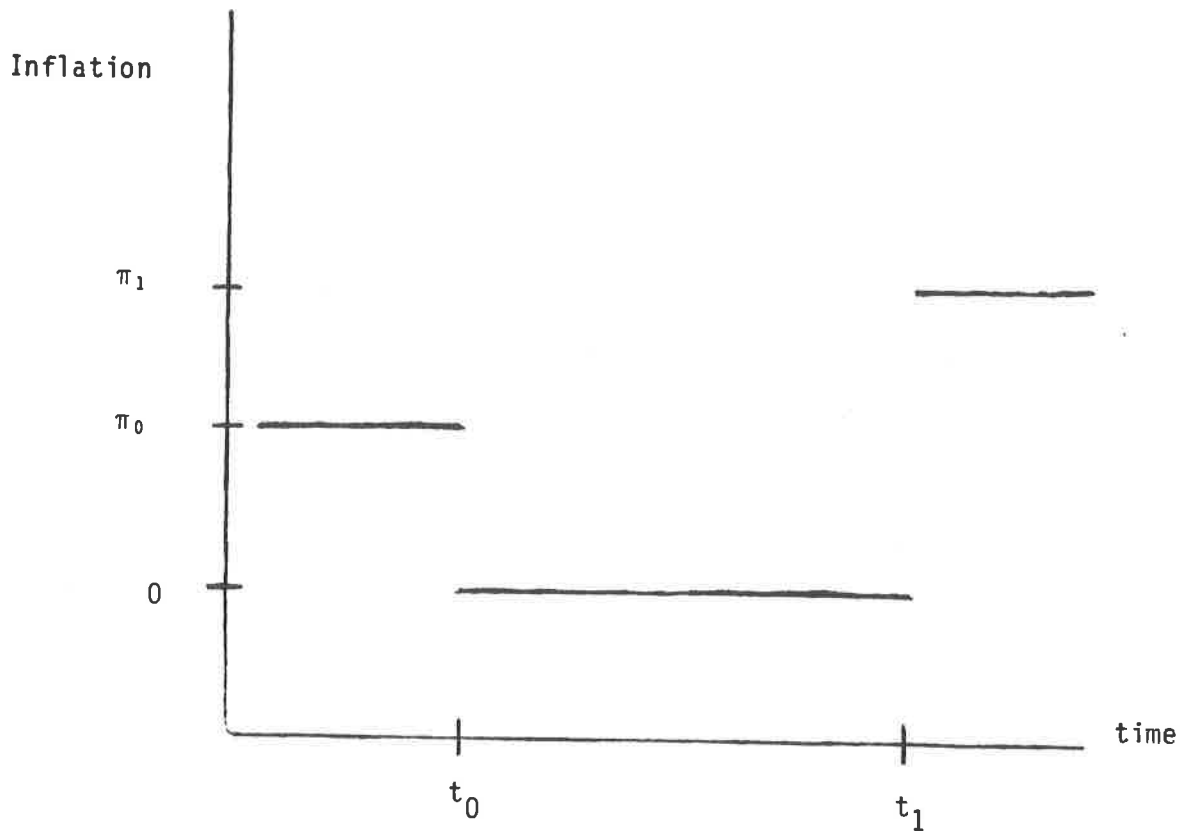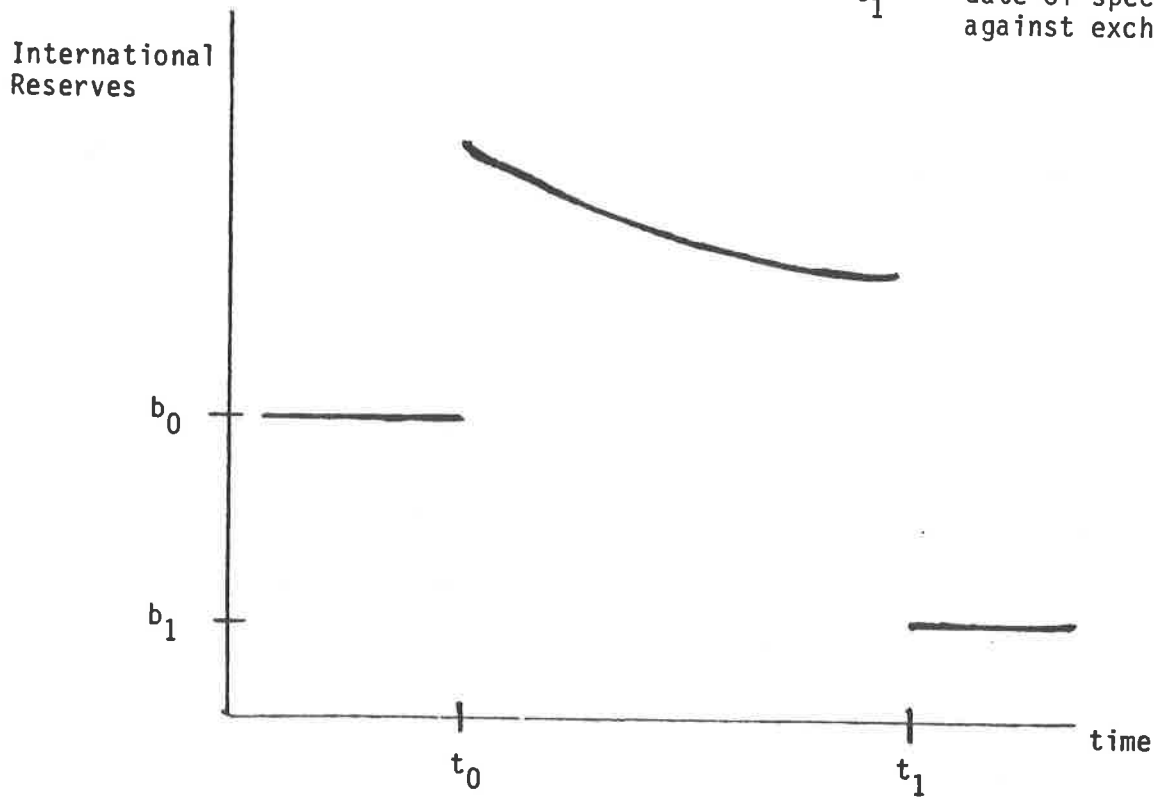
seignorage: by raising seignorage after t_1, from $\pi_0 m(\pi_0)$ to $\pi_1 m(\pi_1)$, the government can forgo seignorage during the internal $[t_0, t_1]$. The public's confidence in long-term price stability is not a necessary precondition for a cessation of inflation upon the announcement of a program.

There are many other ways that a program might work temporarily, even if it is expected to break down over the longer term. Suppose, as an alternative example, that the government does initially hold reserves exactly at the minimum b_1, but has access to a temporary tax that it can levy sufficient to close the budget deficit during the interval $[t_0, t_1]$. The government also pegs the exchange rate at time t_0, at the rate E_0, subject to the reserve constraint $b > b_1$. It is easy to show that the resulting dynamics are as follows. During the interval $[t_0, t_1]$, inflation is completely eliminated, and foreign exchange reserves jump at t_0 from b_1 to $b_1 + [m(0)-m(\pi_1)]$. Until time t_1, real money balances, nominal money balances, the exchange rate, and foreign exchange reserves are all unchanging. At time t_1, a speculative attack occurs just as the temporary tax increase is eliminated. Inflation jumps back to π_1, and foreign exchange reserves fall discretely by the amount $[m(0)-m(\pi_1)]$, thereby returning the level of reserves back to the minimum level b_1. In summary, a temporary tax increase that is just sufficient to eliminate the budget deficit exactly eliminates the inflation during the period that the tax increase is in effect.[9] Once the tax increase is reversed, the inflation returns to its previous path.

As a third example, most closely resembling the Bolivian experience, suppose that a tax increase is instituted (whether temporary or permanent), with the public's inflationary expectations based on some sort of Cagan-style

adaptive mechanism. At the moment of stabilization, the demand for real money balances are fixed by the level of inflationary expectations, which itself adjusts only slowly over time in response to changes in actual inflation performance. In this case, if money creation ceases (because of the tax increase) while inflationary expectations governing money demand persist, price inflation will cease immediately (because prices are tied to the now-fixed exchange rate) while real money balances and foreign exchange reserves remain constant at the moment of stabilization (households do not rush immediately to reconstitute real money balances). Over time, as inflationary expectations diminish, real money balances rise as the central bank purchases foreign exchange from the public. Thus, an immediate cessation of inflation is consistent with no immediate change of inflationary expectations even over the short term, since inflationary expectations govern demand for real money balances rather than good market pricing (which is determined solely by the exchange rate and the level of international prices).

The quick success of Bolivian price stabilization reflects some features of each of the preceding three examples. Almost at the moment of stabilization, central bank credits to the public sector stopped rising, as revenues jumped in response to the higher domestic prices of petroleum products. During October and November 1985, increases in the money supply were due to increases in central bank holdings of foreign exchange reserves. The exchange rate stabilized at 1.1 million pesos per dollar, and the exchange rate stabilization led almost immediately to price stabilization. (Actually, the government did not peg the exchange rate, but rather intervened to prevent the rate from appreciating above the 1.1 million level. Given the pressures

towards appreciation as households started to rebuild real money balances, the one-sided peg of the exchange rate worked as if the government were actually pegging the rate).

Before showing the evidence that inflationary expectations were slow to decline, let us consider some reasons why we should not be surprised that expectations did not shift dramatically upon the announcement of the program.

First, the stabilization program was the seventh attempt in four years, and was being carried out by a President without a majority in Congress, and with a direct electoral mandate of less than thirty percent of the voters. Second, the program promised many reforms that would take a considerable amount of time to negotiate and implement. Third, the program reflected a radical change from the past policies of the President's own party (which, as the vanguard of the Revolution of 1952 does not have a tradition of laissez-faire economics), and so could not be counted on to win the support of the governing party itself. Fourth, there were profound unknowables at the time of stabilization. The overhang of foreign debt remained crushing, and the stabilization in the intermediate run would remain possible only with new foreign funds from the official creditors. But would the IMF consent to a program without the immediate resumption of interest payments to the commercial banks? Would the Paris Club respond with generous debt rescheduling terms? Internally, the situation was as murky. Under Siles, the central administration had reneged on many financial commitments to regional governments. Would those claims by the regional entities now be honored, thereby threatening the solvency of the central government? Would tax reform measures be implemented? Would the unions be able to crush this stabilization

program as they had, in part, the early ones? As of September 9, 1985, there were no budget accounts, reliable tax forecasts, or even statistics on Bolivia's international reserve holdings (the data were in a mass of confusion because of several complications with bilateral payments arrangements with Argentina). There was simply no basis for an informed opinion about the longer-term prospects of the stabilization.

The best indicator of the view that short-run stabilization did not require long-run confidence comes from data in the money market. As has occurred at the end of other hyperinflations, nominal interest rates, and thereby ex post real interest rates, have remained extraordinarily high during much of the year since the beginning of stabilization. Nominal interest rates fell after the stabilization program began, but only gradually and with a long lag in response to the end of currency depreciation. Some data on nominal lending rates are shown in Table 7. Under the deregulated financial system in place since the stabilization program began, loans may be contracted in either dollars or pesos, at unregulated interest rates. The spread between peso and dollar-denominated borrowing, reflects mainly the expected rate of depreciation of the peso vis-a-vis the U.S. dollar. Note that despite the sudden cessation of price increases in September 1985, nominal interest rates in pesos remained on the order of 20 percent per month from October 1985 to March 1986, compared with dollar-denominated interest rates of 1½-2 percent per month. The expectations of continued currency depreciation proved to be appropriate during December 1985 and January 1986, when policy mistakes led to a sharp depreciation of the peso. However, during the period February 1986 to September 1986, the interest rates have remained extraordinarily high, without

Table 7: Peso-Denominated and Dollar-Denominated 30 Day Loan Rates, April 1985 - October 1986 (beginning-of-month)

		Peso	Dollar	Ex Post Dollar Rate on Peso Loan	Excess Cost of Peso Loan
1985	April	34			
	May	35			
	June	44			
	July	50			
	August	45			
	September (stabilization begins)	45			
	October	31			
	November	22	1.4	10.2	8.8
	December	21	1.6	-6.7	-8.3
1986	January	19	1.6	-8.1	-9.7
	February	20	1.7	34.5	32.8
	March	20	1.7	16.8	15.1
	April	19.	1.7	17.5	15.8
	May	13	1.8	13.0	11.2
	June	8	1.9	8.4	6.5
	July	8	1.9	8.0	6.1
	August	8	1.9	7.5	5.6
	September	7	1.9	6.8	4.9
	October	7	1.8	6.8	5.0
	November*	3	1.8		

*Last week of October.

Note: The ex post dollar rate on a peso loan is calculated as $(1+i_t)E_t/E_{t+1}$ where E_t is the beginning of month exchange rate (pesos per dollar), and i_t is the beginning of month t interest rate.

any further currency depreciation. Whether or not the public is fundamentally

accurate in its apparent perception that risks of large currency depreciation

persist, it is clear from the data that there has not been a decisive

restoration of confidence that inflation is firmly under control.

Similar evidence is offered by the time path of real money balances in

the wake of the stabilization program. Holdings of real balances have

increased only gradually during 1986, and they have remained significantly

below historical levels:

Real Money Balances
(base money, billions 1980 pesos)

Average

1980	12.0	
1981	10.0	
1982	10.8	
1983	10.3	
1984	5.8	
1985:8	3.2	
:9	3.0	beginning of stabilization
:10	3.5	
:11	3.4	
:12	4.3	
1986:1	2.9	
:2	3.0	
:3	3.1	
:4	3.3	
:5	3.6	
:6	3.6	

Ironically, an important factor in maintaining the public's expectations

of future depreciation has been the vocal role of the International Monetary

Fund in urging currency depreciation at many key junctures in 1985 and 1986.

It was only when the IMF consented to a revised Letter of Intent with the

Bolivian authorities in September 1986 that called for a nearly stable

exchange rate for the following year that nominal interest rates fell sharply, down to about 2 percent per month as of October 1986.

Further Thoughts on the Political Economy of Hyperinflation and Stabilization

The preceeding analysis provides a framework for interpreting the onset of the hyperinflation and the nature of the stabilization process. To recapitulate, at the core of the hyperinflation was the resort to money creation in 1982 in lieu of foreign capital inflows, after new international loans dried up in early 1982. Initially, the necessary level of inflation finance could be achieved at relatively modest inflation rates, since the "tax base" for the inflation tax -- the level of real money balances -- remained high. As real balances declined, the rate of inflation accelerated. Rising inflation wreaked havoc with the fiscal system, leading over time to a collapse of the tax collection capacity of the government. As tax revenues dried up, contractionary fiscal policies were needed just to keep the budget deficit stable at a very high, but not rising, level. Cuts in expenditures were made in services, materials purchases, and the levels of public sector investment.

Over time, prices adjusted with a shorter and shorter lag to movements in the black market and official exchange rates. By August 1985, wage agreements were being renegotiated on a weekly basis. Thus, stopping the depreciation of the currency was tantamount to stopping the price increases themselves. As shown by a small theoretical model in the paper and as demonstrated in the data, it was easier to stop the rate of price increases, at least initially, then it was to restore confidence in the domestic currency. While prices

stopped increasing almost immediately when the program began, interest rates remained stubbornly high and real money balances increased only gradually during the first year of the program. There were many good reasons for uncertainty, not the least of which was the publicly stated view of the IMF that greater exchange rate depreciation would be advisable in 1986.

A deeper question of political economy is why the political system did not prevent the hyperinflation from arising. What stopped the appropriate fiscal adjustments from being made in 1982 or 1983, after the capital inflows ceased? How can hyperinflation episodes be squared, for example, with Barro's analysis of the public debt, which holds that governments choose tax rates over time to reduce the discounted values of the excess tax burdens? The intensely high marginal tax rates on money during the hyperinflation seem to fly in the face of such an analysis. (It might be possible to square Barro's with hyperinflation if the hyperinflation sharply reduces the future excess burden of taxes, by reducing the nominal value of outstanding long-term government liabilities. In the case of Bolivia, however, no such effect was operative, since the vast bulk of the government's non-money liabilities were denominated in foreign currency.)

A complete understanding of what precluded adequate policy adjustments would take us deeply into the Bolivian political system, which is outside the scope of this paper. A few general points can be raised however. First, a necessary conditionn for the hyperinflation to arise was the cutoff in access to foreign borrowing in 1982: only a credit constrained government would choose to finance current expenditures with a hyperinflation rather than with more foreign borrowing. Second, interest group politics were crucial in the

process. At a fundamental level, an inflation tax is a highly regressive tax that affects a general and poorly organized part of the population, while cuts in government expenditures or increases in other kinds of taxes often affect better organized or more influential interest groups.

Third, many well-connected, rent-seeking individuals made considerable fortunes in the course of the hyperinflation. Anybody with access to official foreign exchange from the central bank could become wealthy almost instantly during the period, by purchasing cheap dollars at the central bank and selling them at a several hundred percent profit in the black market. Similarly, commercial bankers, who took deposits at zero interest rates and lent at high nominal rates, shared in the government's seignorage gains during the hyperinflation. Moreover, the government extended large amounts of low interest loans during the period, which effectively became grants as a result of the inflation. Price controls on public sector goods, such as on petroleum and even flour, generated opportunities for lucrative smuggling operations. All of these opportunities for gain from the price distortions provided a natural constituency of powerful individuals who wanted to see the hyperfinlation process continue.

Fourth, there was a continuing and sometimes profound misunderstanding of the costs of stabilization. One of the most important checks on the stabilization process was the government's political inability to impose real wage "decreases" on the union sector, which at first was an important support group of the Siles government, and later its most vocal opponent. The unions resisted any cuts in measured real wages as part of a stabilization program, despite the fact that the gains in reducing the inflation tax for the workers

could easily exceed any direct real income losses from a reduction in public

sector pay. The problem is that real wages are measured as a nominal wage W

deflated by a consumer price index P that does not include the price (i.e.

opportunity cost) of holding money. Thus, while a rise in oil prices that

allows the government to eliminate inflationary finance could well leave real

wages net of the inflation tax higher than under the hyperinflation, the

policy will almost surely reduce measured W/P. Unfortunately, too many

observers during the Siles government, and many critics of the current

stabilization, have kept their sights on the wrong target.

Footnotes

1.   I have ranked hyperinflations by their maximal inflation rates over half-year calendar intervals (January-June, July-December). By this standard, the Bolivian hyperinflation ranks seventh in the 20th century, following: Hungary (1946:I), Greece (1944:II), Germany (1923:II), China (1949:I), Soviet Union (1922:I), and Poland (1923:II).

2.   Cagan defined the beginning of hyperinflation as the months in which inflation exceeds 50 percent, and the end of hyperinflation as the month in which inflation last exceeds 50 percent and is followed by 12 months of less than 50 percent inflation.

3.   The justification for wage controls in Latin American disinflation, in the presence of staggered, overlapping contracts, was first set out in detail in Pazos (1973). It has recently been supported by Dornbusch and Fischer (1986), and Bruno (1986). The resort to currency reform in the Argentine Austral Plan and in the Brazilian Cruzado Plan had much to do with the desire to rewrite the terms of long-term debt contracts, which legally could not be adjusted without the introduction of a new currency. As an example, a three-month nominal peso loan contract written on the eve of stabilization in Argentina carried an interest rate of approximately 100 percent in nominal terms, with the expectation of lenders and borrowers that inflation would be on the order of 90 percent during the period. After stabilization, that contract would imply a real interest rate of 100 percent. By introducing the austral (at 100,000 austral per peso), and setting the austral/peso exchange rate on a pre-announced path of peso depreciation of, say, 90 percent over the

three month period, then the <u>austral</u> prices of goods can be stabilized while the effective real interest rate on existing peso loans remains at 10 percent. (Effectively, peso inflation remains 90 percent for the three month period, though everybody reckons in australs.)

4.   For a good recent discussion of the underlying political and economic factors which have contributed to past hyperinflation, see "   ," Carnegie-Rochester Conference Series.

5.   See R. Cooper, "Currency Devaluation in Developing Countries," International Finance Section, Princeton University Special Papers No. 86, 1971.

6.   The errors and omissions pricks up capital flight that corresponds to <u>measured</u> exports and imports (e.g. when measured exports do not contribute to a rise in foreign exchange reserves, the discrepancy appears in errors and omissions). However, underinvoiced exports, or wholly uncounted exports (e.g. cocaine), will contribute to capital flight unmeasured by the errors and omissions. It is true that underinvoiced imports may led to an overstatement of capital flight, but in the Bolivian context, the understatement of exports (particularly drug-related) is likely to exceed the understatement of imports.

7.   Municipalities and regional corporations, for example, went directly to the Central Bank for fiscal credits to an unprecedented extent, since the hyperinflation undermined the property tax revenues that normally financed the local governments. Also, state enterprises frequently stopped paying their taxes to the central government, thus contributing to a rise in the central government deficit, even though such a drop in taxes is merely a transfer between parts of the consolidated government sector, and would not raise the

consolidated government sector deficit.

8.   In this case, m, e, ẽ are measured at the end of the month; Π is the change in the monthly price level. Ideally, p_{-1} should be an <u>end</u> of month price. Since prices are available only on a monthly average basis, end of month t-1 prices are proxied by a geometric average of average peroid t and t-1 prices.

9.   Note that if the deficit at t_0 is $g - t - r * b_1$, and if the goal of the tax increase is to reduce the deficit by zero, then taxes during the interval $[t_0, t_1]$ should increase by less than this initial deficit. This is because reserves will be above b_1 during the time interval $[t_0, t_1]$, and therefore government revenues will rise both because taxes increase and because revenues from foreign reserves increase. Specifically, the change in taxes should equal $g - t - r * b_1 - r[m(0)-m(\pi_1)]$, where the term $r[m(0)-m(\pi_1)]$ measures the increase in revenues from higher foreign exchange reserves during the period of the pegged exchange rate.