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por
Juan Antonio Morales

Bolivia's Tin and Natural Gas Crises of 1985-1989*

by
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1. Introduction

This paper is concerned with the negative shocks that affected Bolivia's two main exports, tin and natural gas, in the second half of the 1980s, and with their effects throughout the economy. The shocks started shortly after a drastic stabilization program that the government had launched to tame a devastating hyperinflation (unrelated to the trade shocks). The interaction of the shocks with the anti-inflationary policies gives distinctive features to the Bolivian case. An additional element that distinguishes the Bolivian experience from others is that an ample liberalization of markets accompanied the stabilization program.

For most of our analysis, the frame of reference is the theory of the construction booms developed by Bevan et.al (1989a, 1989b). However, in contrast with their approach, this study deals with: (a) negative shocks, and, (b) happening in the context of a significantly deregulated economy. The theory of the construction booms usually deals with positive shocks.[1] Also, the fact that factor intensities in countries with minerals as main exports differ from the usual assumptions for developing countries adds a distinctive feature to the analysis.

We started our study with a scrutiny on the perceptions of the economic agents on the nature of the shocks. We found that neither the timing nor the magnitude of the shock was anticipated. Once it happened it was not either considered permanent, although expectations on its duration varied across agents. With this building block, we investigated the responses of the economy. A main instrument for this task was the construction of counterfactuals that aim at capturing the situation had the trade shock riot happened.

The main results that emerge of our analysis are as follows. The income losses caused by the shock, cumulated over 1986-89 are estimated to be in present value, 10% of the GDP of 1985. The estimated average annual loss over that period is of 2.9% of 1985's GDP. The output losses were especially important in the first two years after the shock; in 1988, the production indicators started to show a modest recovery. Also, the control of inflation was maintained, except during a few weeks after the tin crash in 1985.

Three factors, in order of importance, explain this inflation and output performance: (1) the huge fiscal adjustment that took place; (2) the regain of access to international loans, some of them to smooth consumption; and, (3) the liberalized markets, that generally

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1 The forerunner of the theory of construction booms, the Dutch Disease theory, does not consider at ah the *case* of negative shocks.

dampened the domestic effects of the shocks. In particular, the exchange rate regime, with its elastic features, and the flexible prices in most markets avoided the development of a persistent inflation, after the once-and-for ah upward adjustment in the price level on impact of the trade shock. The adjustment in consumption that took place after the negative shock was important but, not to the full extent of the slump. So there was a negative savings effect. Yet GFKF expanded, but obviously not at the rate that would have in absence of the shock. The GFKF expansion was probably due more to the easing in international loans than to changes in the marginal efficiency of investment.

The shock has produced major resource movements. The shift has been mainly from the busted tin mining sector to new sectors of exportable production, mainly, zinc, gold, and soybeans. Our data also shows a very significant shift to the sector of agricultural export. Employment in construction also increased from 1987 on.

It is hard to infer clear result on the relative price movements. The adverse trade shock caused on impact a fall in the price of non-tradable (NT) capital relative to the price of import substitutes, and a sharp reduction of activity in the construction sector, at least until 1988. This was expected. Contrariwise, the path of NT-consumer prices relative to the price of import substitutes does not have an explanation, unless extraneous elements, related to the concomitant stabilization cum liberalization program, are added. The price of NT-consumer goods, relative to import substitutes, increased in the aftermath of the shock but then it declined, especially in 1988 and 1989.

Tin and natural gas were not only important because of the foreign exchange and national income that they generated, but they also were a very significant direct source of income for the public sector, as the most important exporters at the time of the shocks were state—owned enterprises. The indirect income, coming from taxes collected from the private tin mines, was important but not as largo as the direct one. The income impact of the negative shock was proportionally larger in the public sector than in the private sector.

Also, the adjustment in the consumption of the private sector was lees significant than in the public sector. It seems that the private sector, that had a more indirect perception of the magnitude of the slump than the government, tended therefore to consider it as more transitory. The government perceived that the very 10w prices after the shock would revert to more normal values only very slowly. In line with this perception major adjustments in consumption and public sector employment took place. However, a spurt in public investment in non-tradables occurred shortly after the initial slump.

The external shocks caused during 1986—89 recurrent menaces to the Bolivia's foreign exchange reserves. Monetary policy had to be then tighter than otherwise. There is a solid ground to think that the very high real interest rates of that period resulted from the excess demand for money, that in turn is explained by the tight policy. The excess demand for money also explains the persistent phenomenon of dollarization.

The trade shocks occurred in the midst of a trade liberalization process. We underline that the market liberalization policies were adopted before the trade shock and not because of it. Neither they were changed after the shock. The shock actually contributed to sustain the liberalization process, as it attenuated the fall in the price of import substitutes relative to the price of exportable. The expansion of imports, especially of consumer imports, that nevertheless took place probably preempted investment.

The study is organized as follows. Section 2 deals with the nature of the shocks and the expectations that were formed on them. Section 3 gives a description of the economic

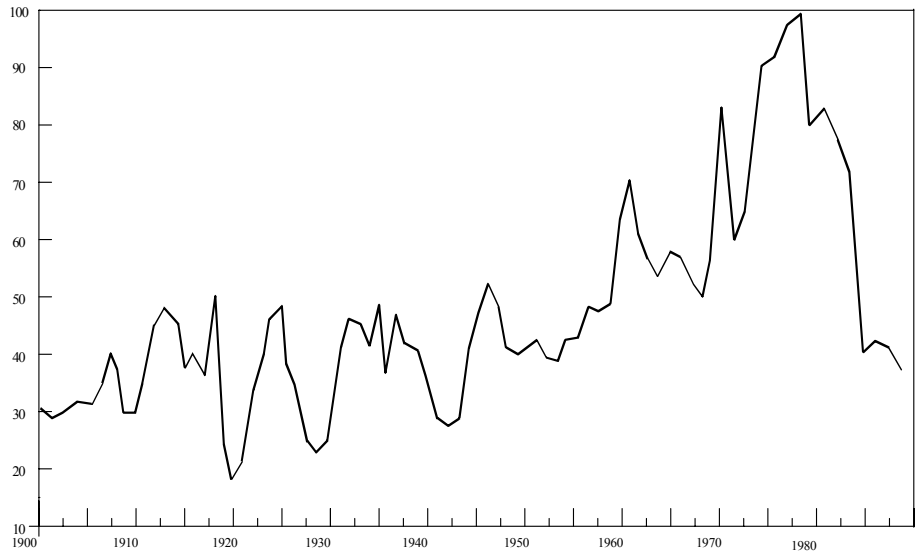
policy environment when the shocks occurred. In section 4 we evaluate the responses of the economy, in terms of investment and savings, and of the reallocation of resources that followed the price changes caused by the shock. In section 5 we make a desegregation of the transmission of the shocks to the public and private sector. In section 6 we examine the interactions between the policy reforms of 1985, that accompanied the stabilization program, and the shocks. Section 7 provides the concluding remarks.

2. The Nature of the Shocks

a. Tin

The long term evolution of the real prices of tin le shown in figure 1. We observe an upward trend between 1900 and 1980 and cycling deviations from it with variable frequencies and amplitudes. If the period 1981-89 le added the upward trend disappears. Remark the very favorable tin prices between 1974 and 1980. From 1981 on, there was a slow decline until the crisis in the last quarter of 1985. Note also that the tin price just before the crisis was still higher than in 1976.

Figure 1
Index of Real Prices of Tin, 1900-1989 (Base 1985=100)



Source: See Appendix A.

The separation of the transitory fluctuations from the trend is central to our analysis. Morales et al. (1992), in their econometric analysis with annual values from 1900 to 1989, find mixed results on the hypothesis that the logarithm of the price level of tin follows a random walk. With quarterly and monthly values they found always impossible to reject the random walk hypothesis.[2] Acceptation of the random walk hypothesis would lead to the conclusion that all price changes are permanent.

A closer examination of the tin market between 1956 and 1985 would suggest high persistence, probably going to the limit of a random walk. There is no doubt that the functioning of the International Tin Agreements (ITAs) gave inertia to the positive price shocks in that period. On the other hand, the tin sales by the General Services Administration (GSA) of the United States often shook the market, producing discontinuous, downward, jumps of random size in prices.[3]

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2 Note, however, that the power of the available tests on the random walk hypothesis is weak (Kletzer et al., 1990).

3 The ITAs were price stabilization schemes negotiated between the majority of producer countries and most of the main consumers of tin. Six ITAs were agreed between 1956 and 1985. The GSA stockpile was built up in the 1950s; in the

The feature of asymmetric inertia in the ITAs needs a closer examination. The asymmetry arose from the ITAs prolonging the favorable states for producers more often than the unfavorable. The scheme was unsustainable in the medium run, as the October 1985 bust proved.[4]

The ITAs and the GSA'S sales had a very important informational content for .~fl participants in the market. High *cost* producer countries, like Bolivia, exerted ah the pressure they could to raise the price fork of the ITAs and to prevent the sales of the GSA. Expectations on tin prices were frequently derived of expectations on the sustainment of the ITAs and on perceptions on the efficacy of the lobby to the United States government. It is worth noting that well before the crash of October 1985, prices were expected to fall. The uncertainty was on the timing and, especially, on the magnitude of the slump.

After the crisis, the expectations for the medium term have been of a slow recovery, following the diminution of the abnormally high tin stocks built up in the early 1980s, but not to the levels of 1980-85. In 1989 a small price boom, but of short duration, was observed.

An examination of the attitude of the domestic producers toward price risks adds elements on the nature of expectations. First, the government typically does not choose the depletion rates, not even in the state—owned mines. This does not mean that government's policy does not influence the depletion rate, rather that this effect is frequently non intentional. The rule in the state—owned mines is, even now, to maximize output, despite market conditions, unless current producer prices are extraordinarily low (CEI4YD (1990, 19)). Private-owned mines are more sensible to market conditions but there is no evidence that they follow Hotelling rates of depletion. Interestingly, some private enterprises anticipated the price bust of 1985 but they did not increase production nor sales.

Second, just before the crisis, Bolivian tin producers had accumulated stocks in expectation of major domestic policy changes. Moreover, the stocks could be financed at very negative real interest rates. Producers betted on a sharp devaluation of the Bolivian peso, either officially or de facto, following a liberalization of the foreign exchange market. This would have meant extra profits even in the event of a moderate drop in world prices.

Finally, large producers, traders, and international lenders, with a direct knowledge of the market and its arbitrage opportunities, probably had different expectations than the national government and the common citizen. Difference in expectations led to different adjustment speeds. The government's perceptions followed, with a small lag, the perceptions of producers and other directly concerned agents. The adjustment lag in the private sectors expectations was longer. The public formed its expectations with the information provided by the government on the nature of the crisis and on the needed cuts in public expenditure and employment to cope with it. Major public announcements made by cabinet members and frequent press release. conveyed the government's perception of the shock to the private sector at large. The actual cuts in public expenditure sent an even more telling signal.

b. Natural Gas

The formation of the price of natural gas is different from that of tin. First, there is not a market for natural gas in a strict sense. It is true that prior to the investment to supply gas,

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following two decades it was (partially) depleted. The depletion followed a discontinuous path, mixing rapid sales with long periods of inactivity.

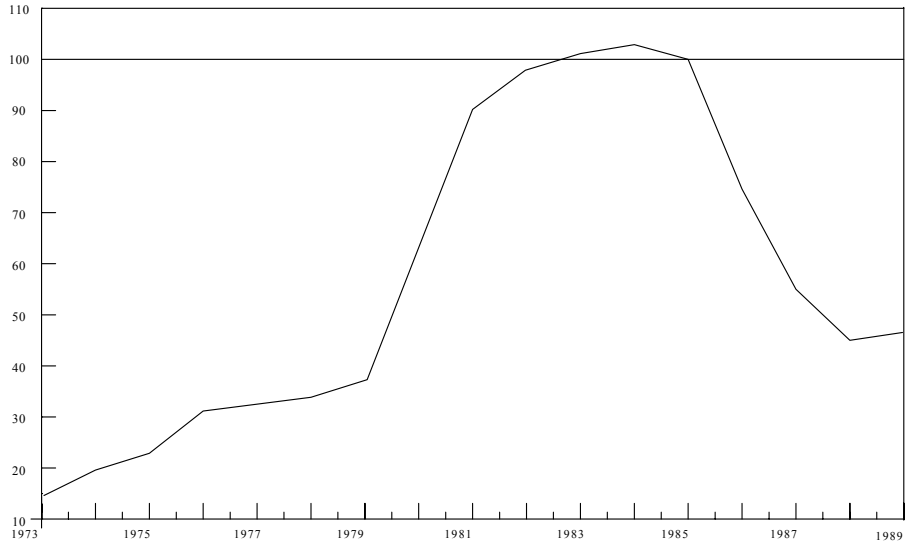
[4] Calabre (1991, 103—111) gives a very informative background of the tin crisis of 1985.

supplier and buyer select each other in a competitive market, but once the investment is made they end forming a bilateral monopoly.[5] In this setting, there is a range where prices are fixed by the relative bargaining power of purchaser and seller. Each party will try to appropriate for itself the common gains of trade.

Argentina has been the sole buyer of the Bolivian natural gas. Sales took place under several contracts of variable duration and scope. Real natural gas price reached a maximum in 1984, declined slightly in 1985, and showed a gradual but profound descent until 1988 (figure 2). Natural gas prices were not initially indexed to petroleum prices, although the latter frequently served as reference in the negotiations on the former. As figure 3 shows, the rise in natural gas prices lagged the rise in petroleum prices after the first oil shock in 1973. Between 1981 and 1985, after the second oil shock, natural gas prices continued increasing, even when oil prices were already falling. With the oil crisis of 1986, the natural gas price had to be revised downward.

Only in 1988, the natural gas price was (partially) indexed to a moving average of quarterly prices (inclusive of the costs of transportation to Argentina from overseas ports) of a basket of fuels. Persistent variations in the price of oil are fully translated in the natural gas income with a lag of six months.

Figure 2
Index of Real Prices of Natural Gas Exports, 1973-1989 (Base 1985=100)

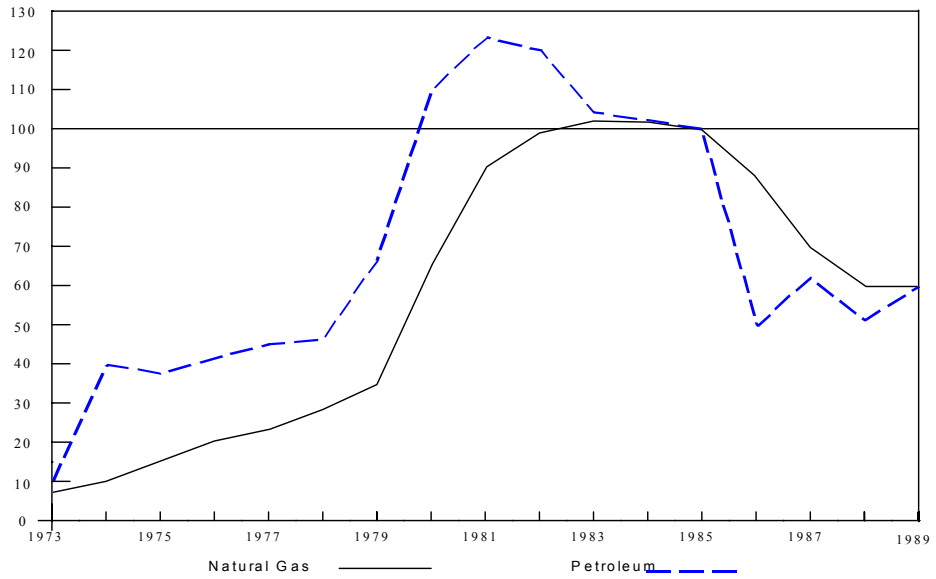


Source: Nominal gas prices from Central Bank (1991). The deflactor is World Bank´s MUV

Bolivia was forced in 1984 to accept payment in Argentinean goods and services for 50% of the natural gas bill. This percentage was lowered afterward. To the extent that the Austral (and the Argentinean peso before) was overvalued, prices in figure 2, before the fall in 1986, are overstated. Also, after 1986, the fall in purchasing power of the gas exports was higher than shown in figure 2.

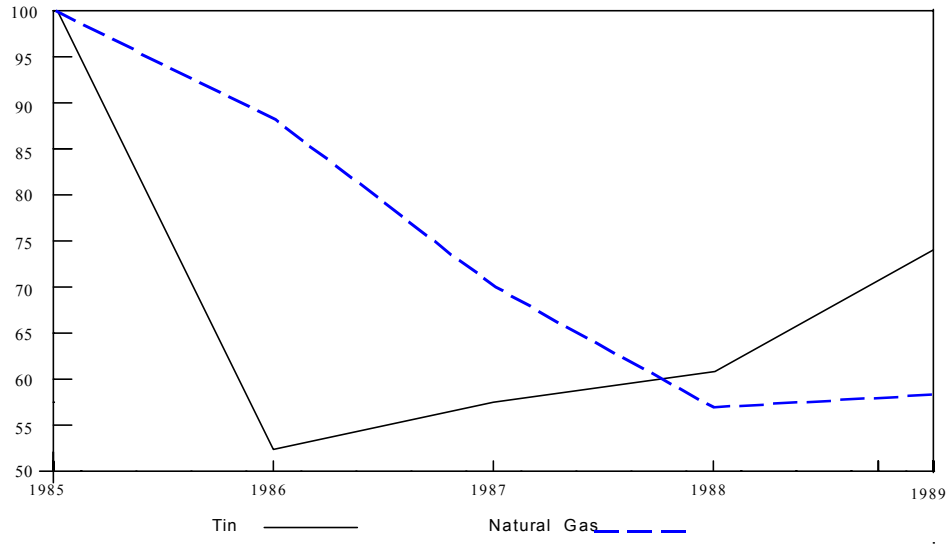
[5] We follow here a reasoning along the lines of Tirole (1989, 21).

Figure 3
Prices Indices of Natural Gas and Petroleum, 1973-1989 (Base 1985= 100)



Source: Petroleum prices, World Bank (1988) and updating.
Natural gas prices form Central Bank of Bolivia (1991)

Figure 4
Prices Indices of Natural Gas and Petroleum, 1973-1989 (Base 1985= 100)



Source: Petroleum prices, World Bank (1988) and updating.
Natural gas prices form Central Bank of Bolivia (1991)

The fall in prices was besides accompanied by frequent delays in payment by Argentina. The accumulation of arrears by Argentina during the 1980s forced a swap of debts in the last quarter of 1989. After the swap payments became more normal. The point to

remark le that Bolivia did not receive for a long period the expected income of its natural gas sales and, to a large extent, had to use that income, captive in Argentina, to prepay the debt.

Bolivia had little experience and exposure to the international energy market, contrariwise to what happened in tin. Natural gas exports to Argentina started only in 1973. Bolivia was not either an importer, as she had been self-sufficient in petroleum since the l950s. The developments in 1986 came a. surprises since there was no memory of this type of events.

In the months preceding the fall, as happened with tin, Bolivian policy-makers believed (although they never admitted publicly), that natural gas prices were at too high levels. They also knew that the fall in petroleum prices in early 1986 would almost surely force a reduction in the contract prices to Argentina. The extent of the fall was not however fully anticipated, neither were the Argentinean arrears that ultimately forced the debt swap to which we referred above.

The natural gas crisis was one of a fall in prices and in permanent income. Even if prices had not fallen, permanent income would have for two reasons. First, the Argentinean arrears forced Bolivia to an involuntary accumulation of foreign assets. Second, the debt swap forced to use current income to make debt service payments before they were due. Arrears as well the debt swap affected of course, but probably not very significantly, the (net) present value of expected income.

There is still much uncertainty surrounding the future of Bolivia's natural gas exports. The sales contract to Argentina expires in 1992. Negotiations for a renewal of the contract are under way, also are negotiations with Brazil and Chile, but concrete contractual clauses are still pending. Regarding prices, if anything, there le the expectation that they viii still go further down. Income recovery can only come from the sale of significantly larger volumes than currently.

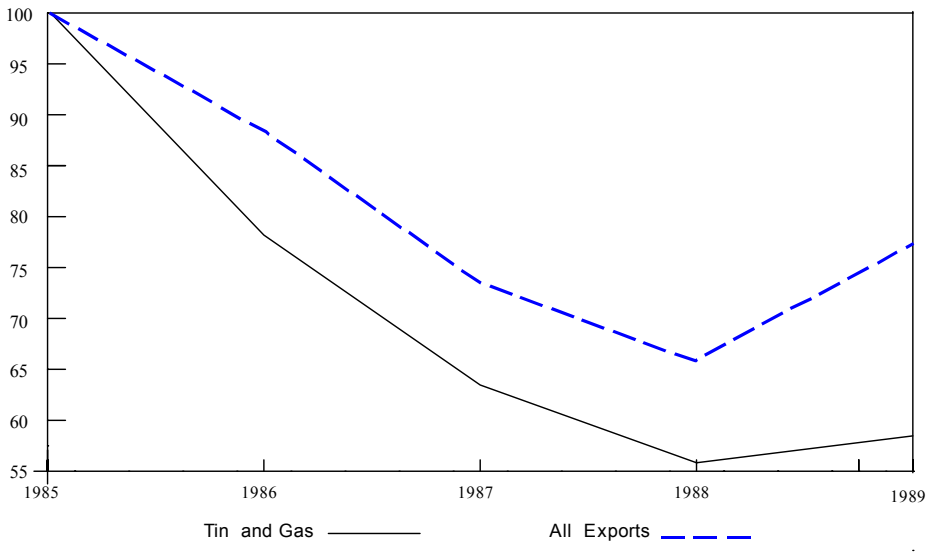
c. Changes in the terms of trade

Tin and natural gas exports represented 74% of total legal merchandise export revenues in the five years preceding the crisis. Figure 5 and table B1 in Appendix B depict the ratio of tin and natural gas export prices to imports and the ratio of ah (merchandise) export prices to import prices (the barter terms-of- trade). Despite the weight of tin and natural gas, note that the fall in their prices relative to the price of imports vas significantly more pronounced than the fall in the overall terms-of-trade. Obviously, the price of exports other than tin and natural gas were experiencing strong improvements.

The illegal cocaine exports, considered to be important, are not included in the computation of the terms-of-trade. We shall ignore these exports in this study because of lack of reliable data.

Measured changes in the terms of trade by themselves give an incomplete idea of the effect of the shock, since the price movements in the export bundle went in different directions. The point to underscore is that the tin and natural gas shocks had an important informational content on Bolivia's short-term economic prospects. This aspect is missed if the analysis is confined to the terms of trade. Furthermore, the shocks directly influenced public sector expectations, and more significantly than in the private sector.

Figure 5
Prices Indices of Exports Relative of Imports, 1985-1989 (Base 1985= 100)



Source and Notes: Table B1 in Appendix B. All exports refers to all merchandise exports

d. Characterization of the expectations

The account given above of the expectations' formation leads unambiguously to a diagnostic of exclusive expectations. Neither the producers, nor the government, nor the public, had included in their prior expectations an export crisis of such magnitude and duration. The characterization of the shocks in revised and unrevised is less clear. Prices, for a long period before the shocks, for tin more than for natural gas, were thought to be unsustainable high. After the shock, expectations were: (a) that the situation of very low prices was transitory; but, (b) that the recovery will not lead to their previous levels for a very long time. The perception was that prices had abruptly passed from too high levels to too low levels.

The price shocks implied also strong and more lasting income shocks in the sense that made some production decisions irreversible. For instance, mines that were barely making even with the pre-shock prices were either closed or ceded to cooperatives of their dismissed workers who try to exploit the little metal that remains.[6] It is unlikely that these mines will be commercially operated again.

The tin crisis, especially, led to a rethinking of Bolivia's development prospects and to important changes in resource allocation, that are far from complete. Policy-makers are aiming now at lower rates of growth of the economy for the next ten years than the average between 1962 and 1978, that used to be considered normal. The spirit around 1986-87 is reflected in the very influential report for the World Bank of David Morawetz (1986) with the title "Beyond tin and natural gas, what?" This discussion suggests that a (partial) revision downward of permanent income occurred. We would be facing a case of exclusive partially revised expectations.

The case also can be made for exclusive unrevised expectations. The more informed agents had discounted, before the shocks, a part of the fall in prices. Even the closing of some

[6] It is true that many mines would hay. not been closed had not been the economy in the midst of a stabilization effort.

mines was probably discounted, because the ores had very lay metal contents for years and the mines were profitable only at very high prices. The price shock of 1985 only ended a very long agony. Permanent income was revised only to the extent that some losses and expenditures were brought forward, a minor consideration in view of the magnitude of the shocks.

It is worth noting at this point that the private sector did not reduce very much its consumption, after the adverse trade shock. On the other hand, adjustment in the public sector was very significant (see sections 4 and 5 below).

For simplicity, we shall assume from now on the case of exclusive unrevised expectations. We believe that many of our results will carry, without major changes, to the case of exclusive partially revised expectations.

e. A counterfactual to the shock

The construction of the counterfactual to the trade shock needs some elaboration, in view of the following observations.

(a) As said above, the price of tin was considered too high in the eve of the shock. In long conversations with Bolivian specialists of the tin market the price observed in 1989, one third lower than in 1985, was considered close to a "normal" price. More important, many private mines could obtain again normal profits at that price.

(b) Similarly, the 1985 high price of natural gas was unsustainable given the developments in the energy market. The fact that domestic investment decisions were made on the assumption of a price close to the one of 1986 helps us in defining a benchmark price.

c) The hyperinflation had caused severe disruptions in the production of tin. Once economic order was restored output and exports immediately increased. The duration of the fall in tin prices obliged, shortly after, to sharp reductions in output.

The construction of the counterfactual uses the information above.

(a) Tin prices are assumed constant over 1986-89 and are set at their 1989 level.

(b) Natural gas prices are similarly assumed constant over 1986—89 and are set at the 1986 level.

c) The volume of tin exports is assumed to remain constant at its 1986 level. This is a conservative assumption. Another assumption could have been that of a gradual return to the 1982 output and export levels over a four year span. Exports in 1982 were almost 40% higher than in 1986.[7]

d) Other exports are considered at their actual values.

Our estimate of counterfactual exports appears in column (10) of table 1. The shortfall in export revenue in 1986 was exclusively due to the fall in prices; between 1987 and 1989, there were also quantity responses in tin (see also table B2 in Appendix B). Over the whole period 1986-89 the estimated shortfall export revenue was a little over U$ 500 million (col.(l1) in table 1).

[7] This second assumption is plausible in view of the abnormally low output levels during the high inflation years of 1982-85. Inflation exacerbated labor unrest in a highly unionized sector, provoking many strikes and work stoppages. To take into account this quantity effect in the counterfactual, the value of tin exports, was deflated by the following indices: 1986, 100.0; 1987, 60.0; 1988; 64.3; 1989; 86.5.

Table 1. Magnitude of the Export Slump

Year	Value of exports				Price Indices					Counter factual Exports (10)	Windfall at	
					Exports							
	Tin (1)	Natural Gas (2)	Other (3)	Total (4)	Tin (5)	Gas (6)	Other (7)	Total (8)	Imports (9)		Current Prices (11)	1985 Prices (12)
1985	186.6	372.6	113.3	672.5	100.0	100.0	100.0	100.0	100.0	672.5	0.0	0.0
1986	104.1	328.6	205.1	637.8	53.6	88.3	99.6	86.8	95.7	679.8	-42.0	-43.9
1987	68.9	248.6	252.0	569.5	58.9	69.7	85.0	75.3	102.1	713.2	-143.7	-140.8
1988	76.9	214.9	308.4	600.2	61.5	57.4	79.2	69.4	105.0	785.3	-185.1	-176.3
1989	126.5	213.8	480.9	821.2	75.2	57.5	103.9	85.0	109.5	955.2	-134.0	-122.4
Total										3133.5	-504.8	-483.4
Present Value										2694.9	-426.3	-409.6

Sources and notes: Export values in millions of US; similarly, price indices derived from prices in U$
Col.(1) to col.(4), from Central Bank of Bolivia (1990)
Col.(5) to col.(9), price indices of exports and imports from Appendix 1, table B1
Col.(10), see text
Col.(11), Col.(4) - Col.(10)
Col.(12), Col.(11) divided by col.(9)

3. The Economic Context

a. The stabilization Program of August 1985

Bolivia suffered very high inflation rates between 1982 and 1985.[8] A whole gamut of economic disruptions was either a cause or a consequence of the high inflation. Let us keep, for further use in this study, three of them: (a) the frequent very high premiums of the free (or black) market exchange rate over the official rate; (b) the erosion in the real value of tax collections (the so-called Olivera-Tanzi effect); and, the losses in the capital stock of the public enterprises, especially in the mining ones, caused by insufficient replacement investments. These initial conditions of extreme distress in the economy set a different path for the effects of the trade shock than it would have been in more normal conditions.

The inflation worsened to the point of becoming a hyperinflation in 1984-85. In August 1985, the government announced a very ambitious (and successful) stabilization program. The stabilization program also included very important reforms to liberalize the economy. The combination of stabilization cum liberalization was denominated New Economic Policy (NEP) by the government.

Fiscal, monetary, and foreign debt policies

The stabilization plan relied on exchange rate unification supported by very tight fiscal and monetary policies. Note that exchange rate unification played an important fiscal role in the stabilization program, since the public sector is a net supplier of foreign exchange to the rest of the economy. The domestic components of the stabilization policies were completed with the suspension of debt service payments to private foreign creditors, until a definite agreement could be reached with them.

The stabilization program included an almost complete liberalization of the market for foreign exchange. Bolivian residents can transact, with no limitations, in foreign exchange. Ah exchange rate controls were lifted except the obligation imposed to exporters to surrender ah their foreign exchange proceeds to the Central Bank. This latter regulation is in fact binding only for the public sector export enterprises, since private exporters can buy back their surrendered foreign exchange almost immediately. Also, the Central Bank does not enforce very vigorously the surrender rule in the private sector.

The Central Bank sells its foreign exchange in a Dutch auction, called the "bolsín". If buys at the average rate set in the most recent auction. This rate becomes the "official" rate. The auction system has evolved into a crawling peg system, with a very slow rate of crawl.[9] The Central Bank accumulates and de-accumulates assets to maintain a targeted path for the exchange rate. There is no other intervention in the foreign exchange market besides this. We reiterate that the Central Bank maintains a stock of foreign exchange reserves, whose evolution is closely monitored by the authorities and the public.

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[8] Very high inflation was experienced from the first quarter of 1982 until the third quarter of 1986. Between July 1984 and August 1985 the price increase reached 20,560%. Accounts of the hyperinflation period can be found in Sachs (1987) and Morales(1988).

[9] This point has been carefully analyzed by Dominguez and Rodrik (1990). The "bolsín" works again as an auction in periods of turbulence in the foreign exchange market. They were very rare between 1986 and 1989.

The NEP rapidly controlled the inflation. As important for our purposes, the NEP was credible with international official lenders. Bolivia, not only received substantial debt alleviation from its creditors but was also able to obtain new loans from multilateral agencies, as well as from foreign governments willing to cooperate with the national effort.

The liberalization of goods, credit, and labor markets

The stabilization program liberalized almost ah markets for goods and factors. All price controls on products of private producers, except public utilities, were lifted.

Foreign trade was also liberalized. The NEP dismantled the system of foreign trade controls that had been in place for many years. Quantitative restrictions on exports and imports were abolished. Tariffs were also substantially lowered toward a unified rate. The average Gross Effective Rate of Protection fluctuated around 17% between 1987 and 1989. (This rate was lowered to around 10% in 1990.)

Note that the trade reform was launched before the trade shock and was not changed afterward in reaction. The trade reform has suffered some minor alterations since 1985, that do not change its nature nor were made in reaction to the external shocks.[10] Bolivia's trade policy, post 1985, le not an "endogenous trade policy" in the sense given to that expression by Bevan et.al (1989).

The liberalization of the financial market was almost complete. Ceilings and floors on interest rates were eliminated. Banks and other financial institutions can accept deposits in foreign exchange along with domestic currency. In particular, domestic banks offer demand and time deposits in dollars. They are only constrained in their operations by: (a) a minimum reserve requirement of 20% for demand deposits and 10% for time deposits; (b) a ratio of assets to capital between 15 and 20, depending on the type of assets.

The deregulation of the labor market was also significant. The principle of "free contracting" -- that had been superseded by administrative regulations an job security -- was reestablished. With free contracting, enterprises can, more easily than before, dismiss workers. Wage indexation was also abolished. It is aloe worth adding that the strength of the labor unions, that used to be considerable especially in the mining sector, was greatly eroded by the trade shock and the NEP.

[10] Note, however, that soon after the launching of the program import licenses were reestablished for sugar and edible oils.

4. Responses of the Economy to the Shocks

a. Asset Changes and Savings Rates

The numbers in table 2 help us to construct an estimate of the losses in Gross Domestic Income (GDY) and in Gross Fixed Capital Formation (GFKF) caused by the trade shock. Actual GDY (col.(2)) is the sum of actual GDP at constant 1985 prices and the overall terms of trade effect, TOTE (col. (8) of table B2 converted to Bs of 1985).

Three assumptions are crucial in the determination of the counterfactual GDY (col. (4)) and GFKF (col. (6)). First, actual GDP is corrected for quantity changes, following hypothesis (c) in page 15.

To this corrected GDP we added a counterfactual TOTE derived from our assumed prices in hypothesis (a) and (b) in page 14). To the GDY so obtained we further add the (negative) returns of the investment foregone by the negative savings effect of the trade shock. Note that actual TOTE less counterfactual TOTE leas the quantity effects (ah in U$, 1985 prices) is equal to the Windfall export income reported in col. (12) of table 1.

Second, the investment ratios used in the counterfactual differ from the actual investment rates. The assumption is that as result of the economic reforms of the last quarter of 1985 the investment rates could have gradually recovered their levels of 1980-82 from 1987 on. This should not be a too strong assumption.

Third, we assume a conservative rate-of-return of 10% on investment.

The trade shock plus the foregone investment produced income losses that cumulated over 1986-89 and taken in present value represented 10.3% of 1985's GDP ((9,956 - 9,662)/2,867 = 0.103). The average annual loss over that period vas 2.9% of 1985's GDP.[11] Investment vas 106.6 millions of Bs. of 1985 (Bs 86.1 millions in present value terms) less than if the trade shock had not happened. A fraction of this small foregone gross investment probably implied disinvestments, as replacement investment and maintenance were not longer made in some tin mines. Some of them even closed as mentioned in section 2.d.

Bolivia resumed its access to international loans from official creditors, following the stabilization plan of 1985. It is very difficult to figure out the proportion of those loans aimed at smoothing the effects of the trade shock. The International Monetary Fund (IMF) came forth with two Compensatory Financing Loans of US$ 77.6 millions in 1986 and of US$ 59.2 millions in 1988, respectively. Other loans, while not explicitly intended for the same purpose, had similar effects.

It is reasonable to think that the shift in the direction of the net resource transfers from 1985 to 1988 was produced by the foreign support to the stabilization program and not by the trade shock. Therefore, the counterfactual in table 3 is constructed on the assumption that the "foreign saving propensities" would not have differed from the actual propensities, except for the incidence of the IMFs loans. This correction in the foreign savings propensities is reflected in column (7) in table 3. Those propensities are applied to the counterfactual GDY in col. (4) of table 2.

[11] These estimates of foregone income, as percentage of GDP, are smaller in around 1.2% than the estimate found in Morales (1991), who uses the methodology of World Bank (1990b, 14).

Table 2. Counterfactual Growth and Capital Formation

Year	Actual			Counterfactuals			Windfall GFKF		
	GFKF/GDP	GDY (1985 Prices)	GFKF*	GDY (1985 Prices)	GFKF/ GDY	GFKF	Annual	Cumul.	Return at 10%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1980	14.4								
1981	11.0								
1982	13.8								
1983	8.6								
1984	8.6								
1985	7.2	2,866.7	207.5	2,866.7	7.2	207.5	0.0	0.0	0.0
1986	9.5	2,746.8	260.9	2,777.7	9.5	263.9	-2.9	-2.9	-0.3
1987	10.3	2,728.4	281.0	2,827.8	10.7	302.3	-21.2	-24.2	-2.4
1988	11.5	2,746.7	315.9	2,873.2	11.9	341.3	-25.4	-49.6	-5.0
1999	11.5	2,881.1	331.3	2,972.2	13.1	388.4	-57.0	-106.6	-10.7
Average 1980-82	13.1								
Total 1986-89		11,102.9		11,450.9			-106.6		-18.3
Present value 1986-89		9,661.7		9,956.0			-86.1		-14.6

Sources and notes: Col. (1): Investment ratios (percent) at current prices from World Bank(1990), except for 1989 Col. (2): Gross Domestic Income (GDY) is the sun of Gross Domestic Product (GDP) and the Terms of Trade Effect (TOTE). GDP date comes from the NIS as reported by the Central Bank of Bolivia (1991), converted to 1985 prices. TOTE date comes from col.(8) of table 12 in Appendix 1, converted to la of 1985, at the rate of exchange of la .704 per US.

Col.. (3): Col.(1) times col.(2)

Col. (4): Counterfactual GDY la actual GDP, in prices of 1965, plus the quantity effect of the of the trade shock in col.(13) in table B2 plus the counterfactual price effect in col.(12) in the same table, converted to Bs. of 1985; in 1987-89 also corrects for lost returns on shortfall investment as shown in col.(9), lagged one year.

Col. (5): Linear reversion to 1980-82 average by 1988.

Col. (6): Col.(4) times col.(5)

Col. (7): Col.(3) minus col.(6)

Col. (8): Col.(7) summed

Col. (9): Col.(8) times 0.1 (1O% return capital)

The net resource transfer from abroad, would have been Be 84.6 millions lower (around U$ 120.2 millions) had the shock not happened. This is a relatively small amount in comparison with the income loss of slightly over U$ 500 millions caused by the shock.

Table 4 summarizes the findings on foregone income and savings caused by the trade shock (in present value). Line 5 shows the negative savings effect of the shock amounting to Bs 163.4 million. Also, we find that the propensity to (dis)save out of (negative) transient income was close to 56.7%.

Table 3. Actual and Counterfactual Foreign Savings

	Foreign savings (Millions of 5. of 1985)			IMF Compensatory Financing (Millions of US)		Foreign savings ratios (%)	
	Actual (1)	Counter factual (2)	Windfall (3)	Current (4)	1985 Prices (5)	Actual (5)	Counter factual (6)
1980						-4.0	
1981						2.1	
1982						-4.0	
1983						-2.9	
1984						-3.3	
1985						1.7	1.7
1986	79.7	23.5	56.2	77.6	81.1	2.9	0.8
1987	174.6	181.0	-6.4	0.0	0.0	6.4	6.4
1988	151.1	118.3	32.7	59.2	56.4	5.5	4.1
1989	-66.3	-68.4	2.1	0.0	0.0	-2.3	-2.3
Total			84.6				
Present value			79.0				

Sources and notes: Col. (1), col.(2) of table 2 times col.(6) divided by 100
Col. (2), col.(4) of table 2 times col.(6) divided by 100 minus col.(5) converted to Bs. by .704
Col. (3), col.(1) - col.(2)
Col. (4), Information provided by the Central Bank of Bolivia
Col. (5), col.(4) deflated by col.C1) of table 1
Col. (6), col.(2) divided by col.(4) of table 2 times 100

Table 4. Savings and Transient income (In millions of Bs of 1985)

Present values	
1. Windfall export income	-288.3
2. Windfall GFKF	-86.1
3. Savings of extra PI	-1.7
4. Windfall foreign savings	79.0
5. Savings from transient income	-163.4
Propensities	
6. Propensity to lave	56.7
7. Propensity to consume	43.3

Sources and notes: Line 1. from col. (12) of table 1 converted to Bs at the exchange rate of Bs .704 per U$ dollar
Line 2. from col.(7) of table 2
Line 3. (col.(5) of table 2 minus col. 7 of table (3) x col. (9) of table 2
Line 4. from col.(3) of table 3
Line 5. line 2. minus line 3. minus line 4.
Line 6. Line 5. over line 1. (%)
Line 7. 100% minus line 6.

Table 5. Employment by sector indices (Base 1987 — 100)

	Tradables			Non-tradables		Whole urban economy plus commercial agriculture(6)
	Mining and Petroleum (1)	Commercial Agriculture (2)	Import-substitution sectors(3)	Construction (4)	Consumer goods (5)	
A. Index (Base 1987=100)						
1985	234.7	80.1	127.8	113.0	89.4	93.3
1986	137.3	72.0	100.0	100.0	98.2	98.6
1987	100.0	100.0	100.0	100.0	100.0	100.0
1988	123.9	119.3	120.0	146.5	100.6	102.4
1989	127.4	157.7	130.8	288.4	103.4	107.7
B. Share relative to whole economy (Base 1987=100)						
1985	251.5	85.9	136.9	121.1	95.8	100.0
1986	139.2	73.0	101.4	101.4	99.6	100.0
1987	100.0	100.0	100.0	100.0	100.0	100.0
1988	121.0	116.5	117.1	143.0	98.2	100.0
1989	118.3	146.4	121.4	267.7	96.0	100.0

Source: Author's computations based on date from UDAPE (1991)
Notes: Col. (3), employment proxies by employment in the formal manufacturing sector.
Col. (5), employment proxies by formal employment in the sectors of electricity, gas, water, commerce, transport, storage, communications, financial services, other services and the whole informal urban sector.

b. Goods markets

The relative price changes after the trade shock are shown in Figures 6 and 7. Observe there: (a) an increase in the price of non—tradable (NT) consumer goods vis-à-vis the price of import substitutes; (b) a strong fall in the price of NT-capital goods relative to the price of import substitutes in 1986, but a rapid recovery afterward; and, (c) a fall in the price of non-traded capital relative to the price of NT-consumer goods during the whole period 1986~89.[12] The price of import substitutes is equal to the Es international price of importable, plus its tariff and the tariff equivalent of its quantitative restrictions.

Figures 6 and 7 need to be interpreted with caution given the contemporaneousness of the stabilization and the trade liberalization programs with the shocks. Observe that most of the relative price changes took place in 1986. Also note that the yearly values in figure 6 overstate the increase because 1985 was still a year of high inflation. The quarterly values in figure 7 are more informative. Unfortunately, there is no data of this frequency for NT-capital goods.

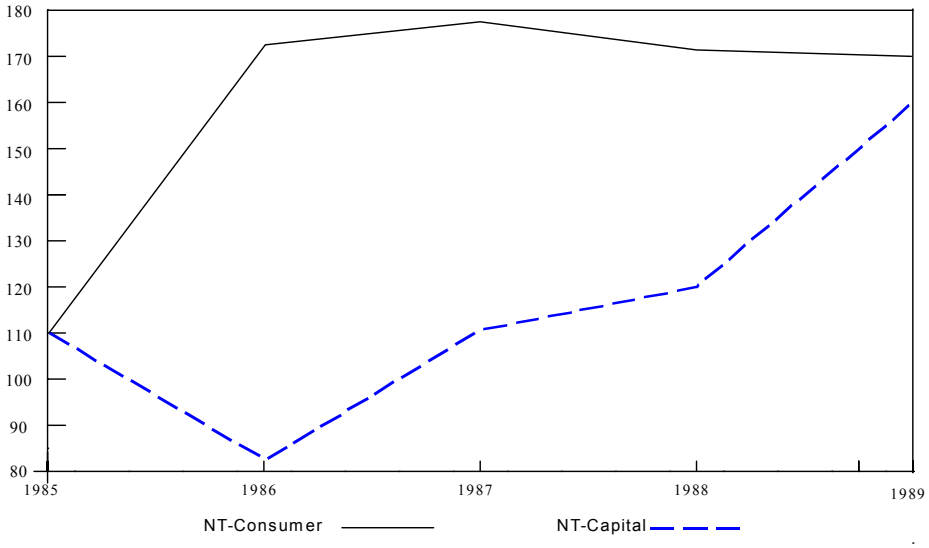
Observe in figure 7 the initial jump in the prices of NT consumer goods relative to the price of import substitutes, that lasted until the third quarter of 1986. We argue that the short run effects of the stabilization and liberalization programs may explain the initial rise in the relative price of NT-consumer goods more than the shock. The argument runs as follows. During the hyperinflation consumer importable were also demanded as assets. For a given real rate of interest, increases in the expected (real) rate of exchange depreciation increased~ the demand for importable and its domestic price relative to the price of NT-goods. After stabilization, expected depreciation decreased and so did the demand and the relative price of

[12] The numbers in table B5 in Appendix B, on which figure 6 is based, need to be interpreted with caution since the quality of the data on the prices for non-tradables is weak. However, the direction of the changes in relative prices seems correct and is consistent with other information's.

importable. The trade liberalization and the larger availability of credits to finance consumer imports further reduced this relative price.[13] The effects of stabilization, trade liberalization, and lees restrictive credit conditions, more than compensated the income effects of the trade shock.

From 1986's fourth quarter on, the price of NT- consumer goods declined relative to the price of import substitutes. The fall was especially strong in 1988 and 1989. We may conclude that it is then that the short-run effects of the trade shock started to be felt.[14]

Figure 6
Prices of Non-Tradables Relative to Import Substitutes, 1985-1989



Source: Table B5 in Appendix B

In regard to the price of NT-capital goods, was not its fall vis-à-vis the price of import substitutes and the price of NT consumer goods more likely due to the liberalization program than to the shock? The answer is mixed. Liberalization may explain the fall of the price of NT-capital relative to the price of NT consumer goods, but the 1986's fall in the price of NT-capital relative to the price of import substitutes is doubtless explained by a strong saving effect.

Three indicators of the quantitative evolution of NT-capital goods are used in our analysis (table B4 in Appendix e and figure 8): (1) an index of investment on NT-capital proper; (2) an index of value added (in prices of 1985) in construction; and, (3) an index of square meters of approved buildings by the municipality of ha Paz.[15]

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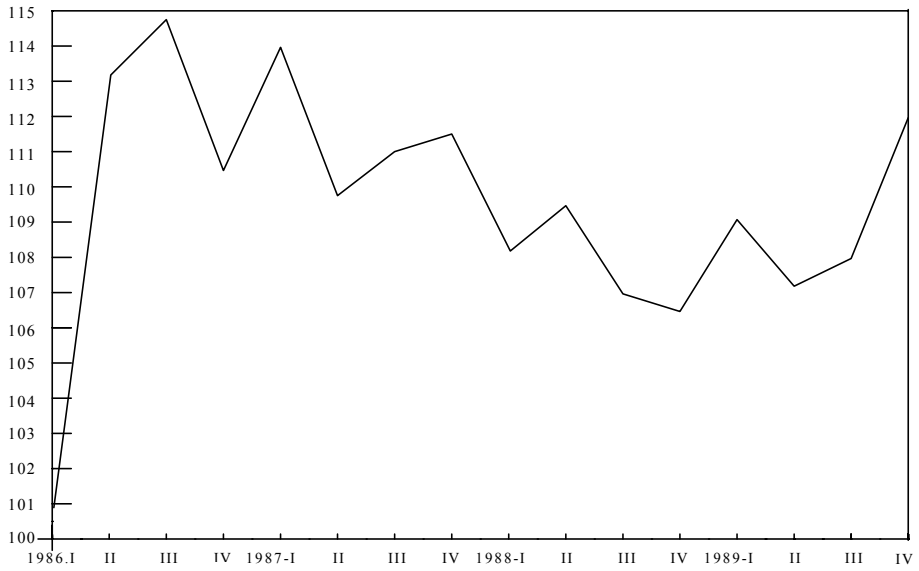
[13] In more conventional terms, the real exchange rate appreciated after the stabilization program. This appreciation of in the aftermath of a stabilization program is a common feature of many high inflation countries. See Bruno et al (1988).

[14] The long run changes in relative prices after the trade shock and the liberalization will be very different from the short run of effects. They will depend on the capital/labor intensities. The information available points out that, in Bolivia, the capital/labor ratio in the production of non-tradables is lower than in the production of importable, and the capital/labor ratio in importable is lower than in exportable. This pattern of capital/labor ratios is typical of mining countries. With full factor mobility, for the price of non-tradables to increase relative to the price of import substitutes, there must be a fall in the price of exports relative to import substitutes.

[15] The index of non-traded capital goods should follow the construction value added index. This is not however the case because the national accounts data registers changes over time in the technical coefficients of value added to final output.

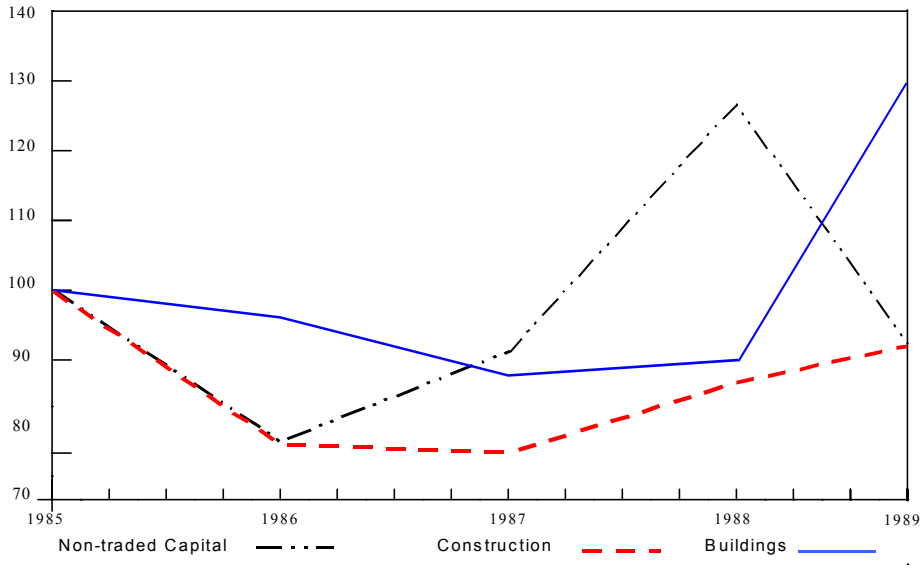
The indicators in figure 8 point out to a sharp decline in the volume of NT-capital goods in 1986 and 1987 (figure 8). The indicators differ from 1988 on. A strong recovery occurred in 1988, caused by the active policy of public works of that year. The unexpectedly 10w values for NT-capital and value added in construction of 1989 are difficult to reconcile with the strong demand for residential construction of 1989, at least in La Paz.

Figure 7
Prices of Non-Tradables Consumer Goods Relative to Import Substitute
(Quarterly data, 1986Q1 – 1990Q1))



Source: Col. (3) in Table B3 in Appendix B.

Figure 8
Prices Indices of Natural Gas and Petroleum, 1973-1989 (Base 1985= 100)

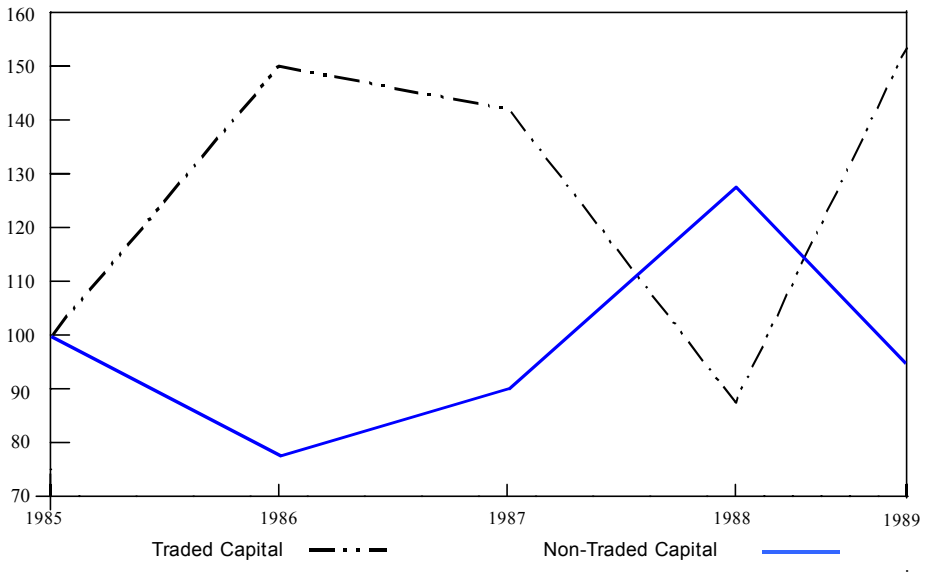


Source: Table B4 in Appendix B

Investment in NT-capital goods (in 1985's prices) significantly lagged the investment in T-capital goods in all years, except in 1988 (figure 9). Investment in T-capital goods rapidly increased in 1986-1987. This was so probably because replacement for equipment was badly in need after the losses in the capital stock during the hyperinflation years.

Thus, it appears that the construction slump was short lived, at most two years, 1986 and 1987. In addition to more loans obtained abroad, two other factors were very instrumental in the recovery of non—traded GFKF: the tax sharing arrangements between the central government, the decentralized regional development corporations and the municipalities, brought about by Tax Reform of 1986, and the Emergency Social Fund (ESF).

Figure 9
Capital Goods at 1985 Prices



Source: Table B4 in Appendix B

Following the tax reform of 1986, the revenues of municipalities significantly increased and they could devote more important resources to the construction and maintenance of urban infrastructure than before. The ESF was created to mitigate the severe hardships imposed by the stabilization program and the trade shocks on the poorest urban groups. The ESF was essentially a financing institution for construction and maintenance projects chosen by local communities and executed by private contractors.

The path of the relative price of NT-capital le consistent with the dynamics of the theory of the construction boom. There was initially a sharp reduction in construction activity, but once the government obtained the international boons and donations (and therefore the actual and shadow rate of interest decreased for government projects, construction resumed.

The movements in opposite directions of the prices of NT-consumer goods and NT-capital goods, relative to the price of import substitutes, seem hard to reconcile with our hypothesis of exclusive unrevised (or, eventually, partially revised) expectations. Still, this difficulty can be surmounted if one allows for adjustment lags and considers the effect of the

price stabilization and the liberalization programs that was simultaneous to the negative shock. Indeed, initially there vas a rise in the price of NT-consumer goods, due to the stabilization and liberalization efforts, while the price of non-traded capital goods fell, due to the dominant negative savings effect on investment. In a second phase, beginning around the fourth quarter of 1986, the relative price of NT-consumer goods responded more to what is predicted by the theory. It started to fall while the price of NT-capital began to increase.

To summarize, in the first phase, the most noticeable feature vas the negative savings effect. In the second phase, there vas a more pronounced positive marginal efficiency of investment effect. Simultaneously, the foreign credits and donations decreased the cost of capital for the public sector investment. Thus the increase in the marginal efficiency of investment and the lower capital costs had to have a positive investment effect, and the price of construction began to rise.

c. Factor markets

Natural gas, as is petroleum, is a very capital intensive activity and therefore we can expect little resource movements in that sector. In the large tin mines, most investments are irreversible but the technology is significantly less capital intensive than in petroleum. Changes in their capital stock (ignoring the wealth accumulated as natural deposits) result, in the absence of positive investments, by slow wear and tear or more dramatically, by closing the mines. We can infer that the amount of capital released by the closing of the mines was almost negligible, but the number of workers freed was very substantial.

Given the discussion above, the investigation of the new destinations for released capital does not seem very fruitful. On the other hand, the identification of the sectors where fresh investments went after the slump can be very informative. Unfortunately, investment figures disaggregated by sector of destination, for such a recent period as 1985-1989, are not available. The indirect information (based on output growth) suggests that many new investments are being undertaken since 1988 in the new, capital-intensive, mining sectors of zinc and gold, and in the sectors of production of agricultural exports.

The trade slump did not affect only tin mining and natural gas but vas transmitted to the non-tradable sectors. Table 5 shows a substantial labor movement between the sectors of tradables and non-tradables and inside each sector. The most noticeable feature is the big reduction of employment, in absolute terms as well as relative to the whole economy, in the mining (and petroleum) sectors. This clearly is a resource movement effect. Employment in the tradable sector of commercial agriculture increased from 1987 on, as many displaced workers of the other sectors moved to the production of soybeans and other agricultural exportables.[16] Employment in the import substitution sector initially suffered a decline, mainly as a consequence of the policy reforms of 1985, but then it rapidly and steadily recovered. Employment in the sector of NT-consumer goods increased in 1986 and has remained almost constant since then. Its share relative to the rest of the economy in 1989 was closer to the one of 1985.

Employment in the construction sector after a strong decline in the first two years after the slump recovered at a very rapid pace with construction output. The number for 1989 seems, all the same, to be anomalous.

[16] The growing number of peasants working in the production of coca leaves, a quintessential but illegal tradable sector, is not considered in the figures of table 5.

Real wages deeply declined in the aftermath of the stabilization program, but they recovered themselves steadily during 1986-89, at least in the private sector (table 6).[17] The behavior of wages in the mining sector relative to mean wages as a whole was very erratic from the third quarter of 1985 until the third quarter of 1987. Then wages became more stable and close to the mean wages as a whole. Construction wages sharply fell relative to mean wages as a whole between the third quarter of 1985 and the second quarter of 1986; afterward their evolution was close to the mean wage as a whole. Wages in the manufacturing sector and the wholesale and retail trade increased less rapidly than both the construction sector and the whole. There is no disaggregated data for import substitutes and NT-manufactures.

Table 6. Mean Real Wage Earnings in the Private Sector (Base l987=100)[a]

	Mining	Manufacturing	Construction	Wholesale and retail trade	Financial establishments	Other Services	All formal wage employment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1985. III	33.2	54.9	46.7	49.2	62.2	43.6	54.6
IV	99.2	73.4	69.3	59.9	88.8	46.4	79.2
1906. I	73.0	62.4	58.1	69.0	87.3	58.7	73.6
II	68.3	70.6	47.6	*77.2*	84.9	68.0	77.0
III	70.9	72.5	84.5	82.0	82.8	88.4	79.8
IV	85.9	80.3	82.5	79.6	82.7	81.8	82.1
1987. I	92.8	90.8	87.0	101.8	89.6	97.9	92.3
II	81.5	99.0	101.9	93.4	103.2	100.6	99.3
III	126.4	108.1	105.9	105.4	108.8	107.9	108.2
IV	109.3	114.1	117.6	111.3	107.5	101.3	110.4
1988. I	112.4	119.4	130.1	117.1	140.4	110.1	126.1
II	122.9	124.6	122.1	114.8	137.8	126.2	132.2
III	132.1	119.1	124.7	111.2	153.6	115.8	130.7
IV	129.4	120.3	129.6	104.3	153.1	116.3	130.3
1989. I	125.9	132.6	129.7	111.6	155.2	124.2	137.4
II	138.7	135.4	141.2	114.0	153.9	133.6	141.6
III	133.1	123.3	128.7	112.9	155.8	134.1	136.2
IV	127.4	125.7	127.2	115.3	159.3	141.3	139.6

Sources and notes: Author's computations based on data from UDAPE (1991).
a. Data at end-of-quarter, real wages are nominal wages deflated by the CPI.

It appears that in mining, the sector directly affected by the shock, the adjustment was in employment and not in wages. In construction, that typically requires fewer skills and where unions are not strong, there was a strong adjustment downward in both wages and employment On impact of the shock. The employment level A recovered first and then, with a lag, wages narrowed the gap that they had with wages as a whole.

[17] The Bolivian data on employment and wages is of a very poor quality. Therefore, we need extreme caution in making inferences based on them. Note, for instance, that mean wages for the whole are in almost all quarters higher than wages in ah sectors, except financial establishments. Since workers in financial establishments constitute a small share of all formal workers there is the suspicion that table 6 is not consistent, even if one allows for much higher wages in the former than in the latter.

5. The Transmission of the Shock to the Public and Private Sectors

a. Main Changes in the Fiscal Aggregates

The trade bust strongly de-stabilized the budget on impact but the government swiftly reacted to redress this situation. Table 7 shows the main changes that occurred in the non-financial public sector (NFPS) accounts (as percent of GDP) in the 1980s. The NFPS accounts consolidate the accounts of the general government (central and local governments) and those of the public enterprises.

Our first observation concerns the very significant change in the NFPS revenues between the beginning years of the 1980s and the final ones. The Olivera-Tanzi effect explains the fall in tax revenues during the high inflation years 1982-85. After the stabilization program of late 1985 and the tax reform of 1986, a substantial recovery of tax collections occurred. The drop in income in the public enterprises, triggered by the adverse. trade shocks, explains the diminution in the item "Other revenues" (see also Table 9).

Tin and natural gas are produced by both the public and the private sectors. The production of the former was in the years preceding the crisis far more important than the one of the latter. The state—owned enterprises relevant to our study are the mining company Corporaci6n Minera de Bolivia (COMIBOL), the tin smelting company Empresa Nacional de Fundiciones (ENAF), and the petroleum company Yacimientos Petrolíferos Fiscales Bolivianos (YPFB). ENAF was consolidated to COMIBOL in the last quarter of 1985. YPFB has production sharing arrangements with private companies, but is the sole exporter of natural gas.

Table 7. Non-financial Public Sector Operations (percent of GDP)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
A. Total revenue	40.5	35.2	31.9	23.5	19.7	25.2	27.5	24.5	26.8	26.4
1. Tax revenue	9.7	9.1	4.7	2.6	2.6	6.7	9.4	11.1	11.0	12.5
2. Other revenues	30.8	26.1	27.2	20.9	17.1	18.5	18.1	13.4	15.8	13.9
B. Total expenditure	37. 4	32.2	29.5	24.9	27.2	23.1	21.5	21.7	25.2	25.0
1. Current expenditures (excluding interest and unrequited transfers)	30.5	26.3	23.8	21.5	3.6	19.4	16.5	15.9	17.2	18.1
2. Capital expenditures	6.9	5.9	5.7	3.4	23.6	3.7	5.0	5.9	8.0	6.9
C. Primary surplus (line A minus line B)	3.1	3.0	2.4	-1.4	-7.5	2.1	6.0	2.8	1.6	1.4
D. Interest	5.5	3.6	4.4	5.0	3.5	7.4	6.7	4.9	4.4	3.7
1. Domestic interest	2.5	0.8	0.7	1.2	0.6	0.7	1.3	0.8	0.2	0.2
2. Foreign interest	3.0	2.8	3.7	3.8	2.9	6.6	5.4	4.1	4.2	3.5
E. Unrequited transfers	5.4	5.7	4.7	4.8	4.0	2.3	1.9	5.3	3.2	2.8
F. Total transfers (Line D + line E)	10.9	9.3	9.1	9.8	7.5	9.7	8.5	10.2	7.6	6.5
G. Other expenditures	0.0	1.3	7.5	6.7	8.6	2.3	0.0	0.0	0.5	0.0
H. Other surplus/deficit (line C - line F .line G)	-7.8	-7.6	-14.2	-17.9	-23.6	-9.8	-2.1	7.4	-6.5	-5.1
1. Net domestic borrowing	2.5	3.6	13.6	19.3	21.1	5.4	-3.4	5.0	1.7	2.0
J. Net foreign borrowing	5.3	3.9	0.7	-1.4	2.5	4.4	6.0	2.4	4.6	3.1

Source: Otálora (1990) for 1990-88 and author's computations for 1989 based on data of the Ministry of Planning, Unit for Policy Analysis, La Paz.

Notes: a. See text for explanation

The adjustment in exhaustible expenditures Clines B.1. and B.2. in table 7) was also substantial. Remark that the main adjustment took place in current expenditures (excluding interests and transfers); contrariwise, capital expenditures increased after the slump vis-à-vis the levels immediately preceding the slump and, surprisingly, vis-à-vis the levels of the earlier period 1980-82.

The severance benefits to the dismissed workers of CONIBOL accounted for a large share of the unrequited transfer of 1987. Remember that the dismissal of miners was a direct consequence of the tin crisis. The item "Other expenditures," with large values during 1982-85, covers an array of ill-defined accounts, mainly related to counterpart items of revaluations of the NFPS (net) foreign liabilities.[18]

The difference between revenue and exhaustible expenditure, defines the primary surplus.[19] In the aftermath of the launching of the stabilization program a primary surplus emerged, that was mostly reduced in the following years.

Increases in capital expenditure and the resulting global deficit were mainly financed with foreign credits and the reduction of foreign assets involuntarily held in Argentina (remember the discussion in section 2). Little recourse was made to seignior age: the Central Bank's credits to the NFPS mainly implied a reduction in its holdings of foreign reserves. Thus the deficits were financed almost entirely with an increase in the net foreign debt.[20]

The construction of a counterfactual of the path of NPPS revenues and expenditures, in absence of the trade shock, is delicate in view of the crucial role that the public finances played both during the inflation and the stabilization. Table 8 supplies the panorama of fiscal changes that can be attributed to the trade shock. The numbers there depend on the following set of assumptions:

(a) The counterfactual revenue/GDY ratio (27.6%) is set at the revenue/GDP value of 1986, for the whole period 1986-89. This ratio is very close to the average ratio of 1983-85, corrected for a reverse Olivera-Tanzi effect, and for the effect of the increase in petroleum taxes, that partially substituted the revenue loss caused by the trade shock.[21]

(b) The counterfactual exhaustible consumption/GDY ratio was set at 19.0%, its average value in 1988-89 (in terms of GDP), under the assumption that this was close to a lower limit without major exogenous shocks.

(c) The counterfactual Public GFKF/GDY was set at it. GFKF/GDP value for 1986. Afterward it was augmented to 5.8%, it. average value of the pre-crisis years 1981-82.

The counterfactual ratios were then applied to the counterfactual GDY (Column (4) in table 2) to obtain the counterfactuals of revenue, consumption and GFKF, respectively. The numbers in columns (1) to (3) in table 8 give the difference between the actual and the counterfactual values.

The fall in NFPS total revenues is surprisingly large, averaging 68.2% of the shortfall revenue over the period 1986-1989 (237.2/(11,450.9-11,102.9) = 68.2%). The fall in NFPS

[18] The item informs us more on the difficulties associated with high inflation accounting and on the lack of adequate treatment of the exchange rate depreciations, than on resource movements. Because the item does not imply resource movements, it was added to the "Unrequited transfer" account in our previous versions.

[19] This definition differs from the more conventional one where only interest payments are excluded from the overall surplus/deficit to yield the primary surplus.

[20] A reduction in foreign exchange reserves implies an increase in the net foreign debt.

[21] From table 9, line C, we obtain the reverse Olivera-Tanzi effect plus the 1986 tax reform effect, as percent of GDP, 3.7+ 5.0 = 8.7. To this we subtract the incidence of petroleum taxes 3.9 (line A2) to obtain 4.8. This value added to 22.9, that was the revenue/GDP ratio of 1983-85, yields 27.7.

consumption expenditures IB lesser than the fall in revenues, as expected, but still it 1. large. The positive public sector GFKF was larger than expected due to the important foreign aid to finance investments (especially those of the ESF). The NFPS accumulated both assets under the form of GFKF and liabilities to finance the primary deficit.

It is interesting that the ESF was financed almost entirely with donations from the international community. The inflow of foreign exchange for the ESF, of slightly more than US$ 117 millions, between 1987 and 1989, represented more than one fifth of the losses caused by the trade shock.

The aggregate GFKF figures hide different behavior across sectors. Investment in COMIBOL was sharply reduced, if anything there vas dis-investment. On the contrary YPFB continued with its investment plane. The Central Government investment program, after a halt in 1986, revived in 1988. The renewed access to international credits made this possible. As important, the heavy conditionality attached to the development loans obtained from official multilateral lenders vas very effective in directing resources to investment.

Table 8. Fiscal Changes due to the Slump (in millions of Bs. of 1985)

Year	Total Revenue	Consumption	GFKF	Total exhaustive expenditure	Primary surplus
	(l)	(2)	(3)	(4)	(5)
1985	0.0	0.0	0.0	0.0	0.0
1986	-8.5	-74.5	-1.5	-76.1	67.6
1987	-112.0	-10.7	-3.0	-13.8	-98.3
1988	-56.9	-24.0	53.1	29.1	-85.9
1909	-59.7	-17.3	26.4	9.1	-68.8
Total	-237.2	-126.6	74.9	-51.7	-185.5
Present value	-202.3	-117.2	59.4	-57.7	-144.5
Ratio of actual/counterfactual revenues			0.92		
Same as above in present value			0.93		
Ratio of total shortfall revenue/shortfall (%)			68.16		

Sources and notes: Col. (1) to (3), see text
Col. (4), col.(2) + col.(3)
Col. (5), col.(1) - col.(4)

b. Public Revenue and Expenditure and Private incomes

Table 9 shows the change in revenue from the average pattem of 1981-82 set as our benchmark. (Comparisons with the bizarre years of the hyperinflation may be misleading.) Taxes levied on minerals decreased as expected, so did income from the foreign sales of goods and services. Remark that in this second case the fall le very substantial. Also, observe that the public enterprises (especially YPFB) were obliged to increase their transfers to the general government.

Unfortunately, a disaggregation of changes in the composition of the NFPS revenues, in terms of tradables and non-tradables, is not feasible and we have to limit ourselves to qualitative remarks. Note that the fall in NFPS income (direct revenue and taxes on exports and imports), due to the export downswing was partially offset by taxes falling on other tradables (petroleum products sold in the domestic market) more than on property or income. The fall in the NFPS income and the changes in its composition implied a transfer of

resources from the domestic private sector to the public sector. This amount cannot be evaluated.

What happened to expenditure? This point will be examined considering three sources of transferences from the NFPS to the private sector. The first source concerns employment and the wage bill. Table 10 shows that there was an initial strong reduction in the number of workers after, and as a consequence of, the trade shock. Also, the proportion of public sector workers among formal wage earners declined. The initial dismissal of workers produced large savings to the NFPS. Also, the wage bill of the public sector, as percentage of GDP, strongly decreased on impact of the shock but returned to levels similar to those of 1982 during 1987-1989.

Second, private sector real wages steadily recovered after their strong fall in the last quarter of 1985 as shown in table 6. Has this had an effect on real wages of the NFPS? To answer this, we point out that by 1987 most adjustments of the stabilization program had probably ended. Since that year, differences in real wage increases can be assumed to be largely determined either by the evolution of the external sector or by the measures domestically taken to cope with it. We can infer from the comparison of tables 6 and 13 that wages in the over-all public sector have lagged wages in the private sectors since that year. By the end of 1989, wages in the public sector were even behind the wages in the traditionally low paying sector of commerce.

Third, regarding changes in the commodity markets, we made the point before that the initial increase in the price of NT-consumer goods relative to the price of import substitutes was a consequence of the stabilization program; afterward this relative price barely moved. Table B7 in Appendix B shows that the transfers from 1987 to 1989 amounted to a positive but very small value (we have discarded the transfers in the consumer goods market that occurred in 1986). The price of NT-capital goods decreased relative to the price of import substitutes in 1986 causing therefore a negative transfer to the private sector. From 1987 on, and especially in 1988 and 1989, the active NFPS investment program strongly increased the price of NT-capital, and therefore the transfers to the private sector became large positive (table B8 in Appendix B).

This transfer to the private sector, via the NT-capital goods markets, can be attributed only indirectly to the slump. We should not overlook that the trade shock (and the stabilization program) induced compensatory financing and other foreign credits for distress alleviation. It is these loans to the government that produced an increment on the NFPS expenditure on NT-capital goods and, hence, the transfers.

To summarize, while it is true that the trade shock primarily influenced the NFPS, the private sector was however significantly affected by it. The shock was transmitted from the public sector to the private sector through two main mechanisms: first, major changes in the tax structure that shifted the burden from trade taxes to domestic taxes (albeit of tradables) and, second, through expenditure, with major cuts in the public payroll and in NT-consumer goods. NFPS expenditure on NT-capital goods became the main transfer mechanism of foreign aid to the private sector, especially after 1987. A non negligible fraction of this foreign aid was intended for consumption smoothing after the shock.

Table 9. Revenue Composition of the Non-Financial Public Sector (percent of GDP)

	Average 1981-82	Average change from 1981-82 pattern	
		1983-85	1986-89
A. Central government revenues	7.0	-3.0	4.0
1. Mining taxis	0.5	-0.2	-0.4
2. Petroleum taxis	2.0	-0.2	3.9
a. On natural gas	0.6	0.8	0.9
b. Other petroleum	1.4	-1.1	3.0
3. Import tariffs	2.0	-1.2	-0.7
4. Internal revenue	2.5	-1.5	0.7
5. Other	0.1	0.0	0.5
MB. Mining and natural gas taxis	1.1	0.7	0.4
B. Revenue of other general government agencies	4.1	-0.7	1.0
C. Total general gvt. revenues	11.2	-3.7	5.0
D. Public enterprises	20.9	-8.5	-14.2
1. Foreign sales of goods and services	14.3	-3.5	-7.8
a. Three main exporters	13.0	-3.1	-7.2
b. Other	1.3	-0.5	-0.6
2. Domestic sales of goods and services	9.9	-4.1	-1.0
3. Other current income	1.1	-0.4	-0.1
4. Lees adjustment for transfers to General Government	0.0 -4.3	0.0 -0.5	0.0 -5.2
E. Other	1.5	1.4	2.0
F. Total	33.6	-10.7	-7.3

Source: Author's computations based on unpublished date of Bolivia, Ministry of Planning. Unit for Policy Analysis, (UDAPE).

c. Changes Caused by the Slump

Assets

We recall that the trade shock does not seem to have impaired the NFPS investment program in the aggregate, contrariwise to what happened with the private sector investment. GFKF in the NFPS was lower than expected only in 1986 and 1987 (table 10). In those two years, the foregone NFPS investment represented 52.6* and 14.3% of total foregone investment. In 1988 a turnaround occurred. It le worth noting that even if the ESF contribution of around 77.5 millions of B of 1975 (around U$ 117.2 millions) is deducted from the cumulative GFKF of Be 75.3 million, only Be 2.2 millions less than the counterfactual will be obtained. This lends support to our hypothesis of a policy-induced huge adjustment in the investment program of the public sector.

Table 11 summarizes the main results on the changes in income, assets, and savings. We can see that the NFPS suffered a greater income lose than the private sector because of the trade shock, as expected from the nature of the Bolivian export sector in 1985-89. The NFPS had to cope with 68.2% of the total GDY loss, whereas the private sector took the

remaining 31.8%. The public sector reduced its consumption proportionately more than the private sector and significantly so. This le reflected in the substantial differences in the savings rates between the public and the private sectors. This was the consequence of differences in perceptions. The government -- and the international organizations that supported the stabilization program -- thought of the reversal of the price shock toward a more normal price as a slow process, anyway, slower than the public.

We may conclude that the government partially revised it. permanent income and, therefore, reduced it. consumption although by lees than its fall in income. Again, the effects on the budget of the trade shock are intertwined with those of the inflation stabilization. The latter hardened, as it had to be, the government's budget. So, most of the reduction in consumption took place in the first year of implementation of the stabilization program. There was even a primary surplus! The initial drastic adjustment smoothed the way for further adjustments to cope with the trade shock.

Table 10. Slump Induced Foregone Investment (in millions of Bs of 1985)

Year	Total (1)	Government GFKF (2)	Government share (%) (3)
1985	0.0	0.0	
1986	-2.9	-1.5	52.6
1987	-21.2	-3.0	14.3
1988	-25.4	53.1	-209.0
1989	-57.0	26.4	-46.3
Cumulative 1986-1989	-106.6	74.9	
Present value 1986-1989	-86.1	59.4	

Sources and notes: Col. (1), col.(7) of table 2
Col. (2), col.(3) of table 8
Col. (3), col.(2) divided by col.(1), percent

Table 11. Distribution of Changes in Assets and Savings Rates (In millions of Be of 1985)

1. Change in public assets	-110.6
2. Change in private assets	-80.7
3. Total value of Windfall	-348.0
4. Gross windfall income of public sector	-237.2
5. Gross windfall income of private sector	-110.8
6. Gross windfall income of public sector (% of total)	68.2
7. Gross windfall income of private sector (% of total)	31.8
8. Overall savings rate (%)	55.0
9. Savings rate in public sector (%)	46.6
10. Savings rate in private sector (%)	72.8

Sources and notes: Line 1. from col. (3) plus col.(5) of table 8
Line 2. from col. (7) of table 2 minus col. (3) of table 3 minus line 1. of this table
Line 3. from col. (2) minus col.(4) of table 2
Line 4. from col. (1) of table 8
Line 5. Line 3. minus line 4
Line 6. Line 4. over line 3
Line 7. line 5. over Line 3
Line 8. line 1. plus line 2.) over line 3
Line 9. line 1. over line 4
Line 10. line 2. over line 5

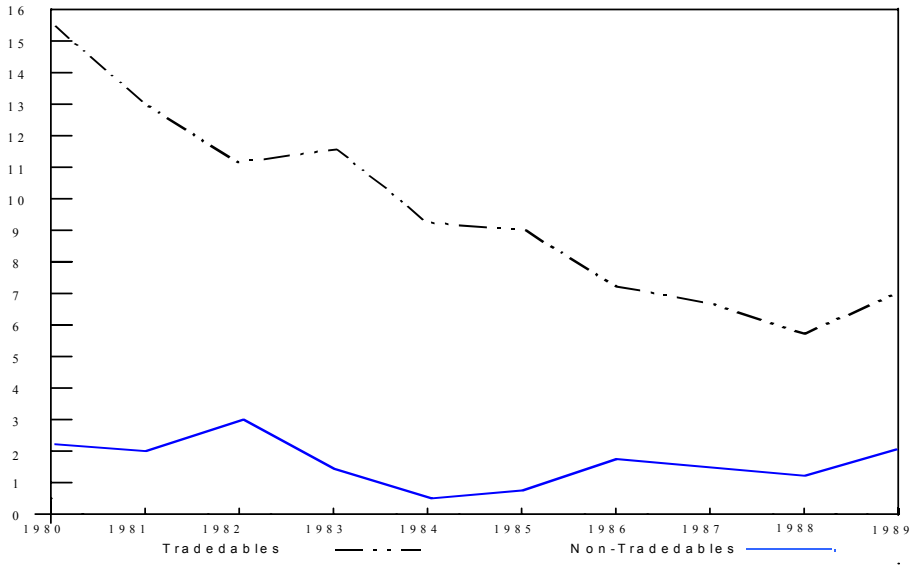
Expenditure on Tradables and non-Tradables

Figures l0A to 10C (and table B6 in Appendix B) show a decomposition of expenditure of the NFPS (as proportion of GDP) in tradables and non-tradables. The pre-shock years are included in the table and the figures for comparative purposes.

The most striking feature in figures l0A to 10C is the decline in the NFPS consumption of non-tradables. Observe that the NFPS consumption of tradables was during 1985-89 only slightly below the consumption of the pre-shock years.

Regarding the GFKF of the NFPS a mild recovery in its tradable content (as a percent of GDP) happened after the shock of 1985. The NFPS expenditure on NT-capital goods augmented les. than the one on T-capital in 1986 but in 1987 and 1988 it grew more rapidly. The resumption of the government's construction program explains this. While the negative trade shock did not have a strong impact on the level of the GFKF in the NFPS, if anything it was positive, it had on its composition. NT-investment received more weight.

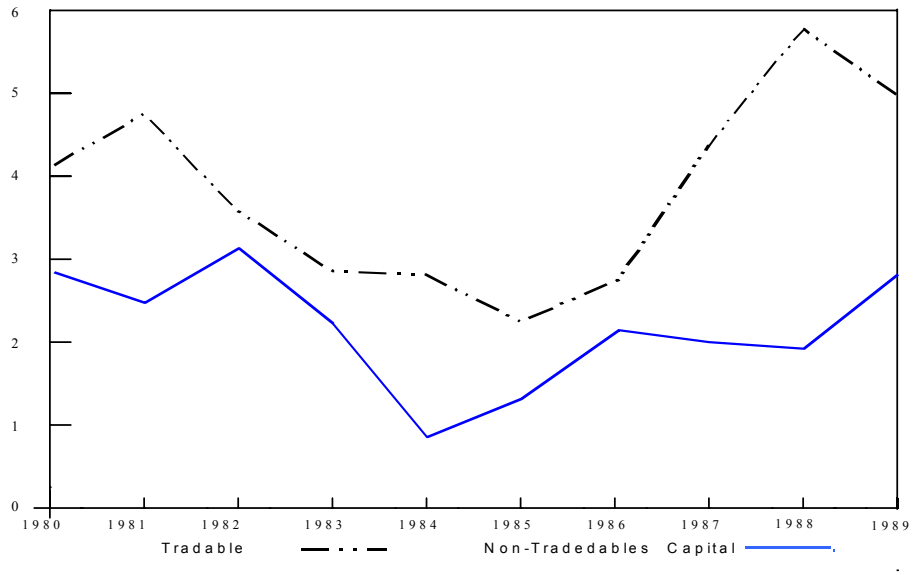
Figure 10A
Public Sector Consumption (Percent of GDP)



Source: Table B6 in Appendix B

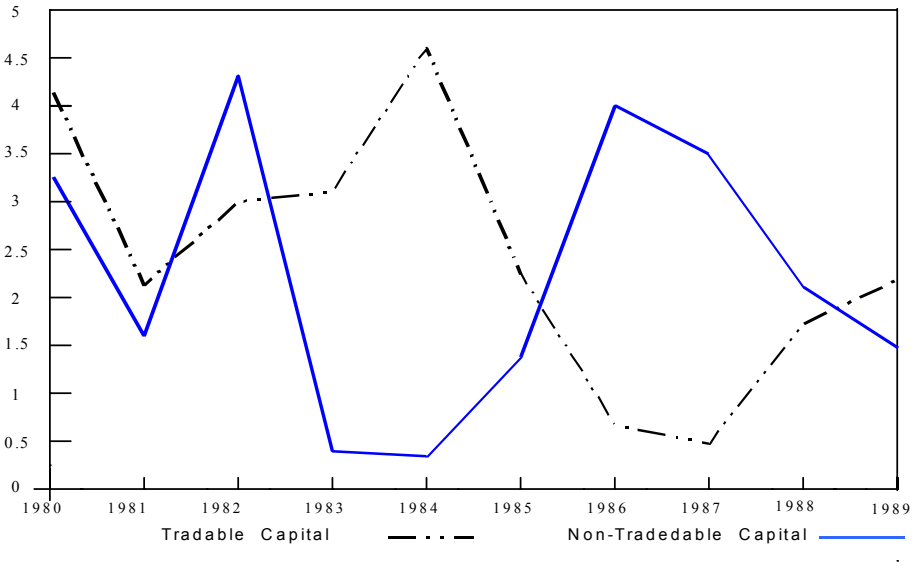
Private NT-GFKF (as a share of GDP) initially suffered a strong fall. This decline continued in 1987 but at a slower rate and there 1. a recovery since 1988. In contrast, there was a rapid rise in T-GFKF in the private sector on impact of the shock, but it declined afterward. The combination of the stabilization program, the opening of the economy, and the trade shock, that prompted investments in the private sector to replace capital equipment, explains this feature.

Figure 10B
Decomposition of Public Gross Fixed Capital Formation (Percent of GDP)



Source: Table B6 in Appendix B

Figure 10C
Decomposition of Private Gross Fixed Capital Formation)Percent of GDP)



Source: Table B6 in Appendix B

Labor allocation between the public and private sectors

The shock caused, as shown in table 12, a reduction in the number of workers in the public sector. The most dramatic case occurred in the state-owned mining corporation COMIBOL where 21 thousand out of 27.6 thousand miners were laid-off. In the same table we observe a strong decline in the public sector wage bill (as percent of GDP) in the first year after the shock; afterward, the share substantially recovered. Employment in the public sector has

reduced its participation in the whole wage employment and in the distribution of income. This was an important consequence of the shock.

Table 12. Labor and Wages In the Public sector

	Number of workers (thousands) (1)	As percent of formal wage camera (2)	Wage bill as % of GDP (3)
1980	170.1	49.7	12.8
1981	174.6	48.1	11.3
1982	182.6	46.0	9.2
1983	190.2	47.8	8.4
1984	202.0	48.4	13.4
1985	211.5	47.0	9.4
1986	180.9	46.6	6.6
1987	174.9	44.6	7.8
1988	175.5	42.3	9.7
1989	179.4	39.7	8.9

Sources: Col. (1) and col. (2), UDAPE (1989)
Col. (3) Otálora (1990), except for 1989 where preliminary estimate of author is used

Table 13. Real Wages in the Public Sector (Base 1987=|00)

	Public Enterprises (1)	Overall Public sector (2)
1918. I	130.9	116.1
II	127.5	117.6
III	120.2	119.1
IV	122.7	122.3
1969. I	111.1	121.0
II	130.7	120.0
III	121.9	110.8
IV	106.3	105.9

Sources and notes: National Institute of Statistics, real wages are nominal wages deflated by the CPI of final month of quarter.

d. Financing the Budget Deficit

The ways of financing the overall budget deficit are shown in lines 1 and J of table 7, as percent of GDP, and in table 14 in millions of current Bs. If unrequited transfers and "other expenditures" (lines E and G in table 7) are deducted from the primary surplus (line C in table 7), a net positive resource transfer to the NFPS appears, for ah years between 1987 and 1989. Domestic and foreign sources financed this resource transfer.

Regarding foreign financing, long and medium term flows generally took the form of development loans, arrearage in interests, and of reduction of Bolivia's asset holdings in Argentina. It can be argued that the long and medium term financing was used for GFKF and interest service. Short-term foreign loans and the depletion of foreign exchange assets, including the foreign exchange reserves (usually misclassified as domestic financing) were used to finance a significant part of the unrequited transfers and the temporary gaps between tax revenues and current exhaustible expenditures.

The discussion above cannot easily be translated into a counterfactual given the difficulty in identifying the sources of additional finance of the shock-induced deficit. We

can only say that the inferred change in the primary deficit fluctuated around 56% of the overall deficit if one leaves out 1986 (column(5) in table 14). We could assume, but with no strong base, that the financing of the inferred deficit was mostly foreign (including in this concept the losses in foreign exchange reserves). The limited domestic financing of the overall deficit, and the even more limited financing of the induced deficit with monetary emission, explain why Bolivia could maintain its stabilization program, despite the very adverse shocks.

Table 14. Financing the Budget Deficit (in millions of current Bs.)

Year	Domestic (1)	Foreign (2)	Overall deficit (3)	Inferred change in primary deficit (In millions of Bs.) (4)	Inferred change in primary deficit As % of overall deficit (5)
1986	-282.1	491.3	209.2	-219.5	-104.9
1987	461.8	221.6	683.4	366.7	53.7
1988	180.3	495.6	675.9	384.9	57.0
1989	355.8	257.9	613.7	352.2	57.4

Sources and notes: Col .(1) to col.(3), UDAPE (1991)
Col. (4) from col.(5) in table 8, converted to current Bs. with implicit GDP deflators
Col. (5) col.(4) divided by col. (3) in percent

6. The Shocks and the Policy Reforms of 1985

a. The trade Slump and the Management of the Foreign Exchange

Shortly after the tin crash of October 1985, an attack on the reserves of the Central Bank occurred. Private agents feared either: (a) a weakening of the NFPS budget, that would induce again excessive seignior age; or (b) that not enough dollars would be available later, should they need them for imports or to hedge themselves against accelerating inflation.

In the first weeks after the tin crisis the Central Bank drastically reduced the amount of foreign exchange reserves that it supplied to the public through the "bolsín". A big jump devaluation of the Bolivian ensued. Altered expectations depreciated the exchange rate beyond what the reserve position justified and the monetary authorities expected. Again, as during the hyperinflation, private agents reduced their cash holdings to a minimum and inflation seemed to rekindle.

As a reaction, the authorities tightened even more the fiscal and monetary policies to stabilize the exchange rate. The stabilization of inflation followed. In the first weeks of February 1986 was again under control. We can explain the short duration of this inflation episode remarking that the jump devaluation of the exchange rate, after the trade shock, produced a jump increase in the price level. With flexible prices in most of the markets and, therefore, little potential for inertial inflation, the initial price level jump was not followed by other price increases. It sufficed to restrain fiscal and monetary expansion to regain control.

The control of inflation and depreciation did not imply that ah foreign exchange problems were solved nor that the situation had come to rest. The external context continued causing severe difficulties to the BoP and the reserves (see tables 15 and 16). Indeed, the huge trade deficits, produced by the fall in export revenues, followed besides by an expansion of imports whose causes are explained below, compounded the B0P problems created by the interest charges on the external debt (table 15). The current account deficits were particularly high in 1986 and 1987. From 1987 to 1989, the net unrestricted foreign exchange reserves diminished due, in addition to the effects of the trade shock, to the Argentinean arrears and retentions. Although the current account deficit of 1986 was very large, there was all the same an important accumulation of reserves coming from the loans to support the BoP (like a stand-by agreement signed with the IMF in June 1986) and a large positive balance in Errors and Omissions.[22]

Following Bevan et.al (1989b) we assume that the transactions demand for money relates to permanent income while the assets demand for money follows the transient component of income. We add, in view of Bolivia'. recent history, that the expected inflation rate is also a major determinant of both transactions and assets demand for domestic money. At the risk of some simplification, we can assimilate the demand for currency and demand deposits in the banking system, i.e., Mi, with the transactions component of demand. On the other hand, we assume that the assets demand for money le satisfied by time deposits and certificates of deposit (CD) issued by the Central Bank.

[22] The dis-hoarding of dollars of the private sector and the capture by the Central Bank of the cocaine dollars, that were a result of the type of stabilization program that was adopted, explain this strange account.

Table 15. Balance of Payments, 1985-89 (Millions of U$)

	1985	1986	1987	1988	1989
1. Trade Balance (1a. - 1b.)	-62.5	-86.5	-247.6	-48.0	103.6
a. Exports FOB	628.4	587.5	518.7	542.5	723.5
b. Imports CIF	690.9	674.0	766.3	590.5	619.9
2. Balance of Non Factor Services	-23.1	-19.6	-19.3	-18.0	-19.0
3. Balance of Factor Services	-373.4	-296.3	-258.7	-262.8	-254.5
4. Net private transfers	14.5	17.0	17.9	12.8	20.0
5. Balance on Current Account (1 + 2 + 3 + 4)	-444.5	-385.4	-507.7	-316.0	-149.9
a. Non-interest Balance on Current Account	-130.2	-141.3	-271.0	-69.0	75.7
6. Balance on Capital Account	-171.1	-36.8	-10.1	231.2	283.6
a. Net Official Transfers	65.5	82.0	103.3	171.5	136.3
b. Direct Foreign Investment	9.8	13.0	36.4	30.0	35.0
c. Net Official Disbursements of Medium and Long Term Debt	-200.4	-95.7	-59.8	123.0	113.9
d. Other Long Term Capital	-44.4	-15.6	13.9	8.6	10.7
e. Net Short Term Capital	-2.2	-20.5	-103.9	-101.9	-12.3
7. Net counterpart it items	7.7	2.2	-9.9	0.1	0.0
8. Exceptional Financing	358.7	310.8	384.9	142.8	-60.0
9. Errors and Omissions	282.0	219.6	64.6	-65.6	-216.0
10. Overall balance (5 + 6 + 7 + 8 + 9)	32.2	110.4	-78.2	-7.5	-142.3
Memo Item: Net Foreign Reserves of Central Bank of Bolivia	136.2	246.6	168.4	160.9	18.6

Source: Authors elaboration with basic date from Central Bank of Bolivia (1990)

Table 16. Composition of Foreign Exchange Reserves (In millions of USS)

Year	Gross reserves (1)	Gold (2)	Natural gas retentions (3)	Gross reserves excluding gold and retentions(4)	Short-term Liabilities (5)	Net Reserves (6)	Net unrestricted Reserves (7)
1985	268.9	37.8	47.2	183.9	132.7	136.2	51.2
1986	505.3	37.8	186.2	281.3	258.7	246.6	22.6
1987	413.5	37.9	210.0	165.6	245.1	168.4	-79.5
1988	404.4	38.0	128.6	237.8	243.5	160.9	-5.7
1989	373.3	38.0	18.6	316.7	354.7	18.6	-38.0

Sources and notes: Central Bank of Bolivia (1990)
Col. (3), reserves held at the Central Bank of the Argentinean Republic earmarked for imports of Argentinean goods and services
Col. (4), col.(1) minus col.(2) minus col.(3)
Col. (6), col.(1) .minus col.(5)
Cot. (7), col.(4) minus col.C5)

The very high degree of dollarization is a main feature of the Bolivian monetary landscape. Most time deposits and CD are in dollars or dollar-indexed. Little of the money stock in Bs can be considered as responding to the asset demand for money. As a consequence, the transient component of liability with the domestic private sector in the

foreign exchange reserves is limited to the required banking reserves on time deposits and the stock of CD.

b. Equilibrium in the Money Market

The events of the last quarter of 1985 created the informational problem of where the demand for money stood. To play on the safe side the monetary authorities continued their tight control on the money supply. Since the (net) official capital transfers in the BoP were insufficient to finance the largo current account deficits, the Central Bank tightened its domestic credit to the point of obligating the NFPS to become a net creditor. The NFPS accumulated more deposits than loans with the Central Bank between 1986 and 1988.[23] This policy preserved the Bank's foreign exchange reserves. In addition, the policy, working through the interest rates, induced a very significant repatriation of private capital.

The radical fall in inflation had to augment the transactions demand for money. The gradual recovery in the NT—capital goods sector and therefore of income had also to increase the demand for money. Yet, the money supply did not follow for the reasons given above. To gauge this temporary disequilibrium, a counterfactual was constructed using the money demand equation of table B9 in Appendix B (that considers only the impact of the fall in inflation and abstracts from income effects). Figure 11 shows the great discrepancies between actual Ml and the Ml predicted by the equation in table B9. The counterfactual annual changes in Ml (column 9 in table 17) is based in these (conservative) predictions. The excess (flow) demand for money appears in column 10. Also, it appears that the increase in Mi, between 1985 and 1989, was 241.5 millions of current Bs. less than what would be derived from the demand for money, given the observed rates of inflation.

Table 17. Annual Changes in Money Stocks and Excess Demand for Ml (In Millions of current Bs.)

Year	Change in M2 (1)	Sources of Change (%)				Change in time deposits		Changes in Ml		Shortfall in Ml	
		NFA (2)	Net credit to Public Sector (3)	Credit to Private Sector (4)	Other Accounts Net (5)	Annual (6)	Cumu lative (7)	Actual (8)	Counter factual (9)	Annual (10)	Cumu lative (11)
1986	255.6	68.7	-53.4	97.9	-13.2	184.3	184.3	71.3	234.5	-163.2	-163.2
1987	104.1	-52.2	76.2	124.9	-48.9	62.9	247.2	41.2	29.3	11.9	-151.3
1988	149.6	-9.6	80.5	84.9	-55.8	102.5	349.7	47.1	65.3	-18.2	-169.5
1989	74.1	-117.9	251.9	182.2	-216.2	113.7	463.3	395	32.5	-72.0	-241.5

Source and notes: Col. (1) to col.(8), derived from date of Central Bank of Bolivia (1991)
C0l. (9), estimated with the money demand equation in table 19 of Appendix 1
Col.(10), col. (8) minus col.(9)

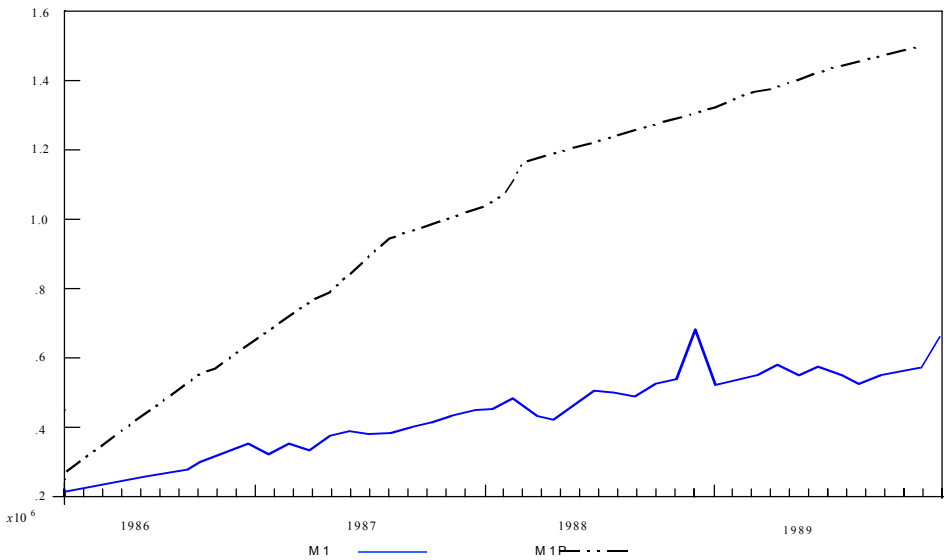
The excess transactions demand for money was partly sponged by the supply of dollar notes circulating in the economy.[24] It also pushed upward the real interest rate and the

[23] The mandatory deposits of the public enterprises in the Central Bank were the main instrument to control the expansion of the money base. Also note that Central Bank credit to the private sector was almost entirely financed with foreign loans and did not give rise to significant money creation. The foreign loans are included in the counterpart account in "Other" in table 18.

[24] The hyperinflation left as legacy a substantial amount of dollars circulating in the domestic economy. In addition, the domestic stock of dollar notes augmented with the proceeds of the illegitimate coca me exports. As can be expected the

interest rate for operations in dollars (table 18).[25] In turn these very high interest rates led to distress demand for credit that pushed them upward even more. As a point of information, lending interest rates for operations in dollars were systematically over 200t the LIBOR rate between end-1986 and end-1989.

Figure 11
Actual and Predicted Demand for M1. (Monthly data Thousands of Bs.)



Source and Notes: Author's computations. M1 is actual M1. M1P in predicted M1 with the money demand equation of table B9 in Appendix B

Foreign *assets* held abroad by the private sector were changed to foreign assets in the domestic banking system (table 19). The momentum in capital repatriation could be sustained with only very high real interest rates. This change in the portfolio of the private sector lessened the pressures on the Central Bank's foreign exchange reserves because the private sector could finance now its imports (and partially service its foreign debt) in private markets.

Table 18. Interest Rates for Dollar Operations, 1985 -1989 (percent)

	Domestic rates		International rates (LIBOR)		
End of:	Lending	Borrowing	30-days	60-days	90-days
1985	16.8	11.2	8.2	8.2	8.1
1986	22.0	15.0	6.9	6.5	6.4
1987	26.0	15.6	7.4	7.2	8.0
1988	22.3	14.9	9.6	9.4	9.4
1989	22.1	15.1	8.8	8.6	8.5

Source: Central Bank of Bolivia (1991)

iliegal transactions of cocaine are cash operations paid in dollar bills. Dollar notes are at the present time widely used for domestic transactions, even of small amounts.

[25] If the exchange rate is not too overvalued the interest rate for operations in dallare is clase to the real exchange rate in es.

Table 19. Annual Changes in the Assets Demand for Money (In Millions of current Bs.)

		Sources of change (%)		
	Change in Time deposits (1)	Deposits in Bs. (2)	Deposits indexed to the U$ (3)	Deposits in USS (4)
1986	184.3	29.2	9.9	60.9
1987	62.9	-43. 9	-18.4	162.3
1988	102.5	-4.3	22.3	82.1
1989	113.7	-13.9	13.3	100.6
1990	176.2	1.9	5.4	92.7

Source: Author's computations based on date of Central Bank of Bolivia (1991)

To conclude, the fall in reserves produced by the downswing in the terms-of-trade, was more than compensated by capital repatriation and foreign savings. Had the trade shock not happened, remonetization after the hyperinflation would have proceeded at a faster pace, giving way to lower interest rates and lesser costs in terms of foregone private investment and output.

c. Trade Policy and the Slump

The trade shock did not change the trade liberalization measures of the NEP. Was the trade liberalization sustainable because of the negative shock? The answer seems yes. To see this, let us assume that the negative trade shock did not happen. With immobile capital in the short run, the trade liberalization would have released labor from the sector of import substitutes to the sector of non-tradables and exportable. Wages would have decreased relative to the return of capital in the sectors of non-tradables and exportable, and increased in the sector of importable . Therefore, with fixed capital, employment and output would have increased in the sectors of non-tradables and exportable, and declined in importable. Since the export sector is very capital intensive, the increase in employment and output would have been small and surely less than in the non-tradable sector. Remark, that the long run effects would be entirely different (see footnote 14). The negative trade shock and the liberalization produced movements in relative prices in opposite directions. In fact, there was a net deterioration in the price of exports relative to the domestic price of importable. This somewhat shielded the sector of importable (and induced a shift of resources to new export sectors). Hence, trade liberalization could be sustained.

Liberalization caused a strong rise in consumer imports. The import backlog built up during the hyperinflation was one cause of this surge. Another one was the speculative demand that came with the belief that liberalization would last only as long as the stock of Central Bank's foreign exchange reserves allowed. Imports of durable consumption goods were particularly important from the last quarter of 1985 through 1987 (table 20).

The opening of the economy put a temporary pressure on the current account of the BoP. The repatriated capital avoided that the full translation of this additional pressure into a one on the reserves. Domestic banks provided the required funds to finance imports. In turn banks could finance consumption imports with the repatriated deposits. We should add that banks preferred the financing of imports over other lending operations. Credit to finance imports seemed a lucrative and safe operation, as the turn-over of the loans was rapid and were given to businesses that operated closely following the foreign exchange movements in

a very dynamic market.[26]

Table 20. Consumer Imports and Total Consumption (millions of current U$)

Year	Consumer imports				Total consumption (5)	As % of consumption	
	Durables (1)	Total (2)	Share of durables (%) (3)	Index of share(1985=100) (4)		Durables (6)	Total 1mports (7)
1980	64.3	168.9	38.1	58.1	2.499	2.6	6.8
1981	117.7	233.6	50.4	76.9	2.908	4.0	8.0
1982	39.2	96.0	40.8	62.3	2,778	1.4	3.5
1983	19. 2	65.6	29.3	44.7	2,610	0.7	2.5
1984	52.9	94.9	55.7	85.0	2,298	2.3	4.1
1985	87.7	133.8	65.5	100.0	2,539	3.5	5.3
1986	71.8	133.7	53.7	81.9	3,383	2.1	4.0
1987	97.5	190.3	51.2	78.2	3,812	2.6	5.0
1988	70. 9	128.3	55.3	84.3	4,004	1.8	3.2
1989	67.3	137.5	48.9	74.7	4,163	1.6	3.3

Sources and notes: Col. (1) and col. (2), Central Bank of Bolivia (1990)
Col. (3), Col.(1) divided by col.(2), percent
Col. (4), col. (3) converted to en index with base 1985 = 100
Col. (5), author's estimate based on World Bank (1990)
Col. (6), col. (1) divided by col. (5), percent
Col. (7), col. (2) divided by col.(5), percent

Did the explosion of consumer imports preempted private sector investment demand and, hence, slowed the re-allocation process and the attainment of the new long-run equilibrium? The description above suggests a positive answer. Indeed, the f 10w of repatriated capital substituted export become, but this change in the composition of the import capacity was accompanied by an increase in the cost of capital for the private sector.[27] The conjecture that the interaction of a very tight monetary policy, partially but significantly due to the price bust, and trade liberalization caused higher interest rates than otherwise seems plausible. Through this indirect channel imports preempted private investment, at least of the domestic firms that could not finance themselves abroad.

[26] After the hyperinflation and the suspension of paymente to foreign private creditors in the early 1980s, it was virtually impossible to open letters of credit for importe from foreign banks, uniese they were fully pre-paid. Suppliers credit whíle available was nevertheless limited.

[27] The supply curve of foreign funds can be thought as a kínked curve, with a horizontal segment at (or below) world interest ratee goíng up to the availability of funde from official lenders, followed by an upward slopping segment fed by private lenders. Since access to international commercial banks was not possible, the upward slopping segment mainly, but not exclusively, captures the supply of repatriated capital.

7. Concluding Remarks

In this paper we applied the theory of the construction booms. The theory has given us a systematic approach to the implications of the shocks on Gross Domestic Income, on the saving and investment decisions, on resource reallocations, and on the balance between the private and the public sector. We added also a discussion on the control of inflation, a major Bolivian concern, and how it vas maintained despite the shocks. Our clearer findings relate to the losses in income, in investment, and in public revenues. The huge adjustment in the public sector is also a major result. The shocks and, especially, their management by the government, who benefited from the support, financial and with advice, of the international official creditors explain the substantial shifts in resource allocation and in the structure of production observed now. Despite the dramatic conditions when the shocks hit the economy, Bolivia could smooth the transition to a new equilibrium rather well. The unwavering application of the policy reforms and the resumption of foreign credits largely explain this outcome. It is also possible, but it is not documented in our study, that the illegal cocaine exports eased the adjustment. Also, the Bolivian economy benefited of a sequence of small positive shocks that vas superimposed to the trade slump and partially neutralized its negative effects.

Rich as is the theory of the construction booms, it was sometimes insufficient for our objective of separating out the effects of the shock from other effects caused by major policy changes. The construction of counterfactuals is always problematic, but in the Bolivian case it was more so. In particular, it has been very difficult to isolate the substitution effects in production and consumption caused by the shock from those arising from the inflation stabilization and the trade reform.

Expectations play a crucial role in the theory. The strict characterization of the Bolivian case is of exclusive partially revised expectation. A full treatment of this case would have called for more disaggregation of the major variables, with the attendant difficulties on the data availability.

The theory of construction booms has more natural applications when the shocks are positive and situations of full employment and even over employment of resources are more likely to arise. The theory is lees developed for the case of unemployment, that has a high probability of occurring with a negative shocks

APPENDIX A

Data Sources

There are three main data sources for tin prices, tied to the markets of London, New York and Kuala Lumpur, respectively. The Bolivian tin was generally traded in the London Metal Exchange (LME). Given that the Lt4E closed its tin operations between October 1985 and June 1989, a crucial period of our study, other sources of ~fl data had to be employed. Figure 1 is *based* in the New York prices, that while not identical to the London prices are generally close. The price data for natural gas comes from the Statistical Bulletins and External Sector Bulletins (various issues) of Central Bank of Bolivia

Real prices are estimated as (average) spot prices deflated by the Manufacturing Unit Value Index (MUV) of the World Bank. The MUV series comes from Grilli and Yang (1988) for the period 1900-1986. Recent World Bank data for 1987-89 was spliced with it to complete the series. Note that other deflators than the MUV yield similar patterns of real prices.

The decomposition of expenditure in tables B3 and ES uses information of the sources given the table in page 90. The decomposition proceeded in the following steps:

(1) The coefficients of tradable and non-tradable GFKF in total GFKF in 1980 prices were updated for changes in prices as follows:

$$c_N^t = c_N^{80} \; x \; P_c / P_k \qquad t = 1980, ..1989$$

$$c_T^t = 1 - c_N^t$$

where c_i^t (i = N,T) stand for the coefficients of non-tradable and tradable GFKF respectively corrected for price changes, PC is the price of construction and is the price of GFKF. CN^{80} stands for the coefficient in 1980 prices.

Table A. Data Sources

Data	Source
GDP in current and in 1980 prices, in domestic currency	NIS as reported in Central Bank (1991)
GFKF/GDP ratio (derived from current Bs.)	World Bank (1990), except for 1989 that le based in NIS data as reported in Central Bank (1991)
Public OFKF/GDP ratio Private GFKF/GDP ratio (derived from current B$)	World Bank (1990), except for 1989 that comes from unpublished date of UDAPE
Non Traded GFKF/GFKF ratio (derived from 1980 Bs.)	ECLA (1990), corresponds to ratio of construction investment in total GFKF
Traded GFKF/GFK.F ratio	One lees the Non Traded GFI(J/GFKF ratio
GFRF data in 8$ (in current prices and in 1985 prices)	NIS a. reported in Central Bank (1991)
Value added in construction (in B$, 1985 prices)	NIS as reported in Central Bank(1991)
Implicit deflators of value added in construction	Unpublished data of NIS until 1987, thereafter, author's estimate based on an index of construction costs
Imports in US$ decomposed in: Consumer imports Consumer non-durables Consumer durables Intermediate goods imports Capital good.	Central Bank (1990)
Imports in U$ decomposed in: Public sector imports Private sector imports	Central Bank (1990)

Notes: NIS le the Bolivian National Institute of Statistics UDAPE is the Unit for Economic Policy Analysis, Ministry of Planning

(2) The GFKF/GDP ratios were applied to current price GDP to obtain the GFKF in current B$. Note that these GFKF figures differ from the published figures of the NIS.

(3) The coefficients obtained in (1) were used to distribute the values of GFKF in current prices in tradable and non-tradable.

(4) The share of imports of capital goods for the public sector in the total of imports of capital goods was applied to tradable GFKF, to obtain an estimate of expenditures of the public sector on tradable GFKF. The estimate of the private sector tradable GFKF resulted from the difference between tradable GFKF and tradable GFKF for the public sector.

(5) The estimate of expenditures of the public sector on on-ltradable GFKF was obtained as the difference between public sector GFKF and public sector tradable GFKF. A similar procedure was used for the private sector.

(6) The ratio of consumer imports to capital goods imports in the public sector import bill was applied to the estimate of tradable GFKF in the public sector obtained in step (3) to obtain an estimate of tradable consumer goods by the public sector. Expenditures on non-tradable consumer goods by the public sector resulted from the difference with total NFPS expenditures on goods and services.

The six categories in which expenditure in current prices was decomposed following the procedure outlined above were deflated by nominal GDP to yield the numbers in table B6.

The non-tradable GFKF expenditure obtained in step (3) above was deflated by its own deflator with *base* 1985 to obtain the index numbers in col.(2) in table B4. The tradable GFKF at 1985 prices was obtained from the difference between GFKF at 1985 prices and non-tradable GFKF. The data was then converted to index numbers.

Unfortunately, the data may not be up to the requirements and the methods used in the paper may not be robust to differences in information. Therefore, our results have to be interpreted with caution. The following comments on the difficulties encountered with the data should be helpful:

First, the trade crisis examined in this paper is a recent event. Many macroeconomic data after the crisis is still very preliminary. In particular, the national accounts data that we used are still in the process of being revised in the NIS.

Second, even in the case of revised data, there are substantial differences between the data supplied by the NIS and the data on Bolivia used by the World Bank in its country economic memorandums and updating (see e.g. World Bank, 1989, 1990). While national accounts at constant prices are broadly comparable, the values in current prices significantly differ. Obviously prices and implicit deflators are very different. This has important consequences for the comparisons of relative prices extensively employed in this study. A substantial effort has been made to examine the sources of differences and to make the series compatible. The choice of data source was determined by judgment and cross-checks with other types of information. For instance, the national accounts in current prices were systematically confronted with information of the Balance-of-Payments.

Third, there are substantial differences in the Balance of Payments presentations of the International Monetary Fund, the World Bank, and the Bolivian Central Bank. The Central Bank data has the advantage of being very detailed and for this reason has been preferred to statistics coming from other sources. However, the Central Bank data is not devoid of inconsistencies.

Fourth, there exists data on GDP by sector of origin in current prices only until 1987 (and published only up to 1986). This prevents therefore the obtention of the crucial price of construction as an implicit deflator of the sector.

Fifth, data on the fiscal accounts for 1989 had to be constructed from the rather raw information for that year provided by the Unit of Policy Analysis (UDAPE) of the Ministry of Planning.

APPENDIX B

Auxiliary Tables

Table B1. Terms-of-trade changes, 1985—1989

	Prices of main exports			Price indexes		Relative prices	
	Tin (1)	Natural gas (2)	Tin end Natural gas (3)	Exports (4)	Imports (5)	Tin and Natural gas (6)	Exports (7)
1980	145.1	64.4	95.5	83.8	79.1	120.7	106.0
1981	122.4	91.2	103.2	89.4	84.4	122.2	105.9
1962	109.3	96.9	102.9	93.4	90.4	113.8	103.3
1963	112.0	101.0	105.2	96.1	89.4	117.7	107.5
1984	105.7	101.1	102.9	98.2	92.2	111.6	106.5
1985	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1986	53.6	88.3	74.9	86.8	95.7	78.3	90.6
1987	58.9	69.7	65.6	75.3	102.1	64.3	73.8
1988	61.5	57.4	59.0	69.4	105.0	56.2	66.1
1989	75.2	57.5	64.3	85.0	109.5	58.7	77.6

Sources and notes: Col. (1) and col. (2), export unit values indices derived from prices in U$; tin prices come from World Bank (1988b) and updating from World Bank; natural gas prices come from Central Bank of Bolivia (1990).
Col. (3) average of col.(1) and cot.(2), weighted with 1985 export value of natural gas and average of tin exports between 1980-85, valued at 1985 prices, index 1985 = 100
Col. (4) and col. (5), index of export and import prices
Col. (6) and col. (7), col.(3) and col. (4) deflated by (5)

Table 52. Price aid Quantity of Effects of the Trade Shock

	Value of exports			Price Indices				Terms of Trade Effect	Counter factual Tin Quantity index	Windfall Exports 1985 prices	Other Effects	Decomposition	
				Actual		Counterfactual							
Year	Tin	Natural gas	Other	Exports	Imports	Tin	Gas					Prices Effects	Quantity Effects
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12	(13)
1985	186.6	372.6	113.3	100.0	100.0	100.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
1986	104.1	328.6	205.1	86.8	95.7	71.2	100.0	689	100.0	-43.9	-25.0	-25.0	0.0
1967	68.9	248.6	252.0	75.3	102.1	78.4	79.0	-198.6	60.0	-140.8	-57.7	-115.2	57.5
1968	76.9	214.9	308.4	69.4	105.0	81.9	65.0	-216.2	64.3	-176.3	-116.8	-166.6	49.5
1969	126.5	213.8	480.9	85.0	109.5	100.0	65.2		86.5	-122.4	-93.9	-111.9	18.1
Total								-776.8		-4834	-293.4	-418.7	125.3
Present value								-654.1		-409.6	-244.5	-351.5	107.0

Sources and notes: Values are in millions of U$
Col. (1) to col. (5), from Central Bank of Bolivia (1990)
Col. (6), col. (1) of table B1 changed to base 1989 = 100
Col. (7), col.(2) of table B1 changed to base 1986 = 100
Col. (8), ((col.(4) col. (5).1)*(sum of col. (1) to col. (3))/col.(4)
Col. (9), see text
Col. (10) ((sum of col. (1) to col. (3)).100*(100*col.(1)/(col.(9)*col.(6)) +col.(2) col. (7)+col.(3))/100] divided by col.(5)/100
Col. (11), col. (8) minus col. (10)
Col. (12), 100*(100*((col.(1)/col.(6)+(col.(2)/col.(7))+col.(3)]/col.(5).100* [sum of col. (l) to col.(3)]/col.(4)
Col. (13), col. (11) minus col. (12)

Table B3. Prices of Non-Tradable Consumer Goods Relative to Import Substitutes

	Non-tradable consumer goods (1)	Import Substitutes (2)	Relative Price (3)
End-of-quarter indices	(Base: Avenge Last quarter of 1985=100)		
1986. I	160.7	159.2	100.9
II	180.6	159.1	113.5
III	187.8	163.7	114.7
IV	187.8	169.9	110.5
1967. I	197.8	173.2	114.2
II	198.5	181.0	109.6
III	202.0	181.9	111.0
IV	207.4	185.7	111.7
1988. I	210.7	194.9	108.1
II	229.0	209.4	109.3
III	241.7	226.0	107.0
IV	249.6	234.2	106.6
1989. I	255.7	234.3	109.1
II	255.9	238.3	107.4
III	276.0	254.1	108.6
IV	294.4	262.5	112.1
1990. I	295.8	270.9	109.2
Yearly average, (Base July 1985=100)			
1985	100.0	100.0	100.0
1986	587.7	340.0	172.8
1987	672.3	378.2	177.8
1988	772.0	449.1	171.9
1989	889.5	518.0	171.7

Sources and notes: Col.(1) and col.(2), National Institute of Statistics, both series are of consumer prices

Table B4. Volume Indices of Traded and Non-Traded Capital Goods (Base 1985 = 100)

	At 1985 prices			Index of approved plans for buildings in La Paz	Output of NT- capital (% of GDP)
	Traded (1)	Non-traded (2)	Construction Value Added (3)		(5)
1985	100.0	100.0	100.0	100.0	100.0
1986	150.5	78.7	78.5	96.7	70.9
1987	144.6	90.3	77.8	87.9	106.0
1988	88.2	128.2	89.1	90.9	163.6
1989	153.1	95.6	94.8	130.8	156.3

Source: Col. (1) and col. (2) see Appendix A
Col. (3), valued added in the construction sector according to preliminary publications of the National Institute of Statistics and reported in Central Bank of Bolivia (1991)
Col. (4), approved plans by the municipality of La Paz in square maters
Col. (5), see Appendix A

Table B5. Prices of Non-Traded Goods Relative to Prices for Import Substitutes

	Consumer Goods (1)	Capital Goods (2)
1985	100.0	100.0
1986	172.5	82.4
1987	177.5	110.3
1988	171.9	122.2
1989	171.7	162.2

Sources and notes: Col. (1). col. (3) of table 13
Col. (2). see Appendix A

Table B6. Expenditure Decomposition (percent of GDP)

	Public sector				Private sector	
	Consumption[a]		GFKF		GFKF	
	Non-tradables	Tradables	Tradables	Non-tradables	Tradables	Non-tradables
1980	2.2	15.5	2.8	4.2	3.2	4.2
1981	1.9	13.1	2.5	4.7	1.7	2.1
1982	3.2	11.5	3.2	3.7	3.9	3.0
1983	1.4	11.7	2.2	2.9	0.4	3.1
1984	0.7	9.5	0.8	2.8	0.4	4.6
1985	0.8	9.2	1.3	2.3	1.4	2.3
1986	1.6	7.4	2.2	2.7	4.0	0.6
1987	1.5	6.6	2.0	4.4	3.5	0.4
1988	1.3	6.1	1.9	5.7	2.1	1.8
1989	2.0	7.2	2.8	5.0	1.5	2.2

Source: See text in Appendix A.
Note: a. Includes only current expenditures on goods and services:
excludes direct payments to tabor as well 1 as transfers

Table B7. NFPS Transfers via the non-tradable Consumer Goods Market

Year	Price of NT Consumer over Price of Import Substitutes (Base 1986 = 100) (1)	NFPS expenditures on NT-consumers (Bs. millions) (2)	Transfers (Bs. millions) (3)
1986	100.0	664.3	0.0
1987	102.9	606.0	17.5
1988	99.5	641.7	-3.3
1989	99.4	887.4	-5.6
Total			8.5
Present value			9.8

Sources and notes: Col. (1), Col. (1) of table B5. with a change of base year
Col. (2), see text in Appendix A
Col. (3) [col.(1)/100.1]*col. (2)

Table B8. NFPS Transfers via the Non-Tradable Capital Goods Market

Year	Price of NT Consumer over Price of Import Substitutes (Base 1986 = 100) (1)	NFPS expenditures on NT-consumers (Bs. millions) (2)	Transfers (Bs. millions) (3)
1985	100.0	93.9	0.0
1986	82.4	267.1	-47.0
1987	110.3	389.9	40.2
1988	122.2	647.5	143.7
1989	162.2	486.8	302.8
Total			439.7
Present value			355.8

Sources and notes: Col. (1), Col. (1) of table B5.
Col. (2), see text in Appendix A
Col. (3) [col.(1)/100.1]*col. (2)

Table B9. Estimation of the Demand for Money

The demand for money during the hyperinflation has been estimated with a Box-Jenkins procedure arid with monthly data from February 1982 through march 1986. Convergence was reached on iteration 13. The results of the estimation are:

DEPENDENT VARIABLE		LNM1R				
TOTAL OBSERVATIONS		50				
USABLE OBSKRVATIONS		50		DEGREES OF FREEDOM		47
R**2		.85172660		RBAR**2		.84541709
SSR		1.9182625		See		.20202499
DURBIN—WATSON		• 41094100				
NO.	LABEL	VAR	LAG	COEFFICIENT	STAND. ERROR	T-STATISTIC
***	*******	***	***	**********	**********	**********
1	CONSTANT	1	0	3.028125	.75191471-01	40.27218
2	N-INFLA	2	0	-.5299619	.65758891-01	-8.059167
3	D-INFLA	3	1	.8952872	.18292511-01	48.94282

where: LNM1R = logarithm of the real money stock M1/CPI CPI = end-of- month consumer price index

INFLA = monthly rate of inflation measured as the month-to-Month changes in the logarithm of the CPI

The coefficient of D INFLA yields the coefficient of adjustment in inflationary expectations. The coefficient of N_INFLA divided by one minus the coefficient of D_INFLA gives the semi elasticity of the money demand to expected inflation.

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