

The Fiscal and Monetary History of Chile 1960-2010*

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Abstract

Chile experienced deep structural changes in the last fifty years. In the 1970s a massive increase in government spending, not financed by an increase in taxes or debt, induced high and unpredictable inflation. Price stability was achieved in the early 1980s, after a fixed exchange rate regime was adopted. This regime, however, generated a sharp real exchange rate appreciation that exacerbated the external imbalances of the economy. The regime was abandoned and nominal devaluations took place. This generated the collapse of the financial system, that had to be rescued by the government. There was no debt default, but in order to service the public debt, the fiscal authority had to generate surpluses. Since 1987, this was a systematic policy followed by all administrations, and helped achieving two different, but related, goals. It contributed to reducing the fiscal debt and enabled the central bank to pursue an independent monetary policy aimed at reducing inflation.

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1 Introduction

Over the past fifty years Chile experienced radical economic and political changes. In economic terms, policies shifted from the imports substitution strategy, adopted by many Latin American economies in the 1940s, to market oriented policies, in which the role of the State, both as producer and regulator was greatly diminished. In political terms the country, who have enjoyed a relatively long period of political stability since 1925, experienced an important institutional collapse in the early seventies. In 1973 a military coup overthrew President Salvador Allende's government. The military remained in power until 1990 and since then seven democratically elected Presidents have been in office.

In recent years, Chile has managed to sustain positive rates of growth, in a context in which inflation has gradually converged to single-digit levels. At the same time unemployment rates have declined substantially . To be more specific, from 1984 to 2010 the average rate of GDP growth has been 5.2%, with only mild recession episodes in 1999 and 2009. In the same period the inflation rate declined from 23% to 3%, whereas unemployment went from 14% to 7% (see Table 1). The performance of the economy in this period is in sharp contrast with the macroeconomic instability that was endemic to Chile, and several Latin American countries, since 1960. In this context, the purpose of this paper is to understand the role of monetary, fiscal and debt management policies in determining the macroeconomic outcomes in Chile in the last fifty years. In particular, we would like to test the hypothesis that inadequate fiscal and/or monetary policy were the main responsible for macroeconomic instability.

The conceptual framework that will be used is based on the government budget constraint, as in Sargent (2013). This framework highlights the interactions between fiscal and monetary policy and the role of debt. In this setup a fiscal deficit, that is not financed by issuing public debt, becomes inflationary if additional based money is issued to finance it. Hence, a clear link between fiscal deficits, debt policies (or lack of it) and nominal volatility emerges in this setup. Now, if inflation becomes indeed a way of financing public debt, a relevant question is whether during periods of hyperinflation Chile was on the right hand side of the Laffer curve. In order to address this issue, we first identify the hyperinflation periods in Chile and then, following Sargent (1977) and Phylaktis and Taylor (1993), we estimate the demand schedule for money as in Cagan (1956). This enable us to use the money demand estimates to calculate the sustained rates of inflation that maximize the flow of real resources that the creators of money could obtain by

printing money. Complementary models, like Krugman (1979) that stress the importance of reserves in preventing balance of payment crises, as well as models that stress the maturity structure of debt, as in Calvo (1995) and Cole and Kehoe (1996), will also be discussed. Finally, we will also consider models that stress the debt denomination, as in Calvo (1988). Those models will be used to understand the foreign debt crisis episode of the early 80s.

In the following section we will discuss the main economic events of the last fifty years, discussing the policy dilemmas faced at each moment, as well as the policy strategies adopted. Section 3 will present our conclusions.

2 The Macroeconomy and Public Debt a Historical Perspective

Thirty year ago, when referring to the study of the economic history of Chile, Edwards (1985) asserted that: "the study of Chile's modern economic history usually generates a sense of excitement and sadness. Excitement, because from 1945 to 1983 Chile has been a social laboratory of sorts, where almost every possible type of economic policy has been experimented. Sadness, because to a large extent all these experiments have ended up in failure and frustration". Today, when analyzing the recent economic history of Chile we still share the sense of excitement: many economic policies, new to the country, have been adopted since the mid 80s. However, we do not have a sense of sadness mainly because the economy has been stable economic path for the last three decades. In this section we will present the main macroeconomic events characterizing the economic history of Chile from 1960 to 2010. In each period we will use different theoretical approaches to try to understand the role fiscal, monetary and public debt policies.

2.1 Nominal Volatility and Fiscal Deficits: 1960-1973

In the 1940s Chile, as well as many Latin American economies, adopted an industrialization process based on import substitution. The idea was to promote the development of a domestic industrial sector. This, in turn, could be achieved if those industries were granted a high degree of protection in the form of import tariff and quotas. As noted by Edwards (1985), the protection was supposed to be only a temporary measure. Protectionism, however, became a permanent feature of the Chilean economy. During the 1950s and early 1960s, this strategy began to run out of steam.

During the 1950s inflation became a serious problem in Chile. There was a consensus that inflationary pressures rested on excessive money creation and remarkably lax fiscal policy (Edwards (1985)). Under Alessandri's administration, 1958-1964, a stabilization process was launched with the aim of containing inflation and reducing public spending. In 1960 and 1961, inflation declined importantly to single-digit figures, from levels of more than 30% during the previous decade (see Table 1). After 1962, however, inflation came back to its historical levels, with a fiscal deficit that, though not exorbitant, seemed to constitute a source of inflationary pressures in a context in which fiscal debt was an stable proportion of GDP (around 30%) . In subsequent years, during the Frei administration,

1964-1970, some economic reforms were undertaken. One of the first measures was to reduce the public deficit, however, in 1967 and as a consequence of political pressures, this attempt was abandoned. The Frei administration also attempted to liberalize trade, although its success was limited. As consequence of these failed reforms, towards the end of 1970, the performance of the Chilean economy was disappointing: GDP growth was 1.9% whereas inflation reached 35%.

In September 1970 Salvador Allende was elected President of Chile, taking office in November 1970. His economic program was characterized by several left-wing oriented structural reforms and was implemented almost immediately. As noted by Edwards (1985) an essential assumption of the economic program was that, in 1970, there was substantial unutilized capital capacity in the manufacturing sector. In this context, it was expected that an increase in aggregate demand could be accommodated without generating inflationary pressures in the short run. As a result, in 1971 an aggressive expansionary fiscal policy was implemented. The fiscal deficit, as a percentage of GDP, rose from 1.4% in 1970 to 8.1% in 1971, whereas nominal growth of high-power money increased from 66% in 1970 to 140% in 1971. Not surprisingly, aggregate demand grew at double-digit rates, 10.4% in 1971, whereas real GDP experienced an expansion of 9.4% with an important decline in the unemployment rate to 3.9% (see Table 1). In the first year of Allende's government prices did not increase importantly. Some economists, Edwards (1985) and Corbo and Fischer (1993), attribute this fact to the existence of price controls and commodity and factor market rationing.

The good performance of 1971 was not to be sustained in the following years. In 1972 the fiscal deficit increased further, to 10.4% of GDP. The rate of growth of high-powered money was 178% and prices, despite the official controls, could not be contained: inflation reached almost 170%, a record since the Chilean independence in 1810 (see Braun-Llona et al. (1995)). In terms of real activity, according to Edwards (1985), a particularly serious problem evolved around the de facto process of expropriations of manufacturing firms implemented by Allende's administration. In particular, government interventions were usually preceded by long labor strikes and seizures of the firm's installations by their workers that generated significant output losses. To make thing worst, the opposition organized, in October 1972, a national strike generating a further decline in activity. In 1972 real output declined by 1.2% and the trade deficit reached 3.5% of GDP. In 1973 the economic crisis deepened. During this year, the fiscal deficit almost doubled, reaching 23% of GDP, at the same time there were clear sings that the inflationary process was

tending towards hyperinflation. In 1973 inflation reached 500% on average whereas the rate of growth of money was 370%.

The expansionary policies caused a progressive deterioration of the current account deficit, that was 3% on average in the 1971-1973 period. As noted by Corbo and Fischer (1993), the government used the large foreign reserves it had inherited from the previous administration to finance those deficits. As a consequence, foreign reserves declined importantly during Allende's administration.

From 1971 to 1973 nominal and real volatility increased substantially. Three elements characterized this period. First, a sequence of increasing fiscal deficits. Second, an important expansion of the high-powered money and finally an inflationary process that became a hyperinflation. To understand the correlation among the previous variables and fiscal debt strategies, we follow Sargent (2013) who develops a framework to analyze the inflationary consequences of government deficits and of alternative ways of financing them.

As noted by Sargent (2013), government expenditures can be financed by alternative combinations of levying taxes borrowing in interest-bearing form, and printing high-power money. The consequences for the price level path of alternative methods of financing a given stream of government expenditure can differ, in ways that depend on how the strategies of the private sector and of the fiscal and monetary authorities are imagined to interact. An important result of this analysis is that the price level today depends on the supply of base money expected to prevail from now into the indefinite future. Hence, if government deficits are to influence the price level, it can only be through their effects on the expected path of high-power money. The analysis developed by Sargent is restricted to a closed economy. This analysis can be extended to an open economy by considering foreign currency denominated debt as well as indexed debt. In this setup the budget constraint of the government can be expressed as:

$$B_t + M_t + b_t P_t + b_t^* E_t = D_t P_t + B_{t-1} R_{t-1} + M_{t-1} + b_{t-1} r_{t-1} P_t + b_{t-1}^* r_{t-1}^* E_t + d_t \quad (2.1)$$

where B_t , b_t and b_t^* are total nominal, indexed and dollar denominated public debt. The variable D_t is the deficit of the government in real terms, measured as expenditures and normal transfers minus taxes. The stock of high-powered money is M_t , whereas P_t

and E_t are the price level and the nominal exchange rate respectively. The variables R_t , r_t and r_t^* are the gross returns on nominal, indexed and foreign bonds.

If we divide (2.1) by nominal GDP, $P_t y_t$, we obtain the following expression:

$$\begin{aligned} \Delta\theta_t^N + \Delta\theta_t^r + \Delta\theta_t^* \xi_t + \left(\frac{\Delta M_t}{P_t}\right) \frac{1}{y_t} = & \theta_{t-1}^N \left(\frac{R_{t-1}}{\pi_t g_t} - 1\right) + \theta_{t-1}^r \left(\frac{r_{t-1}}{g_t} - 1\right) \\ & + \xi_t \theta_{t-1}^* \left(\frac{r_{t-1}^*}{\pi_t^* g_t} - 1\right) + d_t \end{aligned} \quad (2.2)$$

Where $\theta_t^N = \frac{B_t}{P_t y_t}$, $\theta_t^r = \frac{b_t P_t}{P_t y_t}$, $\theta_t^* = \frac{b_t^* / P_t^*}{y_t}$. In this case P_t^* is the foreign price level and π_t^* is foreign inflation. The variable g_t represents the growth rate of real GDP, whereas π_t is domestic gross inflation. Finally, $\frac{\Delta M_t}{P_t}$ is the seigniorage and d_t is the fiscal deficit as percentage of GDP.

The first three terms on the left hand side of (2.2) represent changes in debt to output ratios in the three different types of debt: nominal, indexed and foreign currency. The fourth term represents the seigniorage as percentage of real GDP. Now, the first three terms on the right hand side of (2.2) represents the real returns in each of the three debt types.

From (2.2) it is clear that there is no automatic link between fiscal deficits, monetary expansions and inflation. Sustained deficits may not lead to inflation if the debt is managed to finance all the obligations. On the contrary, if the government is not able to borrow at all ($\Delta\theta_t^N = \Delta\theta_t^r = \Delta\theta_t^* \xi_t = 0$), then the only source of financing is seigniorage¹. In this case, it is possible to associate nominal instability (inflation) with fiscal deficits.

To see the extent to which the relationship in (2.2) can be used to understand the period of nominal volatility in Chile, we first analyze the relationship between money and inflation. From November 1970 to April 1972, the annual growth rate of high-powered money increased from 82% to 108%, without inflation experiencing any substantial change (see Figure 1). In fact, in April 1972 inflation was 31% a level which is similar to the one experienced the previous decade². In May 1972, however, inflation increased substantially

¹If a country is net debtor, and has no access to additional debt, the seigniorage has to finance not only the fiscal deficit, but also the interest rate payments.

²Price controls and sticky prices may have contributed to a delayed response of prices to the increase in money growth.

and, from that date until December 1979, inflation and money growth tended to move together.

What were the elements that triggered the rapid increase in money? One possibility, according to (2.2), is that in the absence of enough funding to cover both the fiscal deficit, d_t , and the interest rate payments of the debt, the government had to rely on seigniorage as a source of funding. In Figure 2 we present some evidence that supports this view. As is clear, between 1971 and 1974 the fiscal deficit and seigniorage moved in the same direction. Furthermore, in quantitative terms, the magnitude of increase is quite similar, with the exception of 1973 in which the fiscal deficit, of 23% could not be financed only with seigniorage. The evolution of debt, on the other hand, suggests that Allende's government was unwilling (or unable) to increase domestic and foreign borrowing considerably. On one hand, between 1970 and 1973 foreign public debt was almost constant at US\$ 2.000 millions. This means that, as a percentage of GDP external debt actually declined in those years (see Figure 3). On the other hand, domestic debt increased, as a percentage of GDP, from 6.4% , in 1970, to 15.5% in 1973 (Figure 4). This increase was, of course, not enough to finance a fiscal deficit that went, in the same period, from 1.4% to 22.9% of GDP.

The evidence presented so far indicates that fiscal deficits, which increased substantially between 1970 to 1973, could not be completely financed by additional public debt (domestic and foreign). As a consequence, seigniorage became the most important source of funds for the fiscal authority. The implication of this strategy was that inflation became, in the end, a fiscal phenomenon.

2.1.1 Money demand and inflation tax: the Cagan model

During hyperinflation episodes, a relevant question is whether the monetary authority is on the right hand side of the Laffer curve. To answer this question we follow Sargent (1977) and Phylaktis and Taylor (1993), and estimate the demand schedule for money as in Cagan (1956). This enable us to use the money demand estimates to calculate the sustained rates of inflation that maximize the flow of real resources that the creators of money could obtain by printing money.

Under a high inflation or a hyperinflationary regime, Cagan (1956) asserted that the demand for money will be largely determined by inflationary expectations, with additional

determinants like output and interest rate, playing a relatively minor role. This model can be written as follows:

$$(m_t - p_t) = -\alpha \Delta p_{t+1}^e + \psi_t \quad (2.3)$$

where m and p denote the logarithm of nominal money balances and prices respectively. The variable Δp_{t+1}^e is the expected inflation level in the next period and ψ_t represents elements of the money demand not captured by the model. The parameter of interest in this model is α , which is the elasticity of real money demand with respect to expected inflation. From this coefficient it is also possible to derive the optimal rate of inflation (the one that maximized seigniorage). The expression for this variable is $1/\alpha$.

As noted by Phylaktis and Taylor (1993) if ψ_t is a variable admitting a Wold representation, then ψ_t will be a stationary but possibly serially correlated series. Now, under conditions of high and accelerating inflation it is possible that both, real balances and inflation are $I(1)$. In this case it can be proved³ that the linear combination, $(m_t - p_t) + \alpha \Delta p_t$, is stationary. As a consequence, a simple test of the applicability of the hyperinflation model lies in testing whether or not real money balances and contemporaneous inflation are cointegrated. In this case, from the cointegrating vector it is possible to obtain the α coefficient.⁴

We check that the real balances and inflation are $I(1)$ in the sample 1971.01 to 1980.01, which is a period of highest, and more volatile, inflation in the history of Chile. We found that both series are stationary and, applying Johanssen's cointegration test, we could not reject the hypothesis that there is a long run relationship between the series⁵. Then we estimate, using the ML approach of Jonansen, a Vector Error Correction Model (VECM). From this procedure we obtain the long-run relationship linking real balances and inflation (i.e. the cointegrating vector) as well as an error correction representation for inflation (i.e. a short-run model for inflation). The estimation results are presented in Table 4. We found that the α estimate is close to 10 and that the short-run speed of adjustment in inflation is 0.025.

From the previous estimates, and following Cagan (1956), we concluded that the inflation rate that maximizes seigniorage is 10% per month (i. e. $\hat{\alpha}^{-1}$). This value is

³See Phylaktis and Taylor (1993) pp.33.

⁴See Cagan (1956)

⁵For brevity we do not present the results here, but are available upon request.

larger than the average per month inflation rate during 1971-1980, which was 7.7%. As a result one may conclude that actual inflation in that period was below the its "optimal" level. This conclusion, however, does not take into account the fact that in some periods, per month inflation was well above 10%. In particular, between August 1972 and June 1976 the per month inflation rate was 14%. As a consequence, it is possible to argue that, in fact, during the early 1970s the monetary authority was on the right hand side of the Laffer curve.

Now, from the previous estimation it is possible to obtain the residuals from the ECM for inflation (last column in Table 4). Those residuals represent the difference between actual inflation and the value predicted by the shot-run model. If this value is positive it means the model is underpredicting inflation and viceversa. Figure 5, plots the residuals for the period 1971 to 1980. Perhaps not surprisingly, the model tends to underpredict inflation in the early 1970s during the hyperinflation period. In particular, the model underpredicts inflation in August 1972, May 1973 and October 1973. Furthermore, the distribution of residuals is apparently non symmetric: underpredictions tend to be more important (in absolute value) than overpredictions.

Now, why is it important to know if a model was able to predict inflation?. The reason is that the terms in which the public sector could issue debt may depend on whether agents are capable of predicting movements in inflation. For instance, public sector internal debt was issued, mainly, in nominal terms from 1970 to 1973. After that period it seems the private sector was unwilling to lend to the government in Chilean pesos. Instead, most of the internal debt of the government was denominated in US dollars in 1974 and 1975.

To summarize, in the early 1970s there was a clear link between nominal volatility and a high fiscal deficit. The impossibility to increase public debt determined that the only available option to finance an ever increasing public debt, was to print money.

2.2 From stabilization to BOP crisis: 1974-1982

At the end of 1973 inflation was still at high levels. The reason behind this is related to the fact that the new government decided to remove price controls after September 1973. As a result, the level of prices increased substantially: in April 1974 the inflation rate (measured as year on year variation) increased to more than 700%. This level of inflation prevailed despite the fact that the new government undertook massive fiscal adjustment in

1974. In particular, subsidies were reduced and taxes (VAT among others) were increased. The fiscal deficit declined from 22.9% in 1973 to 7.4% in 1974.

In 1975, a severe crisis hit the economy and real output growth declined by 13%. The recession of 1975 was generated by several factors. First, there was an important decline in terms of trade, with copper prices falling by about 50% in real terms and the price of oil rising by a factor of four. Second, the fiscal adjustment undertaken, which reduced the fiscal deficit to 0.8% of GDP, had an adverse effect on the aggregate demand that in 1975 declined by 21%. Despite the recession, inflation did not decline substantially from the previous year: it was 341% in December 1975 (see Table 1). The increase in oil prices and the important devaluation, that took place in 1975, can explain some of the observed persistence in inflation. However, the inability to reduce the rate of growth in high-powered money may explain the fact that inflation persisted at high levels even after 1975.

From 1974 to 1976 the seigniorage was an important source of revenues, accounting for 8% of GDP on average in those years (see Table 3). Those revenue sources were important in a context in which the burden of the foreign public debt increased. In particular, as a result of nominal exchange rate devaluations ⁶, the foreign public debt increased from 25% of GDP in 1973 to nearly 50% of GDP in 1975 (Figure 3). To assess the impact of the nominal devaluation on the public finances, we perform a contrafactual simulation of the foreign public debt. In particular, we let the nominal rate to devalue, from 1973 onwards, in a way in which the real exchange rate is constant at its 1973 level. In other words, we generate a counterfactual nominal exchange rate series that is adjusted by the inflation differential between Chile and its main trading partners. As shown in Figure 6, nominal devaluations between 1974 to 1975 increased the burden of public external debt by more than 20% of GDP. Nominal devaluations also increased the burden of domestic debt that, after 1973, was denominated mainly in US dollars (see Figure 4).

In the following years, 1976 and 1977, with the resumption of growth, the main priority of the military regime was to stabilize prices. The slow progress in reducing inflation, despite the fiscal adjustment undertaken since 1974, persuaded the policymakers that further measures were required (Corbo and Fischer (1993)). In February 1978 a crawling peg exchange rate regime was introduced, with the aim of reducing inflation by slowing the rate of nominal devaluation. This policy culminated in a fixed exchange rate regime,

⁶The nominal exchange rate increased from 0.11 in 1973 to 13.05 in 1976.

which was adopted in June 1979. In that year inflation, though not at the level of the early 1970s, was at double-digit levels, 40% at the end of 1979.

In the context of a fixed exchange rate regime, the existence of wage and financial contracts indexation (to past inflation) induced an important real appreciation. In fact, the real exchange rate declined from 92.1 in 1975 to 70.3 in 1979 and 60.9 in 1980 (see Table 1). There is some consensus, Corbo and Fischer (1993) and Edwards (1985), that the exchange rate policy in conjunction with a domestic financial liberalization, carried out while the financial system was poorly regulated, were the main causes of the boom that developed between 1979 and 1981 and of the severe recession that hit the economy in 1982-1983.

The boom is related to the sharp reduction in the cost of foreign borrowing, in local currency, due to the real appreciation of the exchange rate. This reduction induced a large increase in capital inflows. As a consequence of this, domestic demand expanded significantly: on average it grew at 11% per year, between 1979 to 1981. In the same period, the rate of growth of GDP was, on average, 7.8%. The widening gap between the rate of growth of GDP and the aggregate demand, generated persistent trade balance deficits, that went from 1.7% of GDP in 1979 to 7.8% in 1981. Similarly, the current account deficit grew from 5.6% of GDP in 1979 to 14% in 1981. The behavior of the fiscal authority between 1979 and 1981 was very conservative. In fact, in that period there was a fiscal surplus of 4.3% of GDP on average. As is clear, private and public savings were moving in opposite directions. While the public sector was increasing its savings, and reducing its debt (both external and domestic), the private sector was increasing its overall external debt (Figure 7).

After three years in which the exchange rate was fixed, inflation declined to single-digit numbers, 9.5% in 1981. This achievement, however, was not going to last. Adverse external shocks, like foreign capital reversals, an increase in international interest rates and declining terms of trade, put some doubts on the sustainability of the fixed exchange rate policy. To see how these elements may have affected the Chilean economy at that time, we use the standard balance of payment model of Krugman (1979).

2.2.1 A simple model of balance of payment crisis

Following Krugman (1979), suppose the central bank chooses to fix the nominal exchange rate. In such case, the domestic price level, assuming PPP holds, is going to be determined

by the foreign price level, P_t^* . In this way, domestic prices are going to be determined as follows: $P_t = E_t P_t^*$. Furthermore, in the context of a fixed exchange rate regime, and assuming UIP holds, the domestic interest rate is equal to the foreign interest rate, $i_t = i_t^*$. In this context the equilibrium in the money market is going to be characterized by the following expression:

$$M_t = L(i_t^*) = R_t + DC_t \quad (2.4)$$

where M_t is the real money balances (assuming $P_t = 1$), $L(\cdot)$ is the demand for money, R_t are foreign reserves and DC_t is the stock of domestic credit. As is clear, an increase in the foreign interest rate implies that the real money balances have to decline. This can be done either with a decline in reserves, domestic credit or a combination of both. Now, in the context in which foreign credit is not available, as it was the case in 1981, foreign reserves will decline as long as the current account deficit persists. To avoid depleting foreign reserves, the economy needs further increases in interest rates (not possible if the exchange rate is fix), a contractive fiscal policy or a real exchange rate depreciation. This last option is only possible if there is a decline in the price of nontradables (i.e. a reduction in wages).

In Chile we observe that foreign reserves, as percentage of GDP, declined from 15% in 1980 to 11% in 1982, whereas in the same period the rate of growth of money went from 37% to -29% (see Table 1). Hence, as the model predicts, an increase in the foreign interest rate induced in Chile a contraction in money and reserves (as long as foreign capital was not available). If the stock of reserves is finite, then persistent current account deficits will exhaust them and eventually the exchange rate system will be abandoned. In the case of Chile, according to Harberger (1984), one of the main reasons the exchange rate regime was abandoned was the sharp decline in capital inflows in a context in which wages, instead of falling actually increased by 15% in August 1981. Hence, according Harberger (1984), the decline in reserves was not the main driver behind the abandonment of the exchange rate regime nor it was the increase in domestic credit (DC_t), it was the impossibility of adjusting wages so as to induce a real exchange rate depreciation. We believe this is a plausible explanation. However, we think that in the absence of wage adjustments the exchange rate system would have been eventually attacked and reserves would have been depleted. Overall, we think Krugman (1979) model can explain the main features of the crisis, although the transmission mechanisms were not the standard ones. In particular, it was not the existence of fiscal deficits that trigger an increase in domestic credit (an a

decline in reserves). It was the private current account deficit that put pressure on the exchange rate regime.

Eventually, in June 1982, the fixed exchange rate was abandoned and compulsory wage indexation eliminated. In 1982 the economy experienced a severe recession: output declined by 11% and aggregate demand fell by 19%. Unemployment was nearly 20%, even after considering the emergency programs set by the government (see Table 1). After the collapse of the exchange rate regime a severe banking crisis hit the economy. The stabilization plans of the late 1970s had failed.

2.3 Saving the banking system: the fiscal burden of the debt crisis: 1982-1990:

As noted previously, the main debtor with the rest of the World was the private sector. Between 1975 and 1982 the private foreign debt, as percentage of GDP, increases from 10% to 40%. In the same period, the public external debt declined from 55% to less than 20% (see Figure 7). An important part of the private external debt was intermediated by domestic private banks. The sharp depreciation of the peso, in a context of a severe recession made many banks insolvent. They could not recover an important proportion of their credits and, as a consequence were not able to pay back their foreign loans.

As noted by Edwards (1985), in late 1982, the Pinochet government approached the IMF in order to obtain financial assistance to service the foreign debt. Private banks were also approached, and a rescheduling of the foreign debt was proposed. A standby agreement with the IMF, which called for a new orthodox stabilization program was signed. On the other hand, as noticed by Corbo and Fischer (1993), from the beginning of the debt crisis the government developed a strategy of renegotiating the foreign debt, but with the declared goal of servicing it in full. The idea was to reestablish full access to international capital markets. In sharp contrast with other Latin American countries, default in Chile was never an option. The cost of this strategy was enormous and was borne by the fiscal authority and the central bank.

In order to prevent widespread bankruptcies, the government introduced rescue programs that were implemented, in an important proportion, by the central bank.⁷ The

⁷The Chilean central bank is autonomous since 1989. During the 1982 crisis, the central bank was not independent from government.

central bank undertook several measures to rescue the banking system (see Sanhueza (2001)). First, several private banks were liquidated and the central bank provided the liquidity necessary to cover bank liabilities and expenses during the liquidation process. For financial institutions intervened and sold off between 1981 and 1982, the Central Bank provided special credit lines to pay off liabilities at 100% par value. Second, Between 1982 and 1987, the central bank of Chile offered to buy part of commercial banks' and finance companies' risk portfolio, subject to an eventual buy-back of it. The purpose of this measure was to avoid banks going broke. The amount of these operations were the equivalent of 30% of the system's total outstanding loans for that period, representing 25% of the GDP. Finally, the central bank distributed subsidies to financial institutions in the form contracts to buy foreign currency at a price below the market equilibrium (the so called *Dólar Preferencial* program).

As a consequence of the rescue plan, the central bank experienced heavy operational losses (see Figure 8) . In 1985, as a consequence of having assets with low or zero return and liabilities generating large payments, the central bank experienced a operational loss equivalent to 18% of the GDP in that year. The central bank was able to have access to domestic and foreign financial markets to finance its rescue operations. In practice the central bank also relied on direct transfers from the Treasury in the form of long-term bonds. Those enter the balance sheet of the central bank as assets and appear as domestic fiscal debt. In fact in 1985, the fiscal debt (Figure 4) was in a large proportion the Treasury bond that was transferred to the central bank representing nearly 20% of that year's GDP.

The above strategy, implied that the rescue plan was not financed by printing money, but instead by issuing domestic and foreign interest-bearing liabilities of the central bank and receiving transfers (long-term bonds) from the Treasury. For this strategy to be successful and, coherent with price stability, the maturity of the central bank debt (and Treasury transfers) have to be such that it does not put to much pressure on public finances. In the literature there are two, complementary, ways in which this can be done. First, as stressed by Calvo (1995) and Cole and Kehoe (1996), a long maturity debt contract can rule out an equilibrium in which default is expected and as a consequence, funds can not be raised and default materialized. In the case of Chile, we see in Figure 9 and Figure 10, that the increase in debt, both by the central bank and the fiscal authority was concentrated in long-term bonds. As a consequence, the long maturity of debt have prevented the existence of an equilibrium in which deficits are financed by

printing money. The same can be said regarding the public domestic debt. In this case, the bond transferred to the central bank was a 27 year Treasury bond. Furthermore, this bond was indexed to inflation and then converted to US dollar in the late 1980s (see Figure 4. As a consequence, debt repudiation was avoided by having an indexed bond (or US dollar denominated bond), as stressed by Calvo (1988).

2.4 Fiscal discipline, fiscal rules and inflation targeting: 1990-2010

Chile avoided defaulting its, mainly private, external debt. The cost of this strategy was assumed by the central bank and the fiscal authority (Treasury) who assumed, de facto, the debt obligations of the private sector. As is clear, the rescue strategy implied an increase in the debt position of both the Treasury and the central bank. To avoid monetizing the debt and repudiating it, debt obligations were indexed and set to long horizons. Now, those debts have to be, eventually, paid and the only way to achieve this was by generating fiscal surpluses. This idea, that was present since the mid 1970s, was followed by the Pinochet administration in the late 1980s as well as by all the democratic government that came after. In fact, since 1987 to 2010, each year, the fiscal authority generated a surplus (see Table 1). Net asset accumulation over time by the central government help meeting future public sector commitments that grow at a higher rate than fiscal revenues, and potential expenditures on contingent liabilities. Furthermore, they also helped financing the central bank losses due to the carry-over of quasi fiscal costs of the rescue of commercial banks in the early 1980s and the sterilization of large capital inflows in the 1990s.

An important implication of this strategy is that it enabled the, now independent monetary authority, to pursue an inflation targeting regime. This, despite the fact that the central bank was experiencing operational losses (Figure 8) and has a net worth that steadily declined since the mid 1980s. In particular, in 2010 the net worth of the central bank was -3.5% of that year GDP (see Figure 11).

Now, as noted by García et al. (2005) one way of generating fiscal commitment to pursue surpluses, was to establish a fiscal rule. In doing so, in 2001 the government implemented a fiscal policy based on a yearly structural surplus of 1% of GDP. The basic logic of the rule is to stabilize public expenditures over the business cycle and the swings of the copper price, preventing excessive adjustments in periods of recession or unsustainable

expenditure levels in periods of prosperity. Hence, the rule is designed to generate savings in times of prosperity to pay debt contracted in times of recession, thus softening the economic cycle and granting sustainability to public finances. At the same time, because it is a known and transparent rule, it reduces uncertainty for economic agents regarding the future behavior of public finances, and stabilizes public expenditure in economic and socially sensitive areas such as investment and social spending. To establish the credibility of this rule, independent panels of experts have a substantial influence in establishing the reference long run value of the copper price as well as the trend growth of GDP.

To summarize, after the debt crisis of the early 1980 it was clear that the only way to both, service the debt and avoid nominal volatility was to generate fiscal surpluses. This was done in a systematic way since 1987 and, as a consequence, enabled the Treasury to service its foreign and domestic debt (with the central bank) . This, in turn, enabled the central bank to pursue an inflation targeting regime. One important consequence of this strategy is that it broke the correlation between fiscal deficits, seigniorage and inflation, that was prevalent in the 1970s (see Figure 2).

3 Conclusions

In the last fifty years Chile experienced deep structural changes. In the early 1970s an massive increase in government spending, which was not financed by an increase in taxes or debt, induced nominal instability in the form of high and unpredictable inflation. Between 1973 and 1974 Chile experienced a hyperinflation process that had no precedent in the past history. After the military took power, in September 1973, there were some attempts to stabilize the economy. However, inflation, and to some extent fiscal deficits, could not be stabilized in the following years. The rate of growth in high-power money, inflation as well as the seigniorage declined, but remained at relatively high levels. In this context, a fixed exchange rate regime was adopted in order to induce price stability.

In the early 1980s, inflation converged to lower levels. However, as a consequence of nominal wages that were indexed to past inflation, the real exchange rate experienced a sharp appreciation. This, in turn, generated external imbalances that could not be sustained once capital inflows reversed in 1982. In this context, the exchange rate regime had to be abandoned to restore the external equilibrium. This, however, came to an important cost: the banking system collapsed and had to be rescued by the central bank and the Treasury. There was no debt default, but in order to service its debt, the fiscal

authority had to generate, consistently over time, surpluses. We believe that, since 1987, this was a systematic policy followed by all administrations. This policy helped achieving two different, but related, goals. On the one hand, it contributed to reducing the fiscal debt and, on the other, enabled the central bank to pursue an independent monetary policy aimed at reducing inflation.

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Table 1: Macroeconomic Indicators, 1960-2010

Period	Growth of GDP ^a	HP Growth of GDP	Growth of real domestic expenditure ^a	Trade Deficit ^{b,c}	Current Account Deficit ^{b,c}	Public Sector Deficit ^b	Price of Copper ^d	Inflation ^e	Unemployment Rate ^{f,g}	Real Exchange Rate ^h	Monnetary Emission ^b	Growth of Monetary Emission ⁱ	International Reserves ^b
1960	-	-0.7	-	2.9	3.8	3.1	30.7	5.5	7.1	49.2	6.0	-	2.5
1961	5.2	-0.4	6.3	4.3	5.5	2.6	29.9	9.6	8.0	45.5	5.9	10.2	1.8
1962	4.3	-0.5	2.6	1.4	3.0	4.2	29.2	27.7	7.9	43.6	8.6	71.5	1.8
1963	6.0	0.2	5.7	2.5	4.3	3.2	29.8	45.3	7.5	49.7	6.0	6.2	1.9
1964	2.4	-0.6	2.8	0.9	2.7	2.7	42.9	38.5	7.0	44.6	6.6	68.4	1.9
1965	1.0	-1.9	0.8	-0.8	1.3	3.1	50.5	25.8	6.4	46.9	6.6	40.4	2.7
1966	11.0	0.9	15.2	-1.1	1.4	1.9	63.2	17.0	6.1	49.1	7.6	63.1	2.8
1967	3.6	0.8	1.9	-1.4	1.6	0.7	50.4	21.9	4.7	51.7	7.0	20.2	2.2
1968	3.6	0.9	4.6	-0.8	2.0	0.6	51.1	27.9	4.9	55.7	6.9	36.8	3.3
1969	4.1	1.4	5.6	-2.3	0.6	-0.5	63.9	29.3	5.5	58.5	6.8	43.6	4.8
1970	1.9	1.1	1.8	-0.7	1.2	1.4	61.3	34.9	5.7	58.5	7.9	66.1	5.0
1971	9.4	4.1	10.5	1.0	2.1	8.1	49.1	22.1	3.9	53.6	14.5	135.9	2.3
1972	-1.2	2.8	0.8	3.5	3.9	11.7	49.1	163.4	3.3	40.5	21.8	178.2	1.7
1973	-5.0	-0.1	-5.8	-0.2	2.8	22.9	78.4	508.1	5.0	46.6	20.8	365.0	2.9
1974	2.6	0.4	-3.1	-3.1	1.9	7.4	90.2	375.9	9.5	76.8	10.8	319.6	3.0
1975	-13.0	-6.3	-21.1	-0.9	6.6	0.8	55.5	340.7	14.8	92.1	10.7	282.8	4.1
1976	3.7	-5.5	-1.1	-6.3	-1.5	0.5	64.1	174.3	12.7	77.7	11.0	271.6	6.1
1977	10.3	-2.1	15.4	-0.2	4.0	0.2	60.3	63.5	11.8	62.6	9.5	92.5	5.0
1978	7.8	0.1	9.2	2.7	6.9	0.5	62.2	30.3	14.2	69.8	9.0	59.2	8.9
1979	8.6	2.6	10.8	1.7	5.6	-1.9	88.5	38.9	14.6	70.3	8.6	52.7	11.6
1980	8.2	4.9	9.5	2.7	6.9	-1.7	96.8	31.2	10.4	60.9	8.4	37.3	14.7
1981	6.7	6.6	12.3	7.8	13.9	0.0	78.7	9.5	11.3	52.9	6.6	-6.9	11.2
1982	-11.1	0.3	-19.1	-0.2	9.2	-0.3	65.8	20.7	19.6	59.0	4.8	-29.3	10.6
1983	-5.4	-3.3	-9.1	-4.9	5.6	-0.4	71.9	23.1	14.6	70.8	4.4	13.6	13.6
1984	4.0	-3.0	6.4	-1.9	10.9	0.7	61.3	23.0	13.9	74.0	4.3	17.6	15.3
1985	4.3	-2.8	-1.0	-5.1	8.1	0.6	61.0	26.4	12.0	90.9	3.9	34.1	17.7
1986	5.4	-2.4	4.8	-5.9	6.4	0.4	61.6	17.4	10.4	100.0	4.2	37.3	17.3
1987	6.5	-1.8	9.5	-6.0	3.4	-2.3	77.8	21.5	9.6	104.4	3.9	23.7	15.9
1988	7.3	-1.1	7.6	-8.6	0.9	-4.5	114.6	12.7	8.0	111.1	4.0	32.0	15.9
1989	10.0	0.4	12.1	-5.0	2.3	-6.1	124.9	21.4	7.1	108.6	3.9	22.6	15.3
1990	3.4	-0.9	2.2	-3.9	1.5	-4.2	119.1	27.3	7.4	112.7	3.8	25.3	20.8
1991	7.8	-0.5	5.9	-4.0	0.3	-3.6	104.9	18.7	7.1	106.4	4.4	50.7	21.1
1992	11.2	1.2	13.3	-1.6	2.1	-4.5	102.7	12.7	6.2	97.6	3.9	12.6	22.1
1993	6.8	1.2	9.8	2.0	5.2	-4.1	85.3	12.2	6.4	96.9	3.8	17.4	21.4
1994	5.0	0.4	4.7	-1.3	2.8	-4.4	107.1	8.9	7.8	94.2	3.6	13.3	24.7
1995	9.0	1.5	12.6	-1.9	1.8	-5.8	134.7	8.2	6.6	88.9	3.6	21.0	20.6
1996	6.8	1.8	6.7	1.4	4.0	-5.3	105.9	6.6	5.4	84.6	3.8	15.8	20.1
1997	7.1	2.4	7.7	1.7	4.3	-5.1	103.6	6.0	5.3	78.2	4.0	18.9	21.3
1998	4.1	1.9	4.5	2.5	4.8	-3.7	75.1	4.7	7.3	78.0	4.0	3.6	19.8
1999	-0.5	-0.4	-4.9	-3.2	-0.1	-1.5	72.1	2.3	9.3	82.3	4.3	11.4	19.7
2000	5.1	-0.2	6.4	-2.7	1.2	-2.4	84.0	4.5	8.9	86.0	4.0	1.8	19.1
2001	3.3	-0.7	2.5	-2.6	1.5	-2.7	72.6	2.6	8.6	95.8	4.0	8.8	20.2
2002	2.7	-1.4	2.7	-3.4	0.8	-2.1	71.7	2.8	8.7	96.8	4.0	5.9	21.9
2003	3.8	-1.7	4.6	-4.9	1.0	-2.7	81.1	1.1	8.5	104.3	4.0	7.3	20.8
2004	7.0	-0.6	8.1	-9.6	-2.1	-5.0	129.0	2.4	8.9	99.2	3.9	13.9	16.1
2005	6.2	0.2	11.4	-8.8	-1.2	-7.4	168.2	3.7	7.9	95.1	4.2	23.0	13.8
2006	5.7	0.8	7.9	-14.7	-4.6	-10.2	308.9	2.6	6.0	91.7	4.3	20.2	12.6
2007	5.2	1.1	7.3	-13.8	-4.3	-10.9	322.2	7.8	7.2	93.9	4.0	4.5	9.8
2008	3.3	0.8	8.3	-4.7	1.8	-7.5	313.4	7.1	7.5	96.2	4.6	17.1	12.9
2009	-1.0	-1.5	-5.7	-8.2	-1.5	0.0	235.4	-1.4	8.6	95.8	4.9	10.4	14.7
2010	5.8	-0.8	13.6	-7.3	-1.7	-3.5	342.5	3.0	7.1	91.3	5.0	18.2	12.8

Sources: Central Bank of Chile (2002), "Indicadores Económicos y Sociales"; Lüders and Wagner (2010) "The Republic in Numbers (La Republica en Cifras)," EH Clio-Lab Iniciativa Científica Milenio; Chilean Copper Commission and Central Bank of Chile website www.bcentral.cl.

a) Chained GDP

b) As percentage of current GDP

c) Change in Balance of Payments methodology at 1973

d) USD per Pound

e) Change in dec-to-dec CPI

f) as percentage of Labor Force

g) Change in Labor Survey Methodology at 1985

h) Increases indicate real depreciation of the domestic currency

i) Annual Growth of Nominal Monetary Base

Table 2: Macroeconomic Indicators, by governments, 1960-2010

Period	Growth of GDP ^a	HP Deviation of GDP	Growth of real domestic expenditure ^a	Trade Deficit ^{b,c}	Current Account Deficit ^{b,c}	Public Sector Deficit ^b	Price of Copper ^d	Inflation ^e	Unemployment Rate ^{f,g}	Real Exchange Rate ^h	Monetary Emission ^b	Growth of Monetary Emission ⁱ	International Reserves ^b
1960 - 1964 (Alessandri)	4.5	-0.4	4.3	2.4	3.9	3.2	32.5	25.3	7.5	46.5	6.6	39.1	2.0
1964 - 1970 (Frei Montalva)	4.2	0.5	5.0	-1.2	1.4	1.2	56.7	26.1	5.6	53.4	7.2	45.1	3.4
1970 - 1973 (Allende)	1.0	2.3	1.8	1.4	2.9	14.2	58.9	231.2	4.1	46.9	19.0	226.4	2.3
1973 - 1980 (Pinochet I)	4.0	-0.8	2.8	-0.5	4.3	0.8	73.9	150.7	12.6	72.9	9.7	159.4	7.6
1980 - 1990 (Pinochet II)	3.1	-0.8	2.6	-3.3	6.7	-1.3	79.7	19.5	11.8	85.7	4.5	16.1	14.7
1990 - 1994 (Aylwin)	7.3	0.2	7.8	-1.9	2.3	-4.1	103.0	17.7	6.8	103.4	4.0	26.5	21.4
1994 - 2000 (Frei Ruiz-Tagle)	5.2	1.3	5.2	-0.1	2.9	-4.3	99.7	6.1	6.9	84.4	3.9	14.0	21.0
2000 - 2006 (Lagos)	4.7	-0.7	5.9	-5.3	0.2	-3.7	101.1	2.9	8.6	96.2	4.0	10.1	18.7
2006 - 2010 (Bachelet)	3.8	0.1	6.3	-9.8	-2.1	-6.4	304.5	3.8	7.3	93.8	4.6	14.1	12.6

Sources: Central Bank of Chile (2002), "Indicadores Económicos y Sociales"; Lüders and Wagner (2010) "The Republic in Numbers (La Republica en Cifras)," EH Clío-Lab Iniciativa Científica Milenio; Chilean Copper Commission and Central Bank of Chile website www.bcentral.cl.

a) Real chained GDP

b) As percentage of current GDP

c) Change in Balance of Payments methodology at 1973

d) USD per Pound

e) Change in dec-to-dec CPI

f) as percentage of Labor Force

g) Change in Labor Survey Methodology at 1985

h) Increases indicate real depreciation of the domestic currency

i) Annual Growth of Nominal Monetary Base

Table 3: Inflation and Seigniorage

	π_t (YoY variation)	$\frac{\Delta M_t}{P_t}$ (in 1998 \$)	$\frac{\Delta M_t}{P_{t,yt}}$ (as % of GDP)
1970	32,4%	640.933	3,2%
1971	20,2%	1.854.928	8,4%
1972	75,2%	3.057.766	14,0%
1973	311,1%	3.393.015	16,3%
1974	586,1%	1.764.851	8,3%
1975	380,2%	1.464.828	7,9%
1976	229,5%	1.552.429	8,1%
1977	100,9%	973.117	4,6%
1978	41,1%	766.212	3,3%
1979	33,1%	734.369	3,0%
1980	35,5%	614.076	2,3%
1981	20,2%	-138.806	-0,5%

Table 4: Cagan (1956) Model Estimation for Chile

Vector Error Correction Estimates		
Sample: 1971M01 - 1980M01		
Included observations: 109		
Standard errors in () & t-statistics in []		
Cointegrating Equation		
$(m - p)_{t-1}$	1.000	
π_{t-1}	9.774	
	(1.507)	
	[6.487]	
Constant	-10.142	
Error Correction:		$\Delta(m - p)_t$
		$\Delta\pi_t$
Cointegrating Equation	-0.029	-0.025
	(0.015)	(0.014)
	[-1.988]	[-1.876]
$\Delta(m - p)_{t-1}$	-0.033	0.262
	(0.138)	(0.127)
	[-0.239]	[2.064]
$\Delta\pi_{t-1}$	0.0407	-0.158
	(0.111)	(0.102)
	[0.368]	[-1.552]
Constant	0.009	-0.002
	(0.007)	(0.007)
	[1.245]	[-0.285]
R-squared	0.056	0.298
Adj. R-squared	0.029	0.278
Sum sq. resids	0.565	0.478
S.E. equation	0.073	0.067
F-statistic	2.060	14.867
Log likelihood	132.086	141.264
Akaike AIC	-2.350	-2.519
Schwarz SC	-2.251	-2.420
Mean dependent	0.009	0.000
S.D. dependent	0.074	0.079
Determinant resid covariance (dof adj.)		8.98E-06
Determinant resid covariance		8.34E-06
Log likelihood		328.045
Akaike information criterion		-5.836
Schwarz criterion		-5.589

Figure 1: High-Powered Money Growth and CPI Inflation (annual rates)

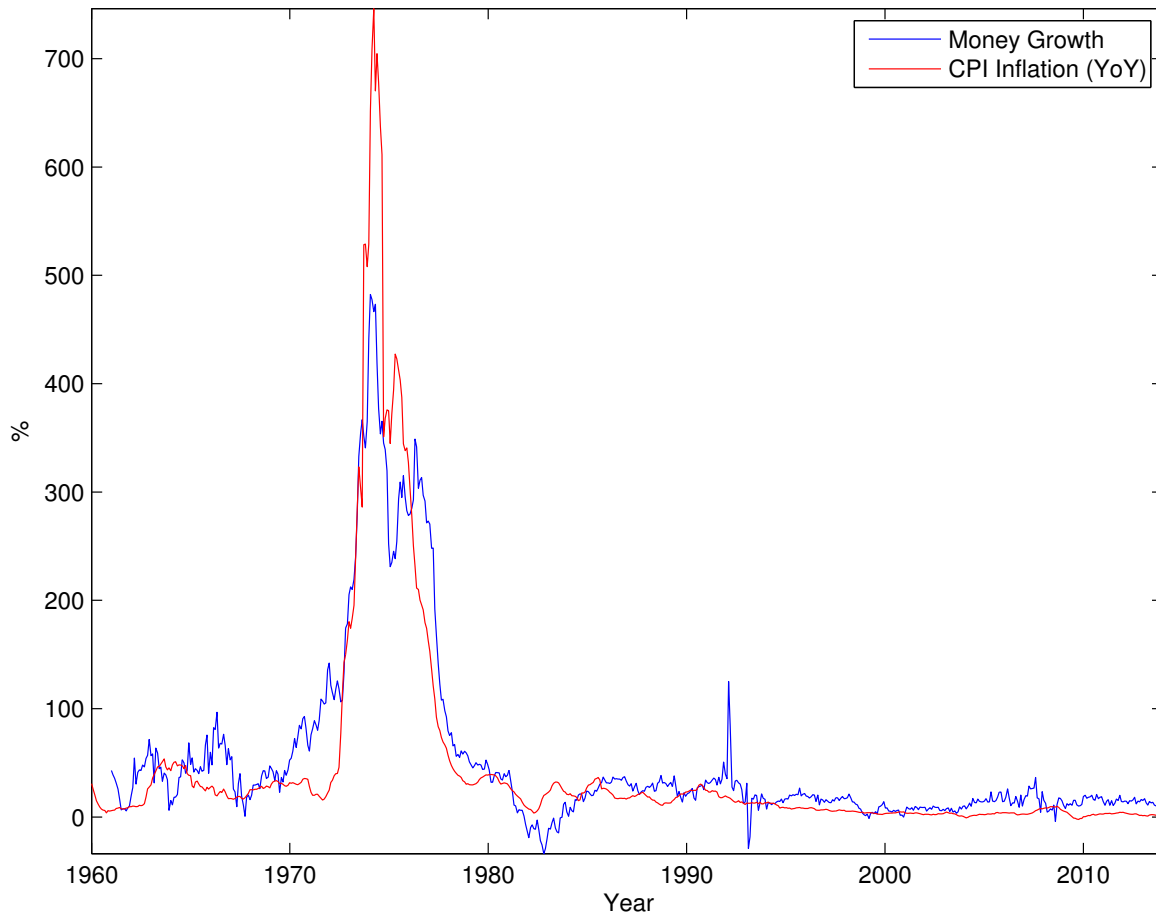


Figure 2: Seigniorage and Public Deficit (as % of GDP)

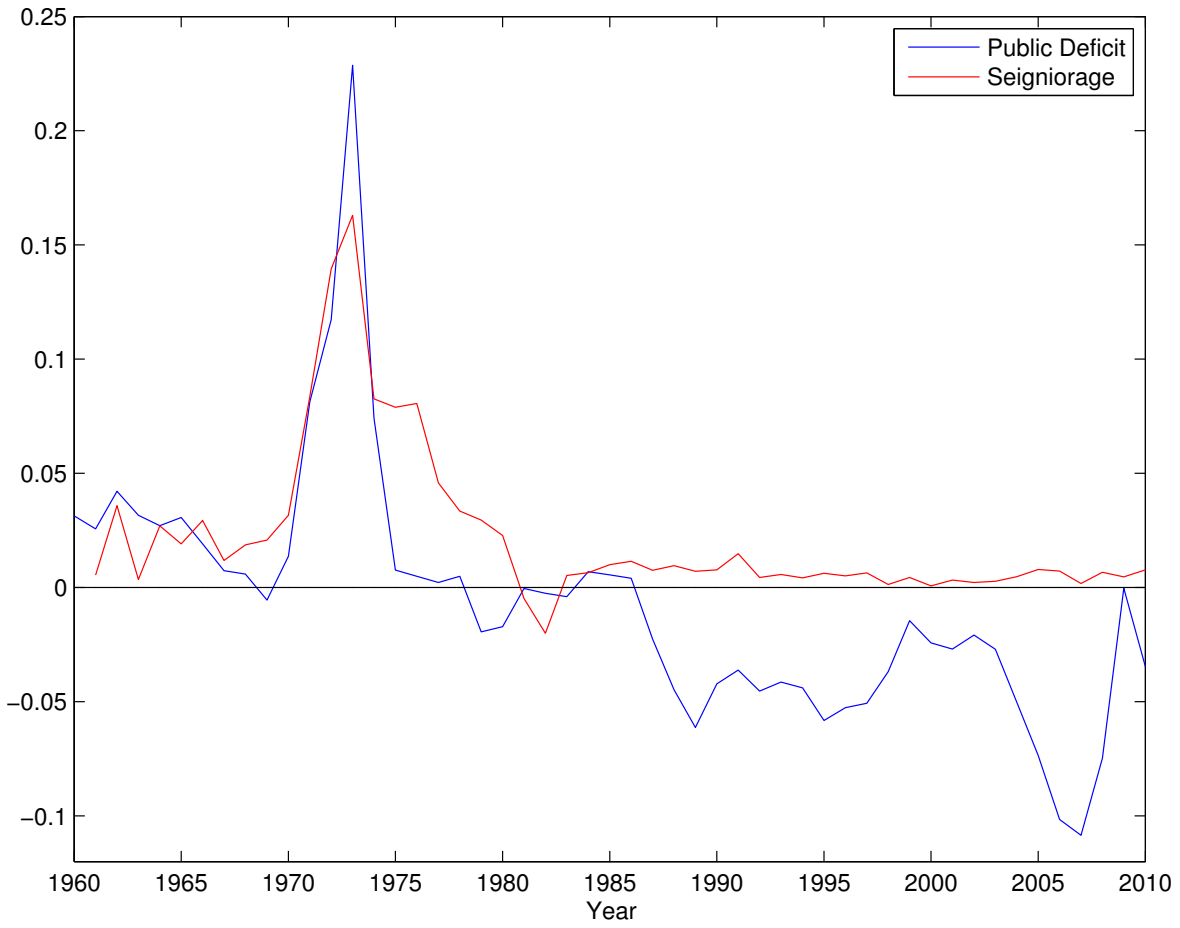


Figure 3: Public External Debt (as % of GDP)

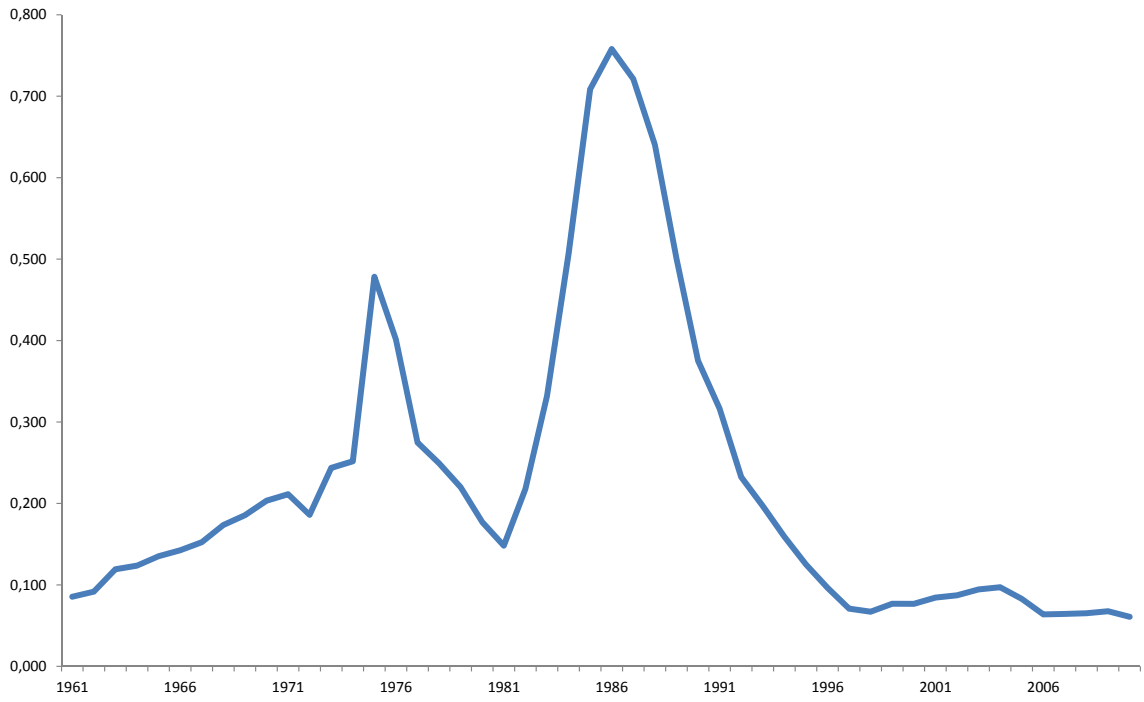


Figure 4: Public Internal Debt (as % of GDP)

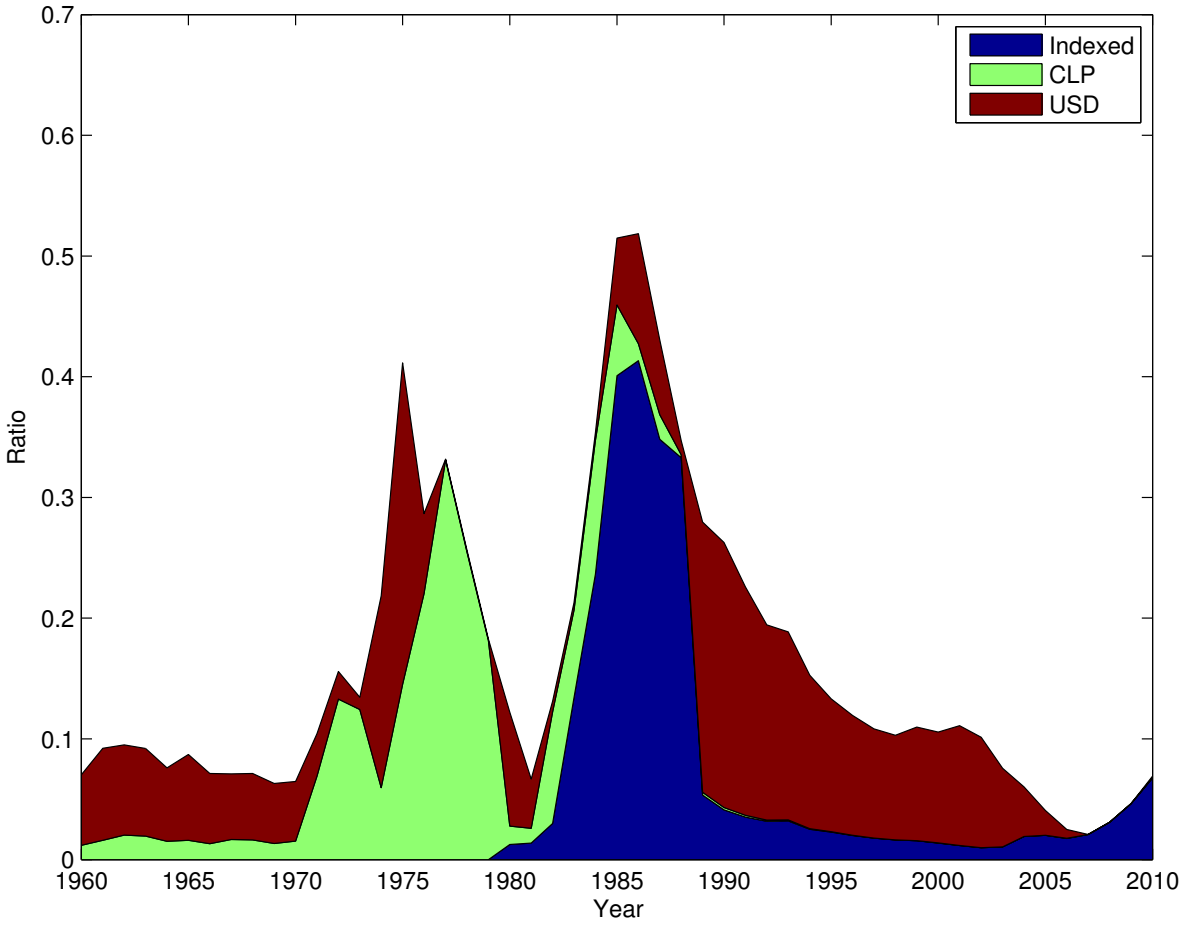


Figure 5: Residuals: ECM for Inflation

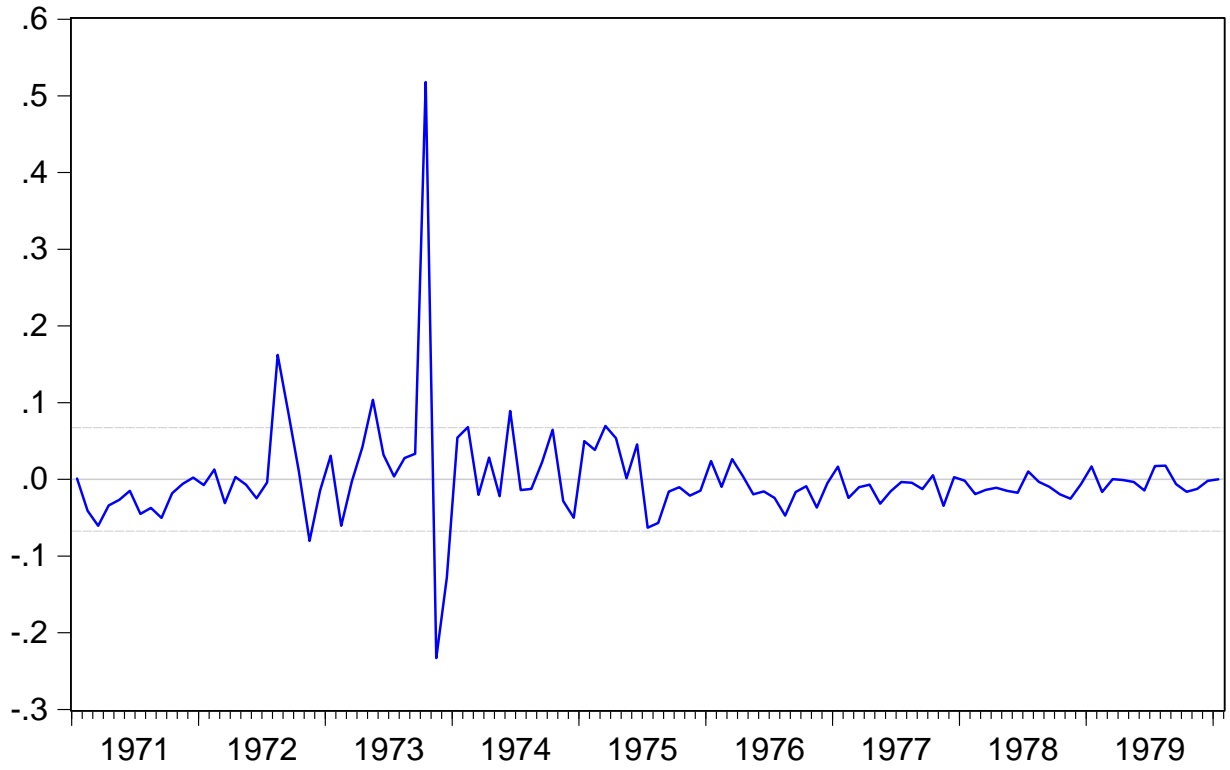


Figure 6: Public External Debt: Contrafactual Evolution w/ Constant Real Exchange Rate (as % of GDP)

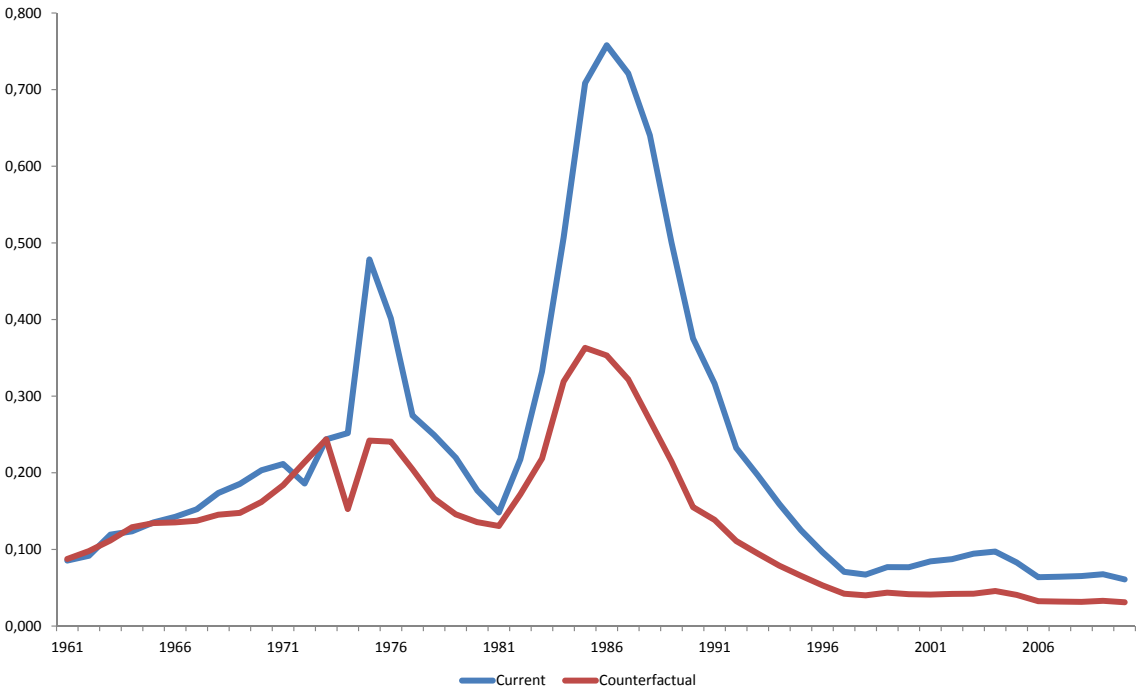


Figure 7: Public and Private External Debt (as % of GDP)

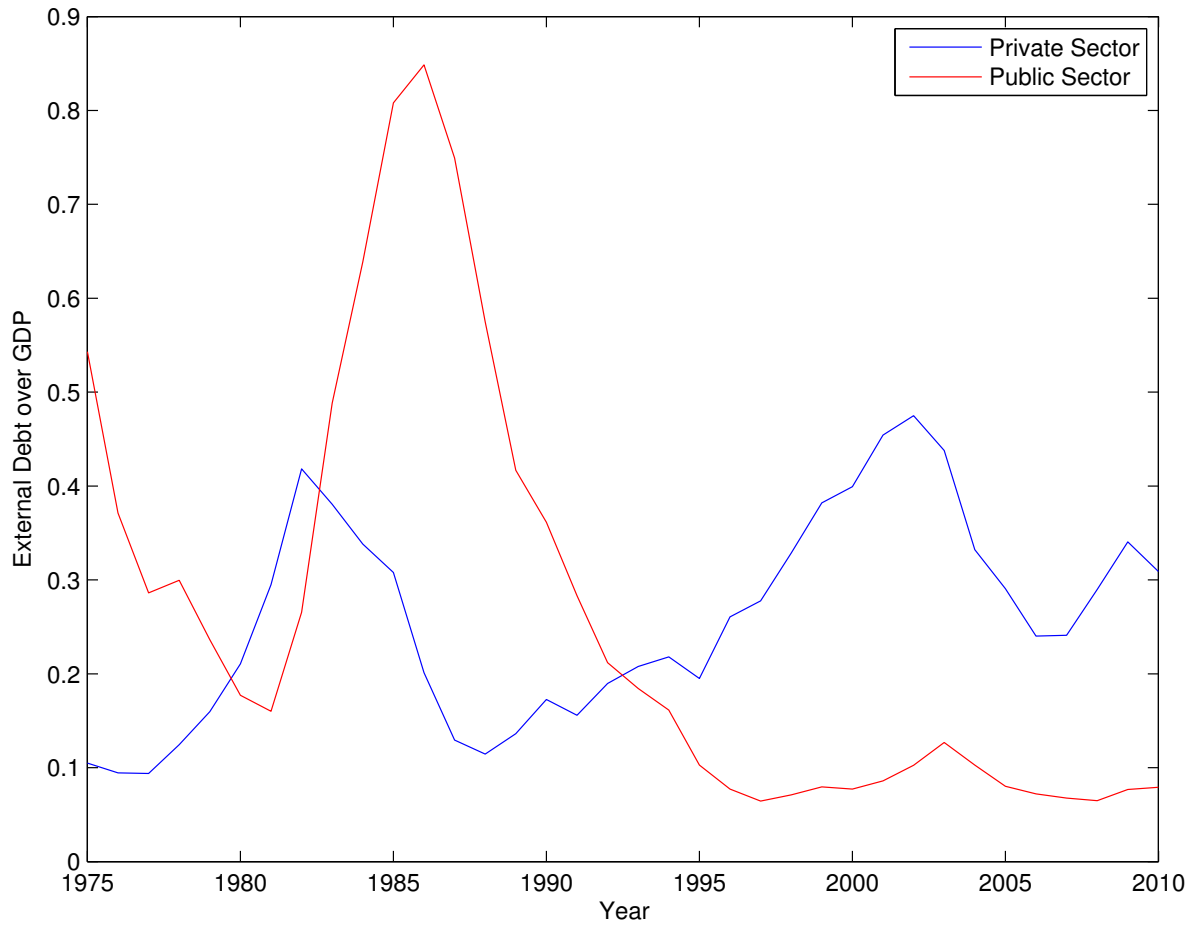


Figure 8: Operational Losses of the Chilean Central Bank (as % of GDP)

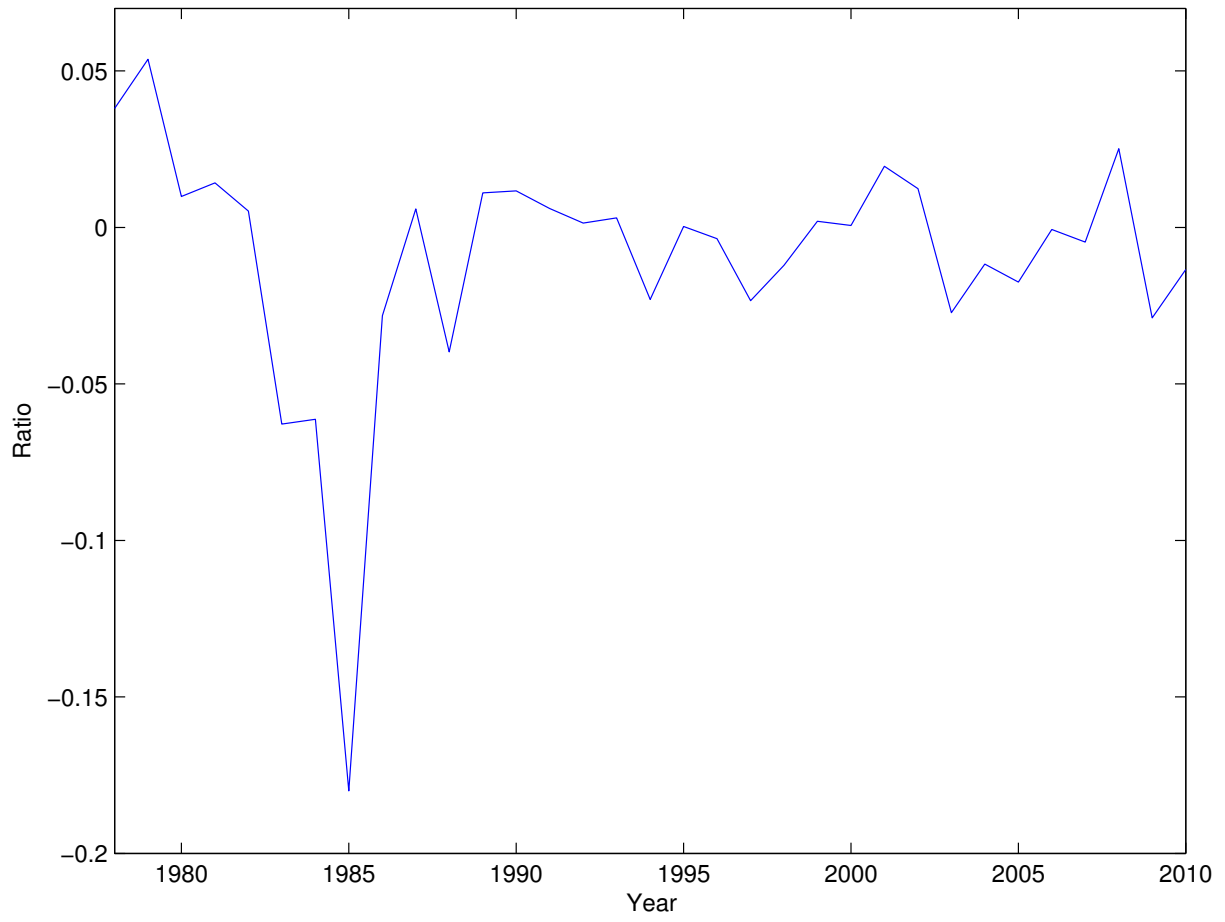


Figure 9: Short and Long Term Public External Debt (as % of GDP)

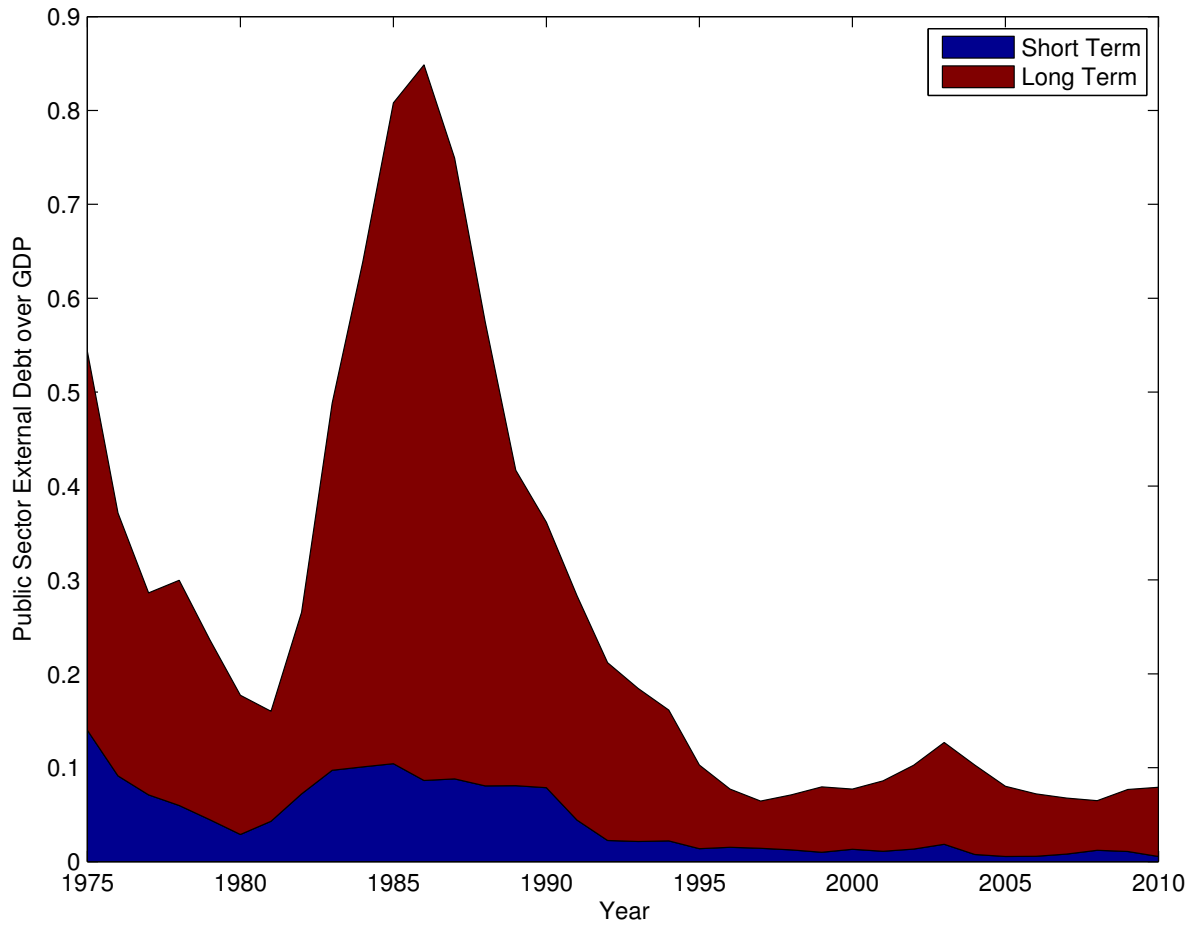


Figure 10: Short and Long Term Central Bank External Debt (as % of GDP)

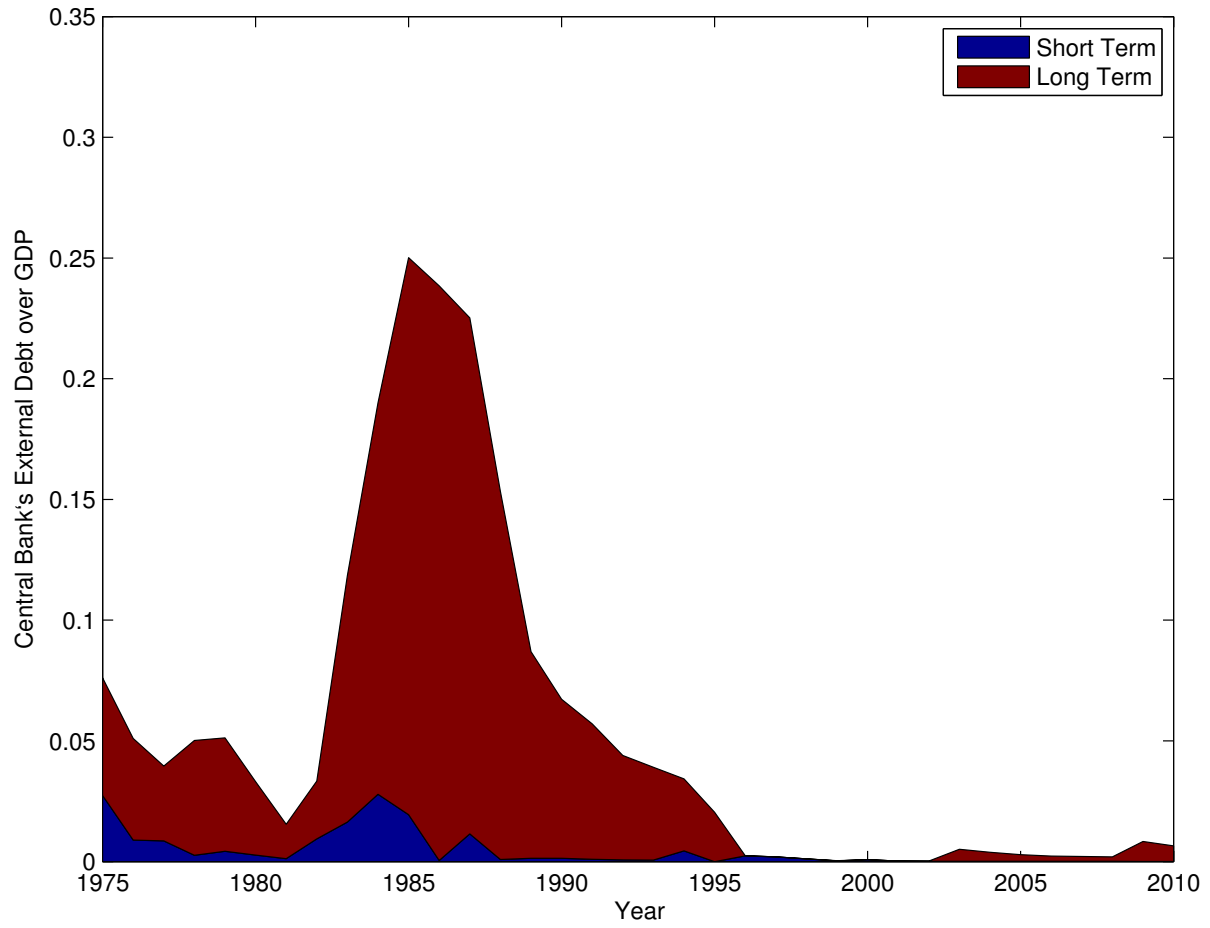


Figure 11: Net Worth of the Central Bank (as % of GDP)

