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MONETARY POLICY IN CHILE: A BLACK BOX?

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Resumen

En este trabajo se analiza empíricamente la conducción de la política monetaria en Chile durante el período 1986-1997. En particular, se busca determinar la efectividad de la tasa de interés real, instrumento empleado por la autoridad monetaria, para afectar en forma sistemática el comportamiento del gasto, la producción y la inflación. Además, se pone especial énfasis en la determinación del mecanismo de transmisión a través del cual se darían dichos efectos. Para ello, se utiliza la metodología de VAR estructurales, encontrándose en la mayoría de los casos sólo efectos débiles sobre las variables de actividad y sobre la inflación. Sin embargo, en el contexto del Enfoque Australiano, nuestros resultados muestran efectos significativos de la tasa de interés real sobre la "brecha gasto-producto" y de ambas variables sobre el nivel de precios de los bienes no transables.

Abstract

This paper studies monetary policy in Chile during the 1986-1997 period. We concentrate in understanding the monetary transmission mechanism by which the Central Bank instrument—the real interest rate—affects total expenditure, output and the inflation rate. The methodology used is structural VARS. We find a weak effect of the interest rate on all the variables. The interest rate has a significant effect on the expenditure-output gap. Both the interest rate and the expenditure-output gap have a significant effect on the price of non-traded goods, in line with the dependent economy model (the Australian model).

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1. INTRODUCTION.

During the nineties, the Chilean economy has gradually cut down inflation rates from figures in the thirties to 4.7% in 1998. Accordingly, Central Bank authorities have pointed out that the main objective of the monetary policy has been to reduce inflation to comparable levels with industrialized countries'. To that end, the designed monetary policy's instrument used has been an indexed interest rate[1], which has attempted to affect the evolution of real market rates for different terms. These, in turn, have supposedly influenced the behavior of spending and aggregate production, thereby managing the inflationary process consistently with the proposed stabilization goals.

This apparent success of the Chilean monetary policy in controlling inflation by using real interest rates as its instrument deserves a closer look, because, in Lucas's words:

> **"Central bankers and even some monetary economists talk knowledgeably of using high interest rates to control inflation, but I know of no evidence from even one economy linking these variables in a useful way..."**
> **(Robert E. Lucas, Jr. Nobel Lecture: Monetary Neutrality, Journal of Political Economy, August 1996)**

Several earlier studies on the Chilean economy have confirmed the lack of solid empirical grounds to back the existence (see Annex Nº2), of a systematic relationship between inflation and interest rates. Also, in those cases where some statistical support exists for such relationship, the transmission mechanism that would permit it is not specified satisfactorily. In that sense, it is frequently argued that policy interest rate increases allegedly permit to reduce the gap between the aggregate spending and the GDP growth rates, or between actual and potential GDP, thereby decelerating the inflation rate. However, monetary theory states that the path of inflation must be linked to a nominal variable, so in order to understand the connection between interest and inflation rates, it is necessary to study the monetary policy's transmission mechanism including the relevant nominal variables.

[1] Until 1995 the Central Bank's 90-day rate was used. The one-day interbank rate has been in use since.

Given the above, this article will analyze the Chilean monetary policy administration during the 1986-97 period, identifying the instruments, intermediate and goals defined by the Central Bank. This analysis will permit us to determine and study the Central Bank's reaction function empirically. Then different transmission mechanisms are reviewed that permit to rationalize the Central Bank's reaction function, which are empirically evaluated using the structural autoregressive vectors methodology.

The reason why we chose autoregressive vectors as the econometric tool of our study was to make our results comparable with those of a larger number of earlier studies. This, because most studies use this methodology. However, as will be explained in detail in the third section, recent international literature shows categorically the need to complement the traditional VAR approach with identification assumptions based on the theory and on institutional considerations, thereby creating what is now known as structural VAR systems.

The rest of this paper is organized as follows: Section two is a conceptual discussion on monetary policy administration and the reaction function used by the Central Bank during 1986-1997; Section three analyzes different possible transmission mechanisms of the interest rate monetary policy; Section four reviews the structural VAR methodology, presents empirical results and offers some interpretations; finally, Section five concludes.

2. MONETARY POLICY MANAGEMENT IN CHILE: INSTRUMENTS AND GOALS.

During the 1986-1998 period the Chilean monetary policy considered the use of intermediate instruments and objectives in order to achieve certain goals or goals. Instruments are those variables that the Central Bank can control directly. Intermediate objectives, in turn, are those variables that are not controlled closely by the monetary policymakers, but whose behavior may be altered, with a certain lag, by using the instruments. Goals are thus eventually achieved since the intermediate objectives are supposedly closely related with the end goals.

a) Goals.

According to the Chilean Central Bank's organic act, its goals are currency stability, a stable internal payment system and the normal operation of the external payment system. The first one has been construed as inflation control, even though the law suggests that it should be perceived as price-level stability.

External payment stability, on the other hand, has been thought of as having a sustainable current account deficit[2]. Based on the past experiences of the Chilean and other economies, the Central Bank has theorized that this deficit should not exceed 3 to 4% of GDP in average because otherwise it will, sooner or later, result in speculative attacks against the domestic currency and a capital outflow, forcing the country into a costly adjustment process. In addition, the external payment stability objective has been interpreted as giving certain stability to the real exchange rate's evolution, which is the other side of the current-account-deficit coin.

Finally, the objective of a stable domestic payment system has reflected on explicit guarantees granted to bank deposits (up to a certain limit) which although not directly given by the Central Bank, are backed by it as the lender of last resort.

Over the years the Central Bank has changed the relative importance it assigns its goals with some degree of what might be called a "crisis mentality", which is a common element in monetary policy management.[3] Thus, after the indebtedness crisis of 1982-83, the primary objective was the current account deficit, which led to a huge adjustment of both private and public spending. At the same time, a "high and stable" real exchange rate objective was decided on, to thereby strengthen the exporting sector and repay the country's huge foreign debt. As a result, during the eighties the low-inflation-rate objective was secondary and subordinated to the real exchange rate, until by the end of the decade voluntary capital flowed back in, thereby relaxing the external constraint.

[2] Such an interpretation is questionable. For example, Rosende (1998) argues that this objective cannot be achieved through monetary policy, and that therefore it should be interpreted as having a monetary policy that will not generate an exchange-rate or balance-of-payments crisis.

Later on, during the nineties the Central Bank's principal objective has been the inflation's control and gradual reduction. However, the real exchange rate and current account objectives have always been there, as proven by the sustained sterilized intervention of the Central Bank in the exchange market during the period, together with the active implementation of controls to capital inflows. Despite this, the current account deficit corrected by the terms of trade's long-term trend has been continually deteriorating since 1993, as shown in Table 1 below.

TABLE 1: CURRENT ACCOUNT DEFICIT

(% of GDP)

	actual c.acc't	c.acc't trend
1990	1.9	1.4
1991	-0.4	-1.1
1992	2.0	0.7
1993	5.6	3.6
1994	3.2	3.8
1995	2.1	5
1996	5.5	5.3
1997	5.3	6.5
1998	6.5	5.8

Source: own calculations based on Central Bank data.

b) Instruments.

As for the selection of monetary policy instruments, from the mid-eighties to April of 1995, the Central Bank used the "UF" or past-cpi-indexed interest rate for its 90-day instruments, which were auctioned at a fixed rate through a window.

The case for using an interest rate as an instrument and for it to be a real rate, as opposed to the common central-bank practice of using a nominal rate, is related with the variability of the demand for money and with the disclosure of information by the Central Bank, as sustained by Fontaine (1991). In this sense, the author's argument is that if the monetary policy objective is informational, then in an indexed economy the best instrument is the real

[3] See Bernanke and Mishkin (1992)

interest rate, since it is clear that nominal rate movements are not always matched by real rate variations. Therefore, using the nominal rate as a monetary policy instrument may be problematic, in the sense that it may give misleading signals to private players. In contrast, the real interest rate will expectedly not only determine the evolution of spending, but will also transmit the Central Bank's perception on the state of the economy in terms of domestic and external equilibrium. While Fontaine recognizes that the demand for money is stable, the velocity is believed to be highly variable due to the heavy fluctuations of the nominal interest rates caused by the UF mechanism. This makes the use of a monetary aggregate as a monetary policy instrument unfeasible and, therefore, is believed to bias the decision in favor of the real interest rate.[4]

While several authors recognize that the instrument used has been the interest rate (see Annex Nº1), Rosende and Herrera (1991) find that money supply movements are a better predictor of transitory fluctuations in the GDP growth rate than is interest rate variation. (see Annex Nº2). This result suggests that, even when using the interest rate as an operative instrument, the Central Bank should try to control the money supply. However, Rojas (1993) holds that the monetary policy has not used a monetary aggregate as an intermediate objective because, while the author finds that money does affect output transitorily, a stable relationship only exists between money and nominal output for the M2A and M3 aggregates, whose use as intermediate objectives is supposedly limited by the scarce control of them by the Central Bank.

In May of 1995 the Central Bank decided to change its monetary policy instrument, dropping the 90-day instrument rate in favor of a shorter-term rate (the interbank one-day rate). The goal was to give the market a more important role in determining medium- and long-term interest rates. Thus the Central Bank auctions out its 90-day instruments so that the market determines the interest rates thereof. In this way, expected capital gains (or losses) are prevented from generating sharp changes in term composition as used to occur

[4] It must be noted, however, that due to the fact that the UF reflects lagged inflation, interest rates using this indexing mechanism do not strictly correspond to the real interest rate. See Calvo and Mendoza (1998).

when the 90-day rate was fixed and caused liquidity management problems for the Central Bank.[5]

c) Intermediate Objectives.

In accordance with the monetary policy transmission mechanisms that will be discussed later on, the Central Bank has used as its main intermediate objectives the spending/ output gap and the actual/ potential output gap, at both their levels and their growth rates (see Annex Nº1). On this matter, the former president of the Central Bank, Mr. Roberto Zahler, warranted the 1995 interest rate increase with the argument that "... but we must not forget that both aggregates, that is the economic activity and the demand, continue to grow now for the fifth quarter in a row, significantly above conservative estimations on the economy's productive potential increase and, therefore, above its trend level, with the resulting pressures over domestic prices"[6].

In another intervention Mr. Zahler stated that "...it is important to differentiate between output and spending levels and growth rates. When the economy has had several years of growth above its potential, and it is also very near it, it is not enough to go back to growing at the potential output rate. If the appropriate levels are to be recovered, it is necessary to grow at a below-potential pace for some time... This will permit us to return to the desired path in terms of output and spending levels and reduce inflationary pressures."

"Regarding domestic demand, we must note that it has grown so strongly in the past few years that it has gone over the potential output level, pushing prices up and generating pressures on foreign accounts. An adjustment is needed, then, to take the domestic demand to more reasonable levels."

"... we use al kinds of indicators to predict price behavior, such as the aforesaid gap between potential and actual output, the evolution of wages, exchange rates, government spending, credits, money supply, and others."[7]

[5] For a detailed analysis, see Budnevich and Pérez (1995).
[6] R. Zahler, seminar on Latin American World Trade and Perspectives for the Year 2000, May 9, 1996.

For these intermediate instruments to be operational, they must respond to the instrument in a predictable way. In other words, an interest rate increase must decelerate the growth rate of spending by a larger amount than that of the output in the spending-output gap case, and the output growth rate directly or through spending in the case of the gap with potential output. Thus, for example, Eyzaguirre and Rojas (1996) argue that "Monetary policy has been based, for over a decade, on the control of the interest rate of some of the financial instruments offered by the Chilean Central Bank. The grounds for this policy have been the influence that these rates have, directly or indirectly, over the expansion rhythm of aggregate spending and thereby on prices, especially of non tradables."

d) Intermediate Objectives of Monetary Policy and the Central Bank's Reaction Function.

As aforesaid, the Central Bank's interest rate policy has been structured around intermediate and goals. Thus, when setting annual inflation rate goals and implicit goals for the current account's trend deficit (a maximum of 4% of GDP at trend prices) the Central Bank adjusts the interest rate instrument according to the evolution of the intermediate objectives.

Consistently with the matters seen above, the Central Bank has used as its intermediate objectives the rate of growth of spending with respect to the growth in output (i.e. the spending-output gap) and the evolution of actual GDP with respect to potential GDP, considering both the level and the growth rate thereof. Thus, whenever the monetary authorities have detected that spending is growing faster than GDP or that the actual GDP has been growing more than the potential GDP for a few quarters, they have moved on to try to adjust the growth in spending by using the interest rate as its instrument. Within this context, it can be stated that in recent years the manipulation of the interest rate has been related to the application of the well-known Taylor's rule (Taylor, 1993), whereby the interest rate is adjusted upwards when the inflation rate exceeds the target and/or output is

[7] R. Zahler's speech at an ASIMET meeting, July 27, 1994

above its potential level. In the opposite case, the interest rate is adjusted downwards. This rule can be represented by the following equation:

$$dR = a\,Y + b\,(\Pi - \Pi^{*}) \qquad (1)$$

where, "dR" is the first difference of the interest rate, "Y" is the output gap[8], Π y Π^{*} stand for the inflation rate and the inflation target, respectively, and "a" and "b" are positive parameters.

On the other hand, the inflation-target literature emphasizes that the Central Bank's expected inflation (inflation forecast) is the intermediate objective *par excellence* (Masson et. al.., 1997). Thus, the monetary policy instrument responds to the difference between the projected inflation and the inflation target for a specified period. Within this context the Central Bank's reaction function is forward-looking, as opposed to reaction policies that respond to intermediate objectives, as represented by past readings of certain variables. In this approach, the monetary policy's operating method can be depicted by the following function:

$$dI_t = ß\,(\Pi^{e}_{t+j} - \Pi^{*}_{t+j}) \qquad (2)$$

where "dI_t" stands for the change in the monetary policy instrument in period "t", while Π^{e}_{t+j} and Π^{*}_{t+j} stand for the expected inflation and the inflation target for period t+j, respectively. Within this analytical framework, the expected inflation results from a series of statistical models combining several indicators, in such a way that the basic difference between this monetary policy model and the one described by equation (1), is that it uses expected inflation instead of past or present inflation to manage the policy instrument.

It must be noted, however, that the inflation target scheme is compatible with Taylor's monetary rule inasmuch as it can be argued that the output gap is the principal determinant of the Central Bank's inflation forecasts. Massad (1998) suggests that the monetary policy

[8] Measured as the percentage deviation from potential output, or as the spending-output gap.

may actually be managed nowadays according to the inflation target scheme, considering activity and employment indicators, the spending-output gap, the current-account balance, monetary aggregates, the wage growth and the interest rate's yield curve. This set of indicators supposedly permits the Central Bank to build the core inflation's future evolution forecast and thereby adjust its instrument according to the gap between the forecasted and the targeted inflation rates.

3. MONETARY POLICY TRANSMISSION MECHANISMS.

The channels whereby the real interest rate –used as a monetary policy instrument- can affect the end targets for inflation, current account and real exchange rate can take a number of forms. Below we shall identify five transmission mechanisms, namely: a) the Australian Mechanism; b) the Phillips Curve Mechanism; c) the Interest-Rate Parity Mechanism; d) the Monetarist Mechanism; and e) the Credit Mechanism.

a) The Australian Mechanism.

This transmission mechanism has the Australian Model[9] for its theoretical framework, whose main assumptions are: a small open economy that produces and consumes tradable and non-tradable goods; capital is a specific factor in both sectors; labor is mobile between sectors and has diminishing returns; the domestic price of the tradable good is determined according to the purchasing-power parity, the nominal exchange rate and the international price; the relative price of non tradables is determined by their supply and demand equilibrium. Within this context, the real exchange rate, defined as the relative price of tradables to non-tradables, depends inversely on the level of aggregate spending with respect to the output[10]. This because an increase in spending over output will result in an increase in the demand for both tradables and non-tradables, thereby creating excess demand in both markets. In the tradable goods market, on the one hand, this will merely

[9] See for example Dornbusch (1980).

[10] The equilibrium real exchange rate here is the one that clears the non-tradable sector. It must be noted, however, that from a long-term perspective, it should also meet the requisite that the current account be equal to the sustainable capital account.

result in increased net imports and therefore in a drop in the trade account balance. The excess demand for non-tradables, on the other hand, requires an increase in the relative price of those goods in order to reach equilibrium in the non-tradable sector, with the resulting reduction in the real exchange rate.

Taking a closer look of the version of this model presented in Kamin (1996), the above considerations can be put in algebraic terms as shown below:

$$TCRE_t = a_0 - a_1 \ (G/Y)_t \qquad a_1 > 0 \qquad (3)$$

$$\pi^n{}_t = b \ (TCR_{t-1} - TCRE_{t-1}) \qquad b > 0 \qquad (4)$$

substituting (3) in (4) we have:

$$\pi^n{}_t = -b \ a_0 + b \ TCR_{t-1} + b \ a_1 \ (G/Y)_t \qquad (5)$$

Equation (3) reflects the fact that the equilibrium real exchange rate (TCRE) in the Australian Model is inversely related to the spending to output ratio (G/Y). Equation (4), in turn, indicates that in the context of a pre-determined nominal exchange rate and slow price adjustment, the convergence of the actual real exchange rate (TCR) towards the equilibrium level takes place through variations in the inflation of non tradables (π^n). From this, it follows that the non-tradables' inflation rate will depend on the gap between TCR and TCRE. Finally, equation (5) shows that the evolution of non-tradables' inflation is determined by the spending-output ratio and by the actual real exchange rate lagged one period.

It must be noted that within this analytical framework the exchange rate system will determine how the real exchange rate will make its adjustments and, therefore, the effect over the price level path associated to changes in relative prices. Thus, with a fixed exchange rate system, the appreciation of the real exchange rate takes place through the

acceleration of non-tradables' inflation[11]. In contrast, if the exchange rate floats, the reduction in the real exchange rate occurs through a nominal appreciation, with the resulting reduction in the tradable goods' inflation. Therefore, the relationship between the spending-output gap and the inflation rate may be either positive or negative, depending on the exchange system.

According to the above, in the context of this model, the relationship between the monetary policy instrument and the inflation rate must go through the spending-output relationship. Thus, if the long-term real interest rate determines the evolution of investment expenses and durable goods consumption, then the manipulation of the short-term interest rate by the Central Bank, through its effect on long-term rates, can reduce the spending-output gap and increase the equilibrium real exchange rate[12]. This, in turn, within a pre-fixed or indexed exchange rate system, will result in reduced inflationary pressures. In this sense, it must be kept in mind that during the past 10 years the Chilean exchange rate policy has considered a band whose midpoint adjusts to past inflation, together with corrections for foreign inflation and productivity, thereby introducing a significant degree of indexing to the nominal exchange rate.

As shown in Graph A, the nominal exchange rate variation between the first quarter of 1990 and the second quarter of 1995 trended downwards, reflecting the gradual reduction of the inflation rate and sporadic discrete revaluations by adjusting the band's midpoint or band width.[13]. These corrections to the exchange rate rule permitted a growing fraction of the relative price correction associated to the spending-output gap' evolution to materialize through the nominal exchange rate, instead of doing so through the non-tradable goods' inflation.

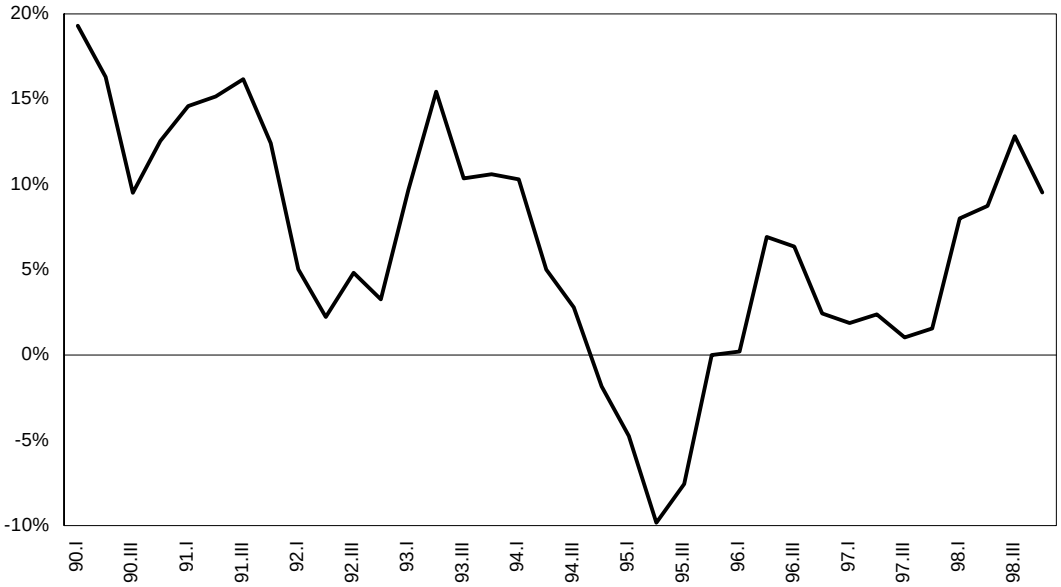
[11] Strictly speaking, the exchange rate adjustment to a transitory demand shock may take place through an increased price level without a variation in the trend inflation. However, in an indexed economy inflation has an inertia component and, therefore, any price level adjustment manifests itself in an increase in inflation. In particular, the inflationary effect associated to a relative price correction shall appear especially strong in those cases where indexation affects the nominal exchange rate.

[12] In the short run, the reduction in the spending growth speed will also translate into reduced GDP growth.

[13] The band's midpoint also considers the evolution of the deutschmark-dollar and Japanese yen-dollar

GRAPH A: NOMINAL DEPRETIATION RATE

(12-month variation rate)



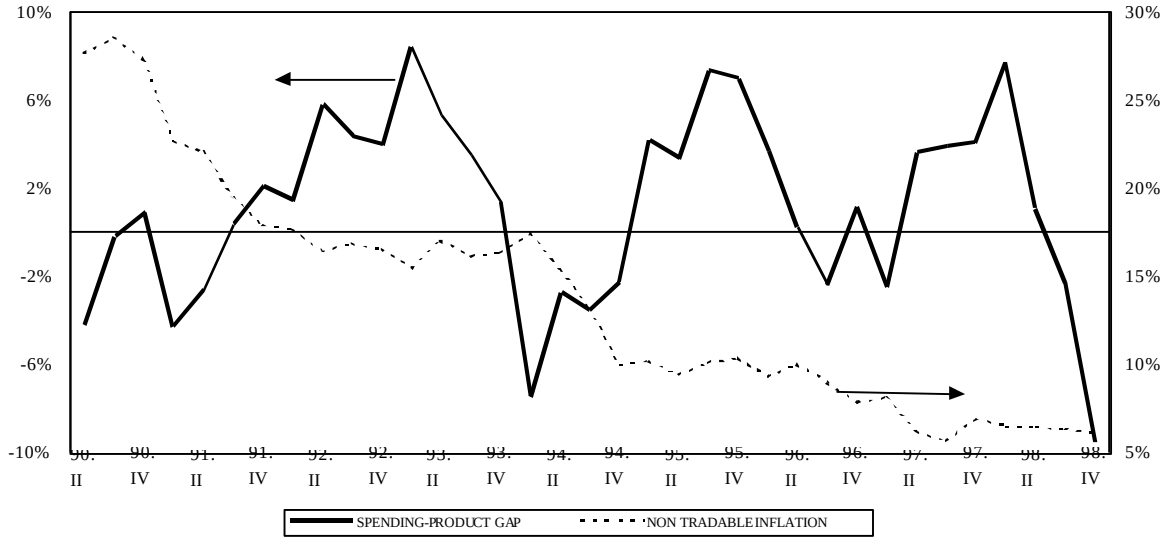
Source: own calculations on Central Bank data.

The above suggests that the gradual decline in inflation is tied to the path of the nominal exchange rate. In fact, as shown in Graph B, whenever the spending/output gap falls, a later deceleration of non-tradables' inflation follows, but in the periods where the gap increases, inflation remains constant. This behavior can be explained by the fact that whenever the gap increases, the nominal exchange rate's growth rate decreases and even becomes negative in some periods, as can be seen in Graph A.

parities. For a detailed analysis of the exchange rate policy see Vergara (1994).

GRAPH B: NON TRADABLES' INFLATION AND SPENDING-GDP GAP

(12-month variation rate)



Source: own calculations on Central Bank data.

b) The Phillips Curve Mechanism.

This transmission mechanism is based on the famous Phillips Curve, augmented by inflation expectations (Friedman, 1976). According to this approach, if actual output (y) is larger than the economy's potential output (y_p), or if the natural rate of unemployment is higher than the actual one, then in the short run the inflation rate of wages and prices (π) with respect to the expected rate (π^e) will accelerate. The inverse relationship, where causality goes from the inflation rate to the unemployment rate, results from a slow adjustment of inflation expectations, rigid prices and wages or from lack of credibility of the policies. Actually, the short-run Phillips Curve is possible only if the actual inflation rate is different from the expected one. In the long run, therefore, there is no trade-off between unemployment and inflation, because the expected inflation adjustment to the actual inflation results in an unemployment rate equal to the natural rate and in actual GDP in line with potential GDP.

Equation (6) shows the Phillips Curve augmented by inflation expectations:

$$\pi_t = \pi^e_t + c\,(y - y_p) \qquad c > 0 \qquad (6)$$

Assuming static expectations (the basis of the accelerationist hypothesis of Phillips Curve), then $\pi^e_t = \pi_{t-1}$ and, therefore, the change in inflation will equal:[14]

$$d\pi_t = c\,(y - y_p) \qquad (7)$$

It is worth noting that what counts here is the level of actual output as compared to its potential, because an economy can grow faster than its potential for some time and not result in inflationary pressures, if its initial output level is lower than the potential[15].

The transmission mechanism of the monetary policy in this theoretical context can be described as follows: whenever there is a GDP growth trend above the potential GDP growth, that after a while leads to a higher GDP level than its potential, an interest rate increase permits the spending growth to decelerate, which in turn reduces the growth speed of GDP until its level equals the potential. In addition, the increased interest rate may also have a direct effect on the actual output through more expensive working capital. Thus, the deceleration of the GDP growth rate may also reduce the inflation rate to the level determined by the nominal anchor (i.e. the exchange rate, a monetary aggregate or the inflation target determined by policymakers) which in steady- state will equal the expected inflation.

The output gap approach is widely used in the empirical literature on inflation determinants. In this sense, as pointed out by Coe and McDermott (1997), from the available evidence on industrialized countries it follows that such a gap is an important determinant of inflation. In addition, these authors find that for the Asian emerging

[14] Naturally expectations may be rational; however, the simplifying assumption of static expectations permits to capture the essence of the transmission mechanism to be applied to empirical studies. See Coe and McDermott (1997).

[15] Zahler (1994) argues in favor of levels being more important than the growth rates of actual and potential output. See footnote 5.

economies the output gap also plays a significant role in the evolution of their inflation rates. However, for a large number of developing countries, the evidence shows that there is no relationship between the output gap and the inflation rate[16]. As for the Chilean case, Mendoza and Fernández (1994) show evidence favoring this relationship.

c) The Interest Rate-Parity Mechanism.

The transmission mechanism of this approach is based on the international arbitrage of interest rates. Thus, whenever the domestic interest rate exceeds the foreign rate corrected by devaluation expectations and country risk, it induces a capital inflow, a nominal exchange rate appreciation, a drop in inflation and an increased current account deficit financed by the capital-account surplus. Then capital mobility ensures that the domestic rate cannot be out of line with the foreign rate and, in a fixed exchange rate system, said mobility also implies that the Central Bank loses its ability to make autonomous monetary policies. In this sense, the question for policymakers is whether to stabilize the exchange rate and have no independent monetary policy, or to have the interest rate as a monetary policy instrument and settle for a greater exchange rate variability.

In Chile, during the nineties the local real interest rate has been permanently above the foreign rate adjusted by real exchange rate expectations and country risk. The resulting massive capital inflows have been partially sterilized, in such a way that the Central Bank has accumulated substantial reserves. This has caused it significant equity losses, because it issued debt bonds at an UF-rate above the one it gets from its dollar-denominated assets. In order to reduce the effect of capital inflows, for a long period the Central Bank imposed a 30% reserve requirement on foreign credits and investments not of "productive" nature. However, as concluded by Valdés and Soto (1998), said reserve requirement has not reduced the total amount of short-term capital and have only affected the composition between the flows subjected to the reserve requirement and liberated flows[17].

[16] On this matter, see World Economic Outlook, October of 1996.
[17] Recently, the Central Bank reduced the reserve requirement to zero, because of the Asian crisis.

According to the above, the interest rate arbitrage has reflected on a changed portfolio composition, where the private sector has borrowed in foreign currency and has acquired UF-denominated assets, while the opposite has happened with the Central Bank's portfolio. So, supposedly, no direct effects have hit the level of aggregate spending and, therefore, the real exchange rate has not been affected by the spending-output gap mechanism[18]. However, this did not necessarily prevent a transitory appreciation of the real exchange rate through a nominal appreciation, and thus a drop in tradables' inflation may have been generated. Actually, the accumulation of international reserves may have led to the exchange rate appreciating within the band[19]. This, together with a slow price adjustment of goods, compared to the exchange rate, may have caused in the short run a real appreciation and a deflationary trend in the prices of non-tradable goods.

On the other hand, it must be noted that with the exchange rate too close to the band's floor for long periods, the resulting continued accumulation of reserves and a number of discrete modifications to the exchange rate band have taken their toll on its credibility, leading to nominal revaluation expectations (which, in the presence of price inflexibilities, would also mean a real appreciation, at least in the short run). This has strengthened the incentives to capital inflow, so the Central Bank has had to endure several episodes of speculative attacks, often being forced to validate the market's appreciation expectations, either by extending the band's limits or by restating its midpoint. As an example, let's say that by the end of 1994 the Central Bank accumulated in two months over 2.0 billion dollars, which forced it to modify the exchange rate band in November, thereby permitting a substantial appreciation of the exchange rate.

In addition, to the extent that an announced decreasing inflation target determine a certain expected path for the nominal exchange rate variation and this implies a reduced real exchange rate, the high domestic interest rates become irresistibly attractive for capital inflows[20]. In this context, short-term real exchange rate swings induced by the nominal appreciation will be out of equilibrium and, therefore, a misalignment will occur between

[18] Keep in mind that in the medium and long run the increase in the domestic interest rate should increase the real exchange rate, in accordance with the spending-output relationship.
[19] For the effects of sterilized intervention on the exchange rate, see Edison (1993).

the actual and the equilibrium exchange rate. This, in turn, will introduce new deflationary pressures over non-tradables' inflation.

However, there is an alternative hypothesis that cannot be ruled out, that consists in that the nominal appreciation only accommodates the equilibrium real appreciation. In this case, individuals would expect a real appreciation based on the evolution of fundamental variables (i.e. relative sector productivity, spending/output ratio, government spending, terms of trade, and the like), thereby increasing the gap between the domestic and the foreign interest rates and provoking the capital inflows to validate the expectations.[21]

d) The Monetarist Mechanism.

This transmission mechanism is based on the monetarist hypothesis of the economic cycle, according to which a non-anticipated change in the nominal money supply will affect inflation and transitorily also the output As opposed to the Keynesian approach, this theoretical scheme not only considers the interest rate as a transmission mechanism, but also contemplates the effects thereof through a set of asset prices and real wealth. Thus, according to this approach, variations in the money supply affect interest rates and the prices of stocks, land, and durable goods. All these variations in relative prices will affect consumption and investment through multiple wealth effects and substitution effects.

According to the interest rate policy that the Central Bank has been using over the last 15 years, an interest rate increase results in a lower monetary expansion during the process of adjusting to the new equilibrium, thereby affecting negatively the prices of other assets and, ultimately spending, output, and the rate of inflation.

[20] On this matter, see Rosende (1998).

[21] Zahler (1997) argues in favor of this hypothesis when he holds that: "we cannot overstate that the real appreciation of the Chilean peso during the nineties, around 4.5% per year, was the result of an equilibrium process, that responded to the structural changes of the Chilean economy over the past years, and not to an exchange rate manipulation with the purpose of artificially reducing the inflationary trend". On the other hand, Rosende (1998) believes that the interest rate policy stressed the downward trend of the real exchange rate.

At this point it is worth noting that it is often argued that whenever a monetary policy uses the interest rate as its instrument, nominal money will be endogenous, so that observed variations in the nominal money supply will allegedly respond to movements of the demand for money. However, whenever the Central Bank chooses to change the level of the interest rate, it does so through exogenous changes in money supply. Certainly, once the new equilibrium has been reached, money supply movements become endogenous again[22].

e) The Credit Mechanism.

The unfavorable international empirical results to the hypothesis that holds that there is a negative relationship between the interest rate and aggregate spending, have directed the monetary policy transmission mechanism research to what has been termed the credit mechanism[23]. This vision emphasizes the role of the banking system as a source of financing for small and middle-sized companies, where the problem of asymmetric information is most important. Two transmission channels are proposed, namely the bank credit channel and the Balance Sheet channel.

As per the credit channel model, an interest rate increase resulting in reduced money growth, bank reserves and deposits will have a contractive effect on bank credits, thereby depressing investment expenditure and this, in turn, will depress the GDP. Note, however, that as explained above, in an open economy a higher domestic interest rate may generate an incentive to capital inflows, which can be intermediated by the banking sector, thus leading to an increase in loans.

On the other hand, the balance sheet channel operates via a deterioration of the companies' cash flow originating at the interest rate increase. This magnifies the adverse selection and

[22] Unpublished results of the authors indicate that some correlation exists between money market imbalances and an acceleration of GDP. For Rosende and Herrera (1991) money market imbalances can be attributed to the fact that the relative prices that the Central Bank attempts to stabilize (i.e. the interest rate or the exchange rate) are far from their equilibrium, thereby generating endogenous movements of the money supply.
[23] Examples of this can be found in Mishkin (1995) and Bernanke and Gertler (1995).

moral hazard problems, thereby reducing corporate loans[24]. This, in turn, has a negative effect on investment and, as an end result, on GDP.

This transmission mechanism, together with the Phillips Curve or the Australian mechanism, suggest that an increase in the interest rate will reduce inflationary pressures by reducing the spending-output gap or the actual-potential output gap.

One example of the application of this approach is Edwards and Vegh (1997), who hold that in Chile and in Mexico the banking sector played a fundamental role in intermediating capital flows, which ended in an explosive growth in consumption (Chile in the eighties and Mexico in the nineties). When capitals left these countries, banks were left with severe financial problems, thereby deepening the recessions. The authors build a model where fixed-exchange-rate stabilization generates output and employment cycles through changes in deposit-credit spreads and in bank credits. In the empirical analysis, the authors use as a proxy to a shock in the banking system the spread between interest rates for credits and for deposits, finding that a shock in this variable will negatively affect economic activity.

4. EMPIRICAL EVALUATION OF SELECTED MONETARY POLICY TRANSMISSION MECHANISMS.

a) Methodology.

A review to the relevant literature leads to the conclusion that the large majority of recent studies on the effects of monetary policy use as their econometric tool the so-called vector autoreggression (VAR)[25]. However, the fact that the VAR methodology has been severely criticized by several authors must not be overlooked. The bulk of this criticism falls into either of the two following categories:

[24] Bernanke and Gertler (1995) argue that this effect should be applied not only to corporate investment expenses but also to the individuals' expenditure in durable goods.

[25] Some examples of this are the works of Bernanke and Blinder (1992), Leeper, Sims and Zha (1996), Garretsen and Swank (1998), Cochrane (1998), Bernanke and Mihov ((1998), Rosende and Herrera (1991), Valdés (1997), Mendoza and Fernández (1994).

1. Those attributing it an non-theoretical nature, and
2. The ones that question the identification procedure used.

With respect to the first type of criticism, it can be said that it is basically a matter of personal preferences, since not one of the econometric methodologies currently in application is totally trouble-free. This because although the economic theory does establish relationships between variables, it seldom provides accurate predictions on the dynamics of said relationships or distinguishes between endogenous and exogenous variables. This forces us to choose between imposing "arbitrary" constraints to the joint dynamics of the set of variables and in selecting endogenous variables or adopting a totally empirical approach, whereby the data "reveal" their joint dynamic process and all the variables are treated symmetrically[26]. The latter is the option implicit in the VAR methodology.

To understand the nature of the aforesaid second type of criticism, the following example will be used:

$$y_t + b_{12}\, z_t = b_{10} + \gamma_{11}\, y_{t-1} + \gamma_{12}\, z_{t-1} + \varepsilon_y \qquad (8)$$

$$z_t + b_{21}\, y_t = b_{20} + \gamma_{21}\, y_{t-1} + \gamma_{22}\, z_{t-1} + \varepsilon_z \qquad (9)$$

where variables (y, z) follow a stocastic process described by equations (8) and (9) and where (εy , εz) are innovations or "white noise". This system of equations, known as the structural VAR, may be described as shown below:

$$B_0\, x_t = \Gamma_0 + \Gamma_1\, x_{t-1} + \varepsilon_t \qquad (10)$$

where: $E(\varepsilon_t \varepsilon_t') = \Sigma$.

Pre-multiplying both sides of equation (10) by B_0^{-1}, the autoreggressive vector is obtained in its reduced form:

[26] On this matter, the classical quote is Sims's paper (1980).

$$x_t = A_0 + A_1 x_{t-1} + e_t \qquad (11)$$

where the following definitions are used:

$$x'_t = [\, y_t \;\; z_t \,] \qquad (12.1)$$

$$A_0 = B_0^{-1} \Gamma_0 \qquad (12.2)$$

$$A_1 = B_0^{-1} \Gamma_1 \qquad (12.3)$$

$$e_t = B_0^{-1} \varepsilon_t \qquad (12.4)$$

$$\Omega = E(e_t e_t') = B_0^{-1} \Sigma (B_0^{-1})' \qquad (12.5)$$

the main fact worth singling out is that, given equation (12.4), every element in the residuals vector of the reduced system is a linear combination of all the structural innovations that affect the endogenous variables that make up the system. Therefore, the dynamic response (impulse-response functions) of said endogenous variables before a shock in one of the system's error vector components in its reduced form cannot be linked to any specific the structural innovations in particular.

In the traditional VAR methodology the described identification problem is solved by placing constraints on the contemporary effects of the variables and on their variance-covariance matrix. Said constraints, associated to Cholesky's decomposition assume a recursive process, where the first variable included in the VAR system is not affected contemporarily by any of the remaining endogenous variables, the second one is affected contemporarily only by the first, and so on.

If the theoretical constraints applicable to the structural dynamic model are such that the B_0 matrix is inferior triangular, with unit coefficients in the principal diagonal, and that matrix Σ is diagonal, where the values in its diagonal are the structural innovations' variances, then said model will be appropriately identified by using the traditional procedure. In this case, an estimation of parameters (B0, Γ, Σ) through the FIML (full-information maximum likelihood) method can be obtained by maximizing the likelihood function with respect of

the estimated parameters of the reduced form. The FIML estimation of B_0 permits to calculate the orthogonalized residues through the relationship $\varepsilon_t = B_0 e_t$, which corresponds to the vector of structural disturbances. Similarly, the orthogonalization of the impulse-response function's coefficients will generate the dynamic consequences of structural innovations. In general, however, the aforesaid constraints will not be the "true constraints" imposed by the economic theory. For such reason, a more flexible identification procedure is needed, that will permit to incorporate constraints consistent with the theoretical model being tested[27].

Given the above, in a second development stage of the VAR methodology more attention was paid to the subject of identification based on the economic theory, and the so-called "structural VAR" were developed. The leaders of this line of research were: Sims, Blanchard, Watson, and Bernanke.

The rationale of the structural VAR methodology is that any identification constraints being imposed on matrixes B_0 y Σ must come from the economic theory. Once said constraints are established it is possible to estimate the values of the structural coefficients that will both satisfy and meet the condition given by equation (12.5). To that end, the FIML method is used[28].

One last methodological subject worth noting is related to the existence of conflicting visions on whether the variables included in a VAR system must be previously filtered in order for all of them to be stationary or they must simply be included in their "natural form". Some authors, such as Sims (1980) and Doan (1992), argue against variable differentiation even if they have a unit root. These authors' main argument is that the structural VAR's objective is to find any interrelations that may exist between the variables included in the system and not the estimated values of parameters per-se. Similarly, they argue against variable filtering because this may imply lost information on joint movements of the variables, such as the possible existence of co-integration relationships between them. However, the larger part of the other authors hold that the variables must be used in

[27] For further details on the VAR estimation methodology, see Hamilton (1994).

such a way that the VAR can imitate the true data-generating process and, therefore, the variables included must be stationary.

b) Identification Criteria Used.

As follows from the previous section, the characteristic element of the structural VAR methodology that will be used herein is the use of identification assumptions explicitly based either on the economic theory or in institutional aspects inherent to the reality under analysis. For such reason, this section will describe in detail the identification assumptions used to estimate the various models considered here. Said assumptions are listed below:

1. Because of the monthly frequency of the data being used, the first assumption will be that the monetary policy instrument (the 90-day PRBC rate) does not respond contemporarily to variables that are not observable within the month, as is the case of activity variables (production and spending). However, said instrument can respond contemporarily to variables observed in the very short term, such as monetary and financial variables and prices.
2. Financial variables (i.e. exchange rate, market interest rates, and asset prices) can respond contemporarily to any information, including non-observable one[29].
3. Activity variables (i.e. spending, output, spending-output gap) respond to all the other variables with a lag, except for working days and, in the case of GDP, to spending itself[30].
4. Prices of goods (i.e. CPI, non-tradables' CPI) respond contemporarily only to those variables affecting them directly, such as the exchange rate and international prices)[31].

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[28] See Hamilton (1994).

[29] Because financial variables are not the result of the decision of one single player but arise from the interaction of many of them inside the respective markets, they can be affected by variables that, without being directly observable, do alter the equilibrium of those markets and by the players' expectations regarding the relevant variables' future evolution.

[30] This assumption is intended to incorporate into the models' empirical estimation the existence of lags in the production and spending decision-making processes or in the implementation thereof. Said lags may arise from delays in the generation and disclosure of information the aforesaid decisions are based on, from difficulties in their interpretation because of uncertainties (for example, with respect to whether shocks are permanent or transitory) or from the presence of rigidities (contractual or other) that may hinder instant reactions.

5. The real exchange rate only responds contemporarily to variables affecting it directly (i.e. nominal exchange rate, international prices, non-tradables' CPI)[32].
6. In the case of the monetary-credit model, actual credits from the financial sector were assumed to respond contemporarily to interest rates and money (which affect the credit supply) because this is the monetary policy's central transmission mechanism according to this model. Also, they might respond contemporarily to aggregate spending (which affects the demand for credit).

c) A Review to the Principal Results.

No agreement exists regarding the need for the variables included in a structural VAR to be stationary, and as a way to check the robustness of the results obtained, all the estimated models were estimated in three versions (except for the "Reaction Function" and the "Phillips Curve", that were estimated only in 2 versions), namely levels, levels and growth rates in 12 months[33], levels and first differences (of levels or of the 12-month variation rate, depending on the type of variable)[34]. This also permits to widen the number of works that our results can be compared with. For that effect, Annex Nº2 includes a table showing a summary of the main results for the Chilean economy reported by other authors.

Because of space and clarity reasons, however, only the results of the version with the most theoretical basis are shown, since they are easier to interpret (said version is the one combining variables in levels and 12-month growth rates). Also, and for the same reasons, in this version of the document only the impulse-response functions that have been considered to be the central hypotheses associated to each one of the models estimated are discussed herein[35].

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[31] This is one of the standard assumptions used in the Keynesian models to allow for the existence of real effects associated to nominal shocks.
[32] This assumption is a direct extension of the previous one.
[33] The 12-month variation was used in those cases where it makes economic sense, as with price indexes and production and spending figures.
[34] This versión of the models sought that all the variables included comply with the seasonality condition, which was checked using the Dickey-Fuller and the Phillip-Perron's tests.
[35] A complete version of the impulse-response functions of this and other models estimated can be requested directly to the authors.

The Central Bank's Reaction Function.

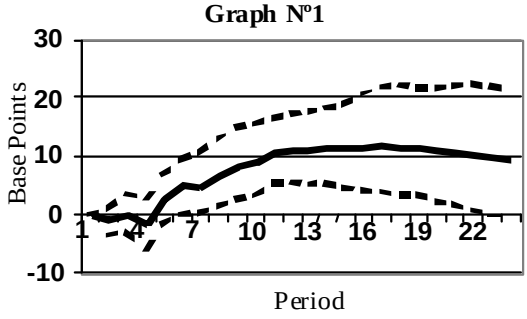
The table below describes the estimated model:

Variables Included **(see Annex Nº 3)**	**Nº. of Lags**	**Period**
TASA; CICLO; V12WUC; V12IPCSUB; seasonal dummies; deterministic trend.	Five	1986.01 – 1996.12

a) Response of the monetary policy rate to a one-percentage-point increase in the GDP's cyclical component:

- As shown by the Graph, the response is positive and strongly significant after the fifth month from the shock.

Graph Nº1

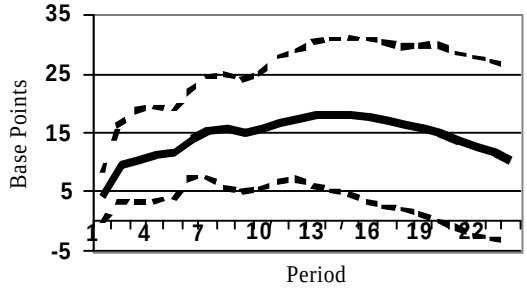


- Said response peaks between 13 and 18 base points, fifteen months after the shock..

b) Response of the monetary policy rate to a one-percentage-point increase in the 12-month variation rate of nominal wages:

- A positive, strongly significant response of the policy rate to a positive shock in the 12-month variation rate of nominal wages is observed.

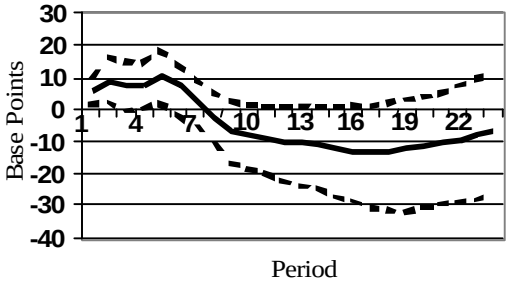
Graph N°2



- Said response reaches its maximum intensity, nearly 20 base points, fifteen months after the shock.

c) Finally, Graph Nº3 depicts the response of the monetary policy rate to a one-percentage-point increase in the core inflation. From there, it can be concluded that:

Graph Nº3



- The response is positive and significant in the period from one to seven months after the shock.

- The maximum response appears around month five after the shock and it amounts to slightly more than 10 base points.

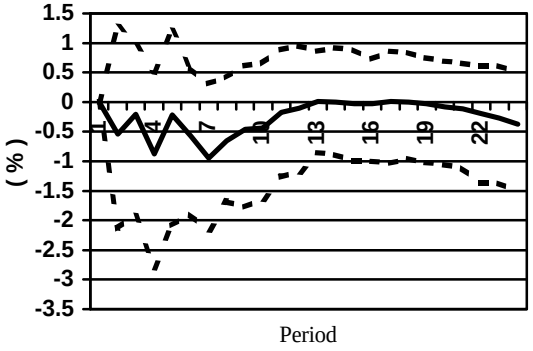
The Australian Model.

The table below shows a summary of the main characteristics of the model:

Variables Included **(see Annex Nº 3)**	**Nº. of Lags**	**Period**
LTTUC; TASABC; TBE; GAP; LTCN; LIPCNT; LTCRINE; seasonal dummies; deterministic trend.	Four	1989.04 – 1997.06

a) Graph Nº 4 shows the response of the Spending-Output Gap to a positive shock of 50 base points in the monetary policy interest rate. The following conclusions can be drawn:

Graph Nº4

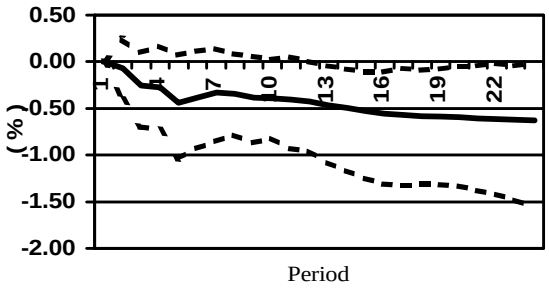


- The response is negative, but not large enough to be significant.
- Said negative response extends from month one and month thirteen after the shock.

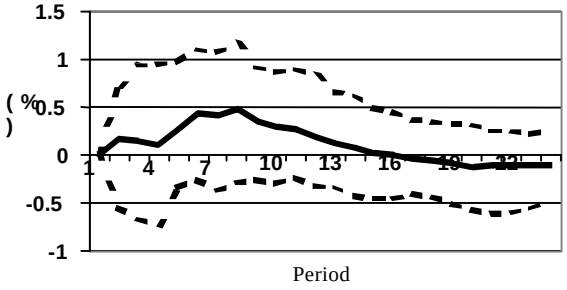
- At its maximum, the Gap reduction is one percentage point.

b) On the other hand, Graph Nº 5 shows the response of the non-tradables' CPI to a increase of 50 base points in the monetary policy interest rate. A review to said results leads to the following conclusion:

Graph Nº5.A



Graph Nº5.B



- Whenever the CPI **level** of non- tradables is used (Graph Nº 5.A), the response is negative and significant (at 10%).

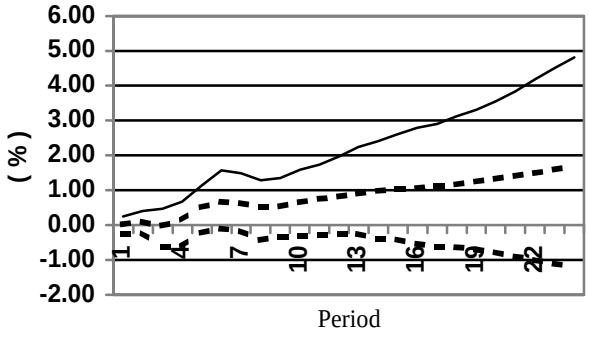
- It must be noted, however, that when the non-tradables' 12-month CPI-variation rates are used (Graph Nº 5.B), the traditional "Price Puzzle"[36] appears, because the response is positive. However, such response is not large enough to be significant.

c) Graph Nº 6 depicts the response of the real exchange rate (TCR) to a 50-base-point shock on the monetary policy interest rate. The main conclusions that can be drawn here are:

- The logarithm of the TCR level increases after the fourth month, and the response is marginally significant at 10%.

After two years the TCR is 2 percentage points above its trend level.

Graph Nº6

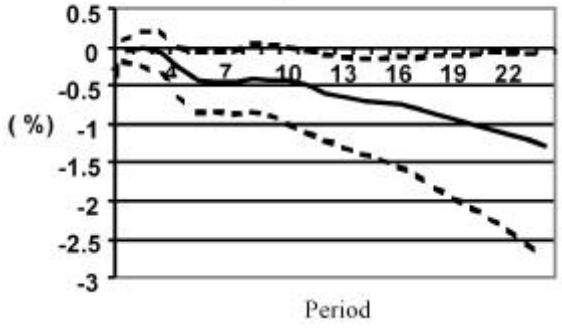


[36] The works by Bernanke and Blinder (1992) and by Leeper, Sims and Zha (1996) may be reviewed for further information on this subject.

d) Finally, Graph Nº 7 shows the response of the real exchange rate to a 5-percentage-point shock in the Spending-Output Gap.

- The response is negative and significant.
- Two years after the shock, the TCR is 1.3 percentage points below its trend level.

Graph Nº7



The Credit Model.

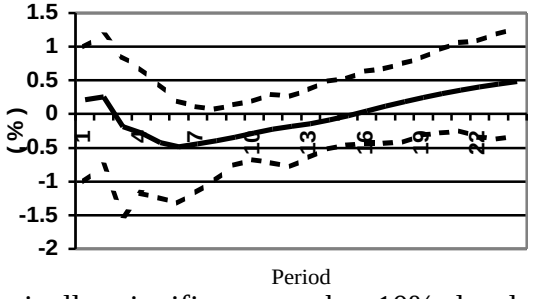
The table below shows the main characteristics of this model:

Variables Included	Nº. of Lags	Period
LTTUC; TASABC; TBE; V12M1A; V12COLOC; V12GASTO; V12PIB; V12TCN; V12IPCSUB; V12DHAB; seasonal dummies; deterministic trend.	Three	1987.01 – 1997.06

a) Graph Nº 8 shows the response of the monetary aggregate M1A to a 50-base-point increase in the monetary policy interest rate, leading to conclude that:

- The response is negative.
- The largest negative effect is reached 6 months after the shock.

Graph Nº8

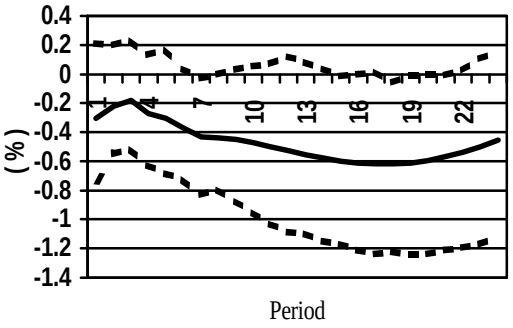


- At its maximum, the response is marginally significant at the 10% level of significance.

b) Graph Nº 9, on its part, depicts the response of the financial system's credit to a 50-base-point increase in the monetary policy rate. From it, the following conclusions can be drawn:

- The credit's response is negative, very persistent and significant at the 10% level.
- This response is at its largest 18 months after the shock, with a reduction 0.60 percentage points in the credit's annual growth rate.

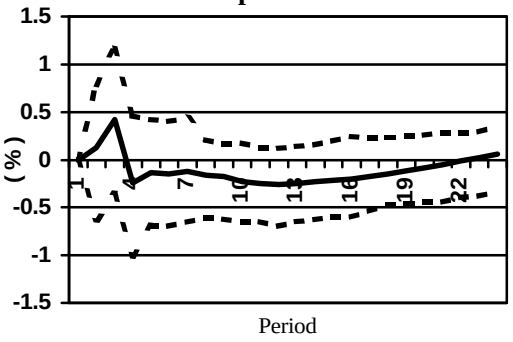
Graph Nº9



c) Graph Nº 10 shows the response of aggregate spending to a 50-base-point shock in the monetary policy rate:

- A lagged negative response is detected from the aggregate spending in the fourth month after the shock. However, this response is not significant at 10%.

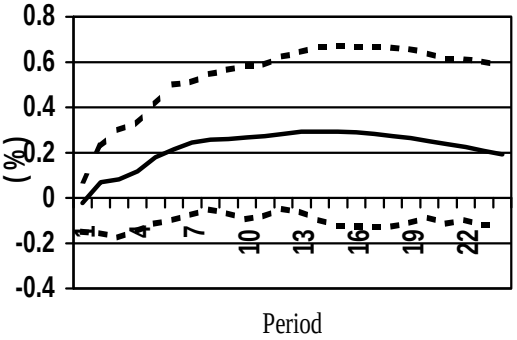
Graph Nº10



d) Graph Nº 11 shows the response of the "core CPI" to an increase of 50 base points in the monetary policy rate:

- The response is positive, revealing the presence of the "price puzzle" mentioned above, as is the case in other studies on the Chilean economy[37]. However, said response is not significant at 10%.

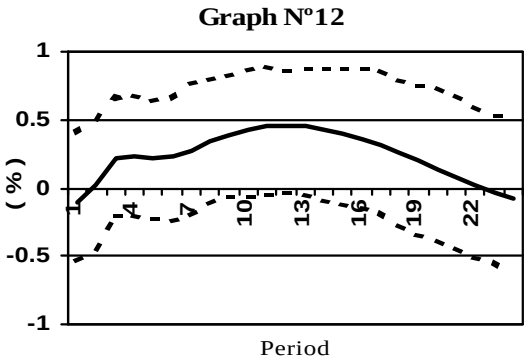
Graph Nº11



[37]See Valdés (1997), Mendoza et al. (1994).

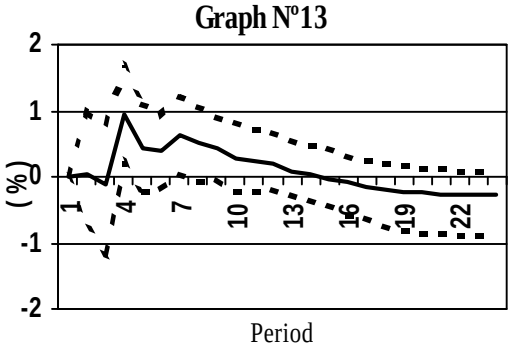
e) Graph Nº 12 depicts the response of the financial system's credits to a positive shock of 5% on M1A. From the results, it can be concluded that:

- The response is positive, arriving at a significant marginal value at 10% between month ten and month thirteen after the shock.
- The credit's response peaks at 12 months after the monetary shock and is near 0.5 percentage points.



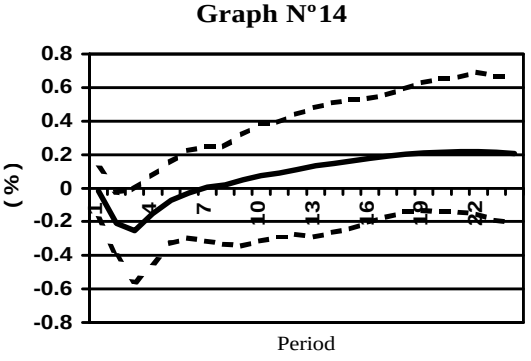
f) Graph Nº 13 shows the response of aggregate spending to a positive shock of 5% in M1A. The main conclusions from this graph are:

- The response is positive and significant at 10%.
- Said response ranges between 4 and 13 months after the shock and peaks near one percentage point.



g) Graph Nº 14 shows the response of the core CPI to a positive shock of 5% on M1A. It can be concluded that:

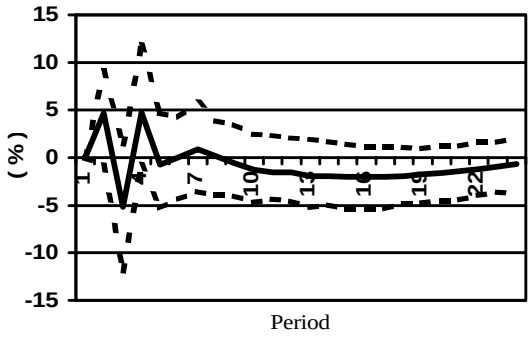
- A negative response is observed between the second and the fourth month after the shock, which is significant at 10%. This result can be interpreted as another indication of the so-called "price puzzle".



- Subsequently, at the fifth month after the shock there appears a positive response from prices, but not large enough to be significant.

h) Finally, Graph Nº 15 shows the response of aggregate spending to a positive shock of 5% in the financial system's credits. The main conclusions that can be derived from this graph are the followings:

Graph Nº15



- The response is somewhat erratic, but positive in the second and fourth months after the shock, that is marginally significant at 10%.

- It must also be noted that the magnitude of the response is relatively large, with its maximum around 5 percentage points.

Monetary Model - Asset Prices.

The main characteristics of the model that we have labeled "monetary-asset prices" are shown in the table below:

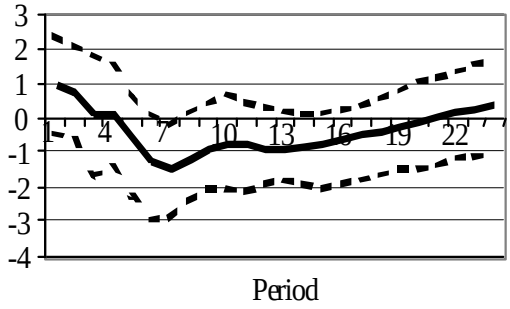
Variables Included (see Annex Nº 3)	**Nº. of Lags**	**Period**
LTTUC; TASABC; TBE; V12M1A; V12IGPA; V12GASTO; V12PIB; V12TCN; V12IPCSUB; V12DHAB; seasonal dummies; deterministic trend.	Three	1987.01 – 1997.06

a) Graph Nº 16 shows the response of M1A to an increase of 50 base points in the monetary policy interest rate, leading to conclude that:

- The response becomes negative at month five after the shock.

- The largest negative effect is reached 7 months later, it is significant at 10% and amounts to almost 1.5 percentage points.

Graph Nº16

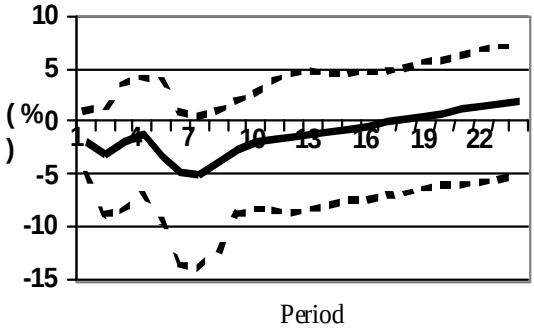


b) Graph Nº 17 shows the response of the general stock price index IGPA to a positive shock of 50 base points in the monetary policy rate. It follows that:

- The response is negative and significant at 10%.

- The response's largest point is achieved between 6 and 7 months after the shock, and it equals 5 percentage points.

Graph Nº17

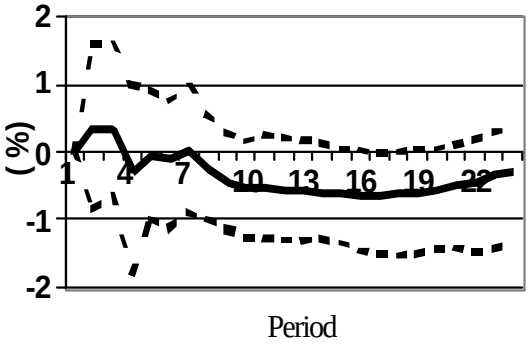


c) Graph Nº 18 shows the response of aggregate spending to a positive shock of 50 base points in the monetary policy rate. It follows that:

- A negative response appears at month eight after the shock, which is significant at 10%.

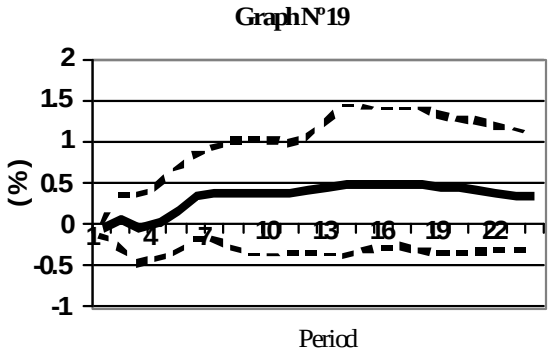
- The maximum effect is reached between 15 and 18 months after the shock, and amounts to 0.6 percentage points.

Graph Nº18



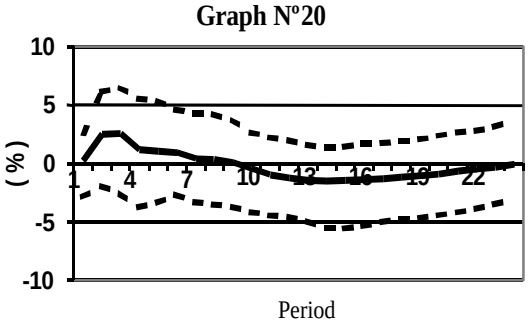
d) Graph Nº 19 shows the response of the "core CPI" to a 50-base-point increase in the monetary policy rate. These results yield the following conclusions:

- Similarly to the credit model case, this model finds a positive response that reveals the presence of the traditional "price puzzle". However, neither in this case is such a response significant at 10%.



e) On the other hand, Graph Nº 20 shows the response of IGPA to a positive shock of 5 percentage points on M1A. The following conclusions can be drawn:

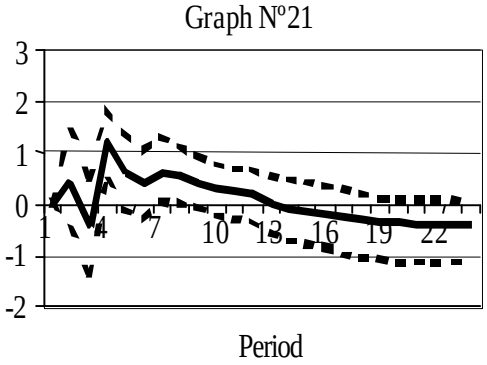
- A positive response is observed between 1 and 9 months after the monetary shock. However, it is not significant.



f) Graph Nº 21 depicts the response of aggregate spending to a 5% positive shock on M1A, showing that:

- The response is positive and significant 10%.

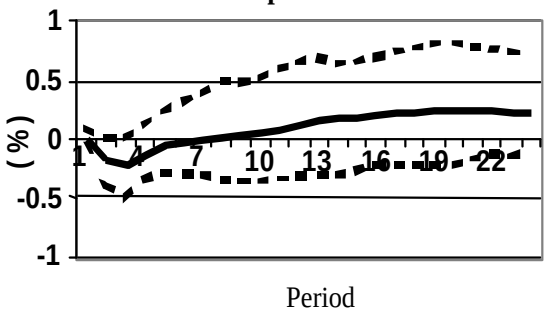
- Said response occurs between 4 and 11 months after the shock and peaks near one percentage point.



g) Graph Nº 22 shows the response of the core CPI to a 5% positive shock in M1A. The following conclusions can be drawn:

- A negative response is observed between the second and the fourth month after the shock, that is marginally significant at 10%. Once again this result can be interpreted as a "price puzzle" manifestation.

Graph Nº22

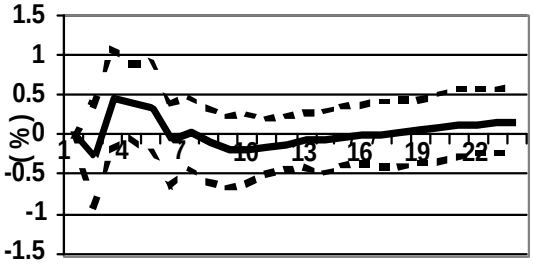


- Subsequently, a positive response of prices appears, but it is not significant.

h) Finally, Graph Nº 23 shows the response of aggregate spending to a positive shock of 10% on IGPA. It follows that:

- A positive response is observed that is marginally significant between month three and month six after the shock.

Graph Nº23



ThePhillips Curve Hypothesis.

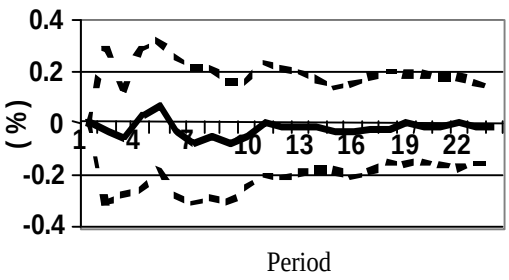
The table below shows a summary of the estimated model's structure to test the hypothesis associated to the Phillips Curve:

Variables Included **(see Annex Nº 3)**	**Nº. of Lags**	**Period**
LTTUC; TASABC; TBE; CYCLE; DV12TCN; DV12IPCSUB; seasonal dummies; deterministic trend.	Five	1986.02 – 1996.12

a) Graph Nº 24 shows the response of the discrepancy between actual and potential output (cycle) to an increase of 50 base points in the monetary policy rate. From this graph it can be concluded that:

- The response is far from significant, so –given the model's specification- no systematic response of the GDP's cyclical component is observed to a shock in the monetary rate.

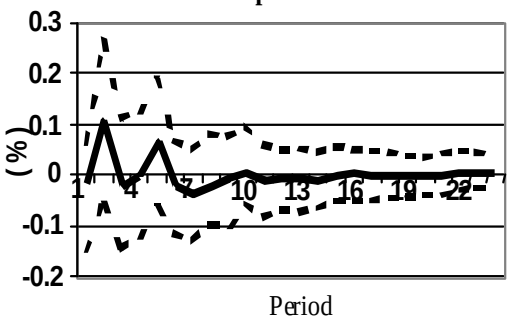
Graph Nº24



b) On the other hand, Graph Nº 25 shows the response of the core inflation's acceleration to a 50-base-point increase in the monetary policy rate.

- Although the observed response is basically positive during the periods immediately following the shock, it is far from significant. Thus, it can be concluded that in this case the "price puzzle" that appears is of a lesser degree than in other models estimated.

Graph Nº25



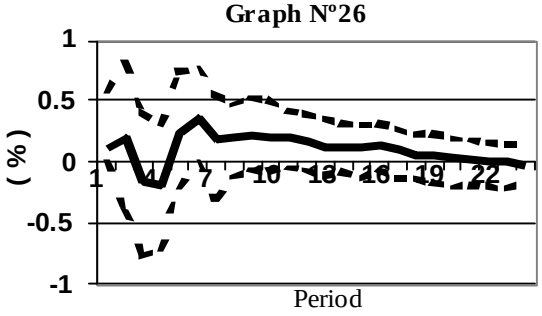
c) Graph Nº 26 shows the response of the core inflation's acceleration to a 5- percentage-point increase in the discrepancy between actual and potential output. It follows that:

- Although at the beginning (between months three and four after the shock) a negative response is detected that is not significant, from month five on a clearly positive and marginally significant response can be seen at the 10% level. This is an indication of the presence of a positive effect from the GDP's cyclical component on the core inflation and, therefore, of the existence of the effect known by the local economic discussion as "overheating".[38] [39]

[38] On this matter, see Zahler (1994). It must also be noted that the international academic literature generally calls "Gap Model" the empirical inflation models that emphasize the existence of this effect. One example of this is the article by Coe and McDermott (1997).

- The same graph shows that at its peak –in month six- said response is of 0.40 percentage points, given the magnitude of the shock we use in our experiment.

Graph Nº26



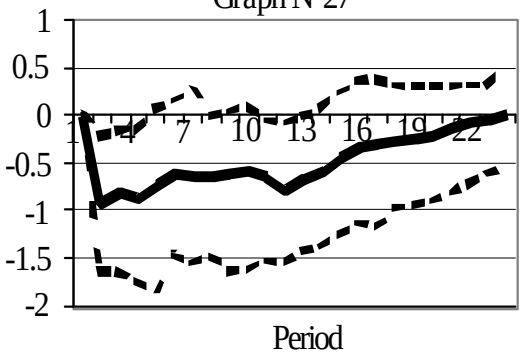
- Also, the results indicate that the positive effect over the inflation's acceleration will remain until the eighteenth month after the shock.

d) Graph Nº 27 shows the response of the cyclical component of GDP (Cycle) to a 5-percentage-point increase in inflation acceleration. It can be concluded that:

- A clearly negative response is observed, that is significant at the 10% level.

- At its largest, this response reaches almost one percentage point and stays negative during the 24 months following the shock.

Graph Nº27



- This evidence is opposed to the hypothesis implicit in the so-called "Lucas Supply", according to which innovations in the inflation rate will have a positive effect on the aggregate output.

[39] The existence of this effect supports the use of the GDP's cyclical component as one of the elements in the Central Bank's Reaction Function.

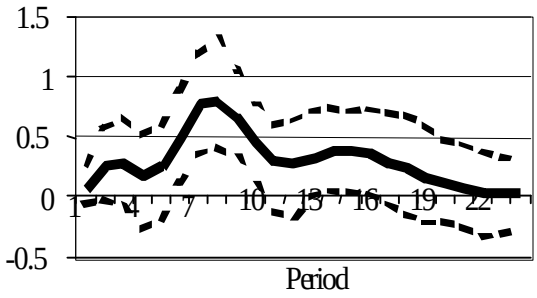
The Interest-Rate Parity Model.[40]

Variables Included (see Annex Nº 3)	**Nº of Lags**	**Period**
TASABC; LIBOR; VTCREXPOST; V3TCN; V3IPC; seasonal dummies, deterministic trend.	Six	1987.01 -1997.12

a) Graph Nº 28 shows the response of inflation to an increase of 50 base points in the monetary rate.

- Again, there is the strong presence of the "price puzzle", since the estimated response is positive and highly significant.

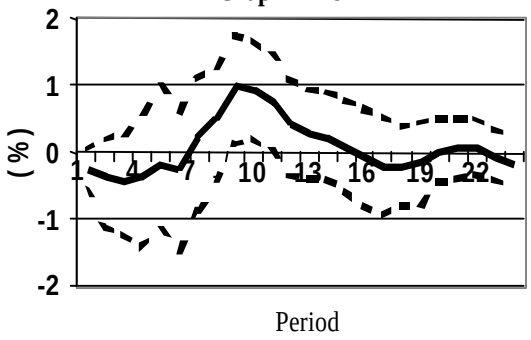
Graph Nº28



b) On the other hand, Graph Nº 29 shows the response of the nominal exchange rate to a 50-base-point increase in the monetary rate:

- Although, as predicted by the interest rate arbitrage hypothesis the initial response of exchange rate is negative, it is far from being significant.

Graph Nº29



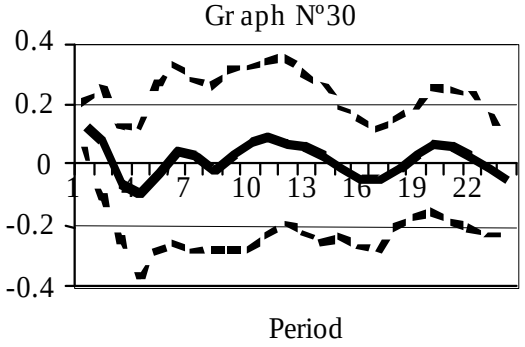
[40] The results below must be considered carefully. Due to the lack of information available, it wasn't possible to include in the model estimated either a country-risk premium or an adjustment for under-one-year foreign credit reserves. Therefore, there may be a model specification problem because of ommitted variables, that might alter the results.

- Then, as of the seventh month after the shock, a positive significant response from the exchange rate is detected, which goes in tandem with the inflation response's behavior. This reveals that some degree of nominal exchange rate indexation exists.

c) Similarly, Graph Nº 30 shows the response of the nominal exchange rate to an increase of 50 base points in the LIBO Rate.

- In this case a slight evidence in favor of the arbitrage hypothesis is detected, since in the month contemporary to the shock there is a positive, significant response. Afterwards, however, the response fluctuates around zero, and is far from being significant.

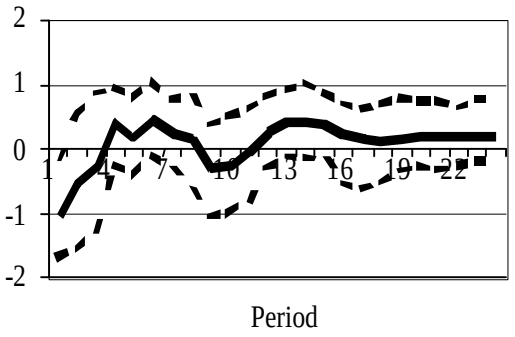
Graph Nº30



d) Finally, Graph Nº 31 shows the response of the rate of inflation to a positive shock of 5 percentage points in the rate of variation of the nominal exchange rate.

- As can be seen in the graph, there is a positive, marginally significant response after 3 months from the aforesaid shock. This reveals that the exchange rate fluctuations have affected the inflation's evolution over the period under study.

Graph Nº31



d) Lessons to Be Learned About Monetary Policy Effectiveness.

A number of conclusions can be derived from the results in the previous section, with respect to monetary policy effects on several macroeconomic variables. This section will focus on the effects on 4 such variables, namely inflation, output, spending, and the real exchange rate.

Monetary Policy and Inflation.

The results associated to the Australian Model indicate that a positive innovation of 50 base points in the monetary policy interest rate will provoke a negative deviation of the non-tradables' CPI from its trend, the magnitude whereof would amount to around 0.4 percentage points after one year and 0.6 percentage points after 2 years. These results are similar to the ones obtained by Rosende and Herrera (1991), who estimate that an increase of 120 base points in the banks' deposit interest rate provokes a global price level deviation from its trend in the 0.43 to 0.75 percentage points range, with an estimated duration of roughly 6 quarters.[41]

Our results also seem generally consistent with the ones obtained by Eyzaguirre and Rojas (1996), who estimate that a 100-base-point increase in the banks' credit interest rate will reduce the non-tradables' inflation by 0.3 percentage points after one year, and will jump to 1 percentage point after one year and a half..[42]

In contrast, the papers by Valdés (1997) and Mendoza and Fernández (1994) find a positive response of inflation to a shock of the same sign in the interest rate. On this matter, it must be noted that Mendoza and Fernández describe their result pointing out that, while there

[41] Considering that the magnitude of the shock used in our estimate is 0.42 times the magnitude of Rosende and Herrera's shock, and that the share of non-tradables in the overall CPI is 50%, it can be concluded that the responses calculated in both studies are very similar in size. However, special care must be taken with this conclusion because it will hold only if the CPI of tradables is independent from that of non-tradables, a condition that will not occur in the presence of any degree of exchange-rate indexation.

[42] It must be noted that in the papers by both Rosende and Herrera and by Eyzaguirre and Rojas, the shock analyzed is not the true monetary policy instrument, so interpreting them as monetary shocks is dubious.

appears to be no systematic effect of the interest rate on inflation, upon sharp increases in said rate (such as the ones observed in Chile between 1988 and 1992), there will be a negative effect on inflation with a 9-month lag. On the other hand, in an attempt to resolve the aforesaid puzzle, Valdés uses as a variable the difference between actual and the Central-Bank's target inflation, and finds a negative effect of the interest rate on that difference. However, in our opinion this procedure is inadequate because the reported result implies that an increase in the interest rate would provoke an increase in the target inflation (and this would be larger than the one observed in actual inflation, in such a way as to reduce the differential) which makes no economic sense. Another problem in Valdes's procedure is his use of the inflationary projections of a local consulting office as a target inflation proxy, very questionable. For such reason, we reconstructed the aforesaid inflationary differential using the targets reported by the Central Bank itself from 1991 on (see Magendzo, 1997) and incorporated it into different VAR systems, and found no systematic effect of the interest rate on it.

The "price puzzle" is present in many of the models estimated in this work. However, a global evaluation of our results yields that, as stated by Leeper, Sims and Zha (1996), the "price puzzle" is supposedly the result of wrong identification assumptions and of specification problems in the VAR system.[43]

Monetary policy and Activity.

As for the monetary policy effects on activity indicators, our results show very weak negative responses by aggregate spending, GDP, and the GDP's cyclical component to positive shocks in the interest rate used as a monetary policy instrument. Only in the case of the gap between the growth rates of spending and output is a stronger negative response detected, that lasts 13 months and that in its maximum point (around month eight) is

[43] This, because by using identifying assumptions consistent with our results, a substantial mitigation of the anomalous response of inflation appears in comparison with the VAR systems with the traditional recursive identification (non-structural VAR). In addition, said results show that the strength of the "price puzzle" varies inversely to the estimated model's global adjustment.

somewhere between one and two percentage points, to an increase of 50 base points in the aforesaid interest rate.

On the other hand, it must be noted that our results show significant positive responses from both GDP and aggregate spending to positive innovations in the nominal money supply. In the case of aggregate spending, said response is observed between the fourth and the thirteenth month after the shock (of 5 percentage points in M1A) and reaches a magnitude of 0.5 to 1 percentage point.

Rosende and Herrera (1991), in turn, find a positive effect of nominal money on the deviation of GDP from its trend so that, according to their estimates, a 3.2-percentage-point increase in the money supply will generate a positive deviation of GDP ranging between 0.36 and 0.89 percentage points during 4 quarters. Similarly, they find that an increase of 120 base points in the interest rate (of price-level-adjustable 1-year bank deposits) will reduce the output's deviation by an estimated 0.97 to 1.25 percentage points after 4 quarters, an effect that will fade out in the seventh quarter after the shock.[44]

More consistently with our results on this matter, Mendoza and Fernández (1994) find no systematic effect of the interest rate (of 1-year bank credits) on the GDP's gap from its potential level, but they do observe a Granger causality from M1A to this gap.

Along the line of Rosende and Herrera's results, Eyzaguirre and Rojas (1996) find that an increase of 100 base points in the interest rate (of 1-year bank credits) will reduce the aggregate spending's growth rate by an estimated 1 percentage point in the short run, an effect that will reach an estimated 1.5 percentage points after 5 to 6 quarters.

Finally, Valdés (1997) also finds a negative effect of the interest rate (of 90-day PRBCs) on the output growth rate (IMACEC approximation). Such an effect will be observed for an

[44] Unfortunately, Rosende and Herrera do not report the significance bands associated to the impulse-response functions, so it is not possible to determine whether or not the effects detected are statistiacally significant.

estimated 4 to 15 months after the shock and will amount to some 0.5 percentage points upon an increase of 30 base points in the aforesaid interest rate.

A global evaluation of these results leads to the conclusion that the estimated response of spending and aggregate production to shocks in the interest rate appears to be strongly influenced by the VAR-system specification used. In contrast, the effects of monetary innovations appear to be more robust.

Monetary policy and Real Exchange Rate.

The Australian Model version reported herein shows that a positive shock of 50 base points in the monetary policy rate will provoke a positive deviation of the real exchange rate from its trend, which after a year will amount to one percentage point, and after two years will be near two percentage points.

The results reported by Eyzaguirre and Rojas (1996) tend to back our own, because they find a positive effect of the interest rate on the real exchange rate and state that, after 3 quarters from the shock in the interest rate, it explains around an estimated 20% of the forecast error of the model with respect to the aforesaid relative price.[45]

In contrast, the works by Mendoza and Fernández (1994) and Valdés (1997) find no significant responses of the real exchange rate to shocks in the interest rate.[46, 47]

5. MAIN CONCLUSIONS.

The most robust results of our research are those on the Central Bank's Reaction Function. In this sense, the evidence shows that during the period analyzed the monetary authorities

[45] Unfortunately, these authors report no estimates on the magnitude of the real exchange rate's response.
[46] It must be noted that the real exchange rate definitions used by these authors differ from the one used herein, and ours is the same one used by Eyzaguirre and Rojas.
[47] Rosende and Herrera (1991) report no results on the monetary policy's effect on the real exchange rate.

have responded systematically to signs of "overheating" (a discrepancy between actual and potential GDP or to a spending-output gap)[48] and to direct inflation indicators (nominal wages and the CPI) by increasing the interest rate used as an instrument.

Paradoxically, the results yield a weak evidence in favor of the hypotheses whereby spending and output respond negatively to the monetary policy instrument. In this sense, the greatest response is found in the spending-output gap. However, spending and output do seem to respond systematically to shocks in the nominal money supply. Here the obvious question arises about the possible convenience of redefining the variable used as a monetary policy instrument.

Still more paradoxical is the evidence showing that in the large majority of the models estimated inflation responds positively to an increase in the monetary policy rate (price puzzle). It must be mentioned, however, that regarding the results offered by the traditional VAR systems, the use of "structural" identification assumptions permits to reduce this anomaly substantially, making it non-significant in most cases. Also, within the Australian Model's context, a response with the expected negative sign and significant is detected. Given this, it can be speculated that the "price puzzle" phenomenon is associated not only to the wrong selection of identification assumptions, but also to specification problems in the VAR system. This, because the aforesaid anomalous result is observed with more strength in the models that tend to be rejected by the data in general terms.

As for the global empirical evaluation of the theoretical transmission mechanisms, the one getting the most support is the one associated to the Australian Model, since the results show a (weak) negative effect of the monetary policy rate on the spending-output gap[49]. Also, a negative effect from the monetary policy on the non-tradables' price level and a positive effect on the real exchange rate level are detected. Finally, the evidence shows the

[48] Although this version of the document only shows the results regarding the response of the monetary instrument to innovations in the GDP's cyclical component, the impulse-response functions that were obtained with the Australian Model are evidencing the existence of a positive and significant response to shocks on the spending-output gap.

[49] It must be noted, however, that from a strict econometric point of view, the correct way to compare the estimated models is to use nested tests. Sadly, this can't be done because the available data are not sufficient.

existence of a negative effect from the spending-output gap on the real exchange rate (both on its level and on its acceleration).

Monetary models, in turn, (under both the credit and the asset price approaches) get mixed support. This, because -consistently with the models' predictions- the empirical evidence shows that the monetary policy rate has a negative effect on M1A, on the financial system's credits in real terms and on the real IGPA. It must be noted, however, that the evidence shows that the positive relationship between monetary shocks (M1A), the financial system's real credits and stock prices (real IGPA) are weak.

Still consistent with the monetarist hypotheses, most of the models estimated show the existence of a strong positive effect on aggregate spending upon a shock in nominal money balances. Also, the results obtained consistently show the existence of positive effects on aggregate spending associated to shocks in both the financial system's credits and stock prices.

Despite the above, the monetarist view does not receive full support to its predictions, because the evidence provides weak support to the presumption of a negative effect of the monetary policy rate on aggregate spending. Besides, the results show the existence of the "price puzzle", even with the anomalous response being non-significant more often than not.

As for the Phillips Curve hypothesis, the evidence collected is adverse. This because the results obtained do not permit to propose that a "Lucas Supply" exists, since innovations in inflationary acceleration provoke a clearly negative effect on the GDP's cyclical component. Accordingly, neither is a significant effect of shocks in the monetary policy instrument detected on the cyclical component of the GDP. In addition, the same evidence shows the presence of a "price puzzle", but which, the same as in most of the other cases where this result appears, is not statistically significant.

It must be noted, however, that the evidence collected when estimating the model we call the Phillips Curve, shows a strong positive effect on the core inflation's acceleration

resulting from a shock in the GDP's cyclical component. This is the primary prediction arising from the empirical inflation models based on the "overheating" hypothesis (Gap Model), that for many is another version of the Phillips Curve.[50]

On the other hand, the hypothesis that gets the least empirical support, according to the models estimated, is the interest-rate-parity one.[51] This, because the results show that the sign of the nominal exchange rate's response to shocks in the domestic interest rate is the opposite of the expected one. Besides, its response to shocks in the foreign interest rate is very weak. Finally, in the estimated versions of this model, the presence of the "price puzzle" is strong.

Finally, it must be pointed out that after the above comparison there is no presumption that the transmission mechanisms analyzed are intrinsically incompatible with each other, because the theory shows that, in generally, they can appear simultaneously. Thus, the true purpose of the aforementioned comparison is to determine which ones among the theoretical transmission channels have manifested themselves with greatest strength over a specific period of Chile's economic history.

[50] See the references mentioned in footnote Nº 14.
[51] As mentioned above, this can be due to specification problems in the model because of limited data available.

ANNEX Nº1:

Essential Monetary Policy Guidelines According to Selected Authors

Author	Instrument	Intermediate Objective	Goal	Transmission Mechanism
R. Valdés (1997)	• 90-day PRBC interest rate (1985-April 1995) •Interbank rate from May 1995 on)	• Gap between growth rates of actual and potential output	• Current Account (1985-89) • Inflation (1989 on)	• Not disclosed
Mendoza and Fernández (1994)	• 90-day PRBC interest rate	• M1A growth rate • Gap between actual and potential output (trend)	Inflation	• PRBC interest rate affects market rates and M1A growth rate. This affects the spending-output gap, thereby determining inflation. • As an alternative mechanism they propose one whereby unexpected inflation affects output trend deviations and inflation.
Eyzaguirre and Rojas (1996)	• 90-day PRBC interest rate (1985-April 1995) • Interbank rate (from May 1995 on)	• Spending Expansion rate	• Current Account Deficit no greater than 3-4% of GDP • Gradual reduction of inflation	• PRBC rate affects market credit rates, that influence the expansion of aggregate spending. This ultimately affects price and wage inflation.
Budnevich and Pérez (1995)	• 90-day PRBC interest rate (1985-April 1995) • Interbank rate (from May 1995 on)	• Spending-potential output gap	• In the 80s: real exchange rate • In the 90s: - Real exchange rate - Current Account Deficit no greater than 3-4% of GDP - Inflation.	• Market rates closely linked to Central Bank's short rate. Market rates affect spending and thereby affects the inflation rate.
Magendzo (1997)	• 90-day PRBC interest rate (1985-April 1995) • Interbank rate (from May 1995 on)	• Spending-output gap	• "High" TCR and Current Account (1985-1989). • Mid- and long-term equilibrium of TCR (in the 90's) • Inflation • Current Account Deficit no larger than 3-4% of GDP	• The rate has communicational properties and affects the spending-output gap, which determines the inflationary trend.
R. Zahler (1994)	• 90-day PRBC interest rate	• Actual output-potential output gap • Gap between growth rates of spending and potential output.	• Inflation • Mid- and long-term Current Account Deficit no larger than 3-4% of GDP	• Interest rate affects spending growth which in turn affects inflation.

ANNEX Nº 2:

SUMMARIZED TABLE OF EMPIRICAL RESULTS FROM SELECTED STUDIES

	Monetary Policy Effect Over:			
Author	**Inflation**	**Activity**	**TCR**	**Methodology Used**
Rosende and Herrera (1991)	• A 120-bp increase in the interest rate causes negative effect on price level deviation from trend in the 0.43 and 0.75 percentage point range and lasts around 6 quarters. • After 4 quarters, 45% of the variance in price level deviations is attributable to shocks on TCR and 12% to shocks in the interest rate. Money explains a mere 0.64% of said variance.	• A 120-bp increase in the interest rate will reduce the output's deviation from its trend by 0.97 to 1.25 percentage points after 4 quarters. This effect is transitory, lasting roughly 6 quarters. • A positive 3.2-percentage-point shock in money will increase the output's deviation from its trend by an estimated 0.36 to 0.89 percentage points during 4 quarters. • After 4 quarters, shocks in money explain an estimated 22% of GDP's variance, while shocks in the interest rate explain 14% of said variance. In the mid-run, (i.e. 8 to 16 quarters) the real exchange rate explains nearly 43% of the output's variance.	• No results from the VAR relating to the effects of monetary variables on the TCR are reported.	• 90 to 365-day inflation-adjustable deposit rate is used as a proxy to the monetary policy instrument • Quarterly data are used for the period from Q1 1978 to Q2 • A VAR system is estimated that includes: exchange rate; interest rate; TCR (Central Bank); CPI; M1A; GDP. • Variable deviations from the trend are used (Kydland and Prescott's filter)
Mendoza and Fernández (1994)	• The interest rate has no Granger causality on the inflation rate for 12 months. • M1A has no Granger-causality on inflation, but inflation does cause M1A • Week evidence exists that the output gap with its potential level has a Granger causality on inflation. • No systematic effect exists on inflation from an increased interest rate in UF (actually, the VAR shows an initial positive response) • Only sharp interest rate increases (1988-1992) induce	• The interest rate has no Granger causality on the output gap. • The M1A's 12-month growth rate has a Granger causality on the output gap, but not vice-versa. • Unexpected inflation has a Granger causality on the output gap (impulse-response analyses show that the relationship is negative). • No systematic effect exists of the interest rate in UF on the output gap. • Only sharp interest rate increases (1988-1992) induce a output-gap reduction with a lag of 9 months.	• No systematic responses to shocks in the UF interest rate or to shocks in the growth-rate of M1A are reported.	• 90 to 365-day inflation-adjustable deposit rate is used as a proxy to the monetary policy instrument • Quarterly data are used for the period from January'86 to March'94. • Granger causality test: interest rate-intermediate objectives (i.e. money, output gap (money; output gap); intermediate objectives inflation.; interest rate- inflation. • VAR: interest rate; 12 month variation rate of M1A; actual seasonally adjusted output gap-trend; 12-month inflation rate; TCR; terms of trade (exogenous variable).

	inflation drops with a 9-month lag.			
Eyzaguirre and Rojas (1996)	• A 1-percentage-point increase in the spending-output gap will increase non-tradables' inflation by 0.25 percentage points during the 2 to 3 months following the shock. This effect amounts to an estimated 0.5-0.6 percentage points after 5 to 6 quarters. • A 100-bp increase in the credit interest rate will reduce the non-tradables' inflation by 0.3 percentage points after one year, accumulating a 1-percentage point reduction after 18 months from the shock. • Innovations in the spending-output gap explain an estimated 50% of the non-tradables' inflation variance after 4 quarters.	• An increase of 100 bp in the credit rate will expectedly reduce the spending's growth rate by 1 percentage point in the short run. This effect will increase to 1.5 percentage points after 5 to 6 quarters. • Innovations in the credit rate explain 25% of the spending's variance, and its greatest impact occurs after the third quarter.	• After 3 quarters, innovations in productivity, the credit rate and the spending-output gap explain 20 to 24% of the TCR each. In contrast, the differential between the domestic and the foreign rates explains no significant fraction of said variance.	• 30 to 90-day inflation-adjustable deposit rate is used as a proxy to the monetary policy instrument • Quarterly data: Q1 1998 to Q4 1995. • Simple correlation analysis between the PRBC90 rate, the 30 to 365-day bank credit rate and a hybrid foreign interest rate (looking for association). • Decomposition of the variance of the PRBC90 rate, the 90 to 365-day bank credit rate and a hybrid foreign interest rate (looking for causality). • OLS regression: first difference of spending against own lags and disposable income, the credit rate and the foreign rate. Variance analysis of spending forecast error. • OLS regression: non-tradables' inflation against own lags and lags of the spending-output gap, wages, the exchange rate and tradables' inflation; Variance Analysis of the non-tradables' inflation forecast errors. • OLS regression: real exchange rate against mean productivity lags, the credit rate, the domestic-foreign rate differential and the spending-output gap; Variance analysis of the real exchange rate forecast error.
R. Valdés (1997)	• The monetary policy rate has a reported negative transitory effect (between months 6 and	• Transitory negative effect (between months 4 and 15) on the growth rate of the IMACEC. A30-bp increase in the interest	• No significant effect	• Monthly data: January 1985 to August 1996 • The PRBC90 and the interbank rates

	12) on the gap between core and target inflation. A 30 bp in the rate reduces the gap by 0.4% after 9 months. • Non significant positive effect over the "core inflation level"	rate reduces the IMACEC's growth rate by 0.5% (maximum effect after 7 months). • Transitory negative effect (between months 7 and 18) on spending-output gap.		are used as a proxy to the monetary policy instrument. • "Semi-structural" VARs: interest rate; core-target inflation gap; IMACEC's 12-month variation rate; TCR's 12-month variation rate; M1A's 12-month variation rate; Spending's 12- month variation rate.

ANNEX Nº3

VARIABLE NOMENCLATURE AND DESCRIPTION

BRECHA: Is the difference between the 12-month percentage variation of spending and output. (Source: the Chilean Central Bank)

CICLO: Is the differential between the seasonally adjusted GDP logarithm and the potential GDP.

DTASABC: Is the first difference of 90-day PRBC levels.

DTBE: Is the first difference of 8-year PRC levels.

DV12IPCSUB: Is the first difference of the 12-month percentage variation in the IPCSUB.

DV12TCN: Is the first difference of the 12-month percentage variation in the TCN.

DV12IPCNT: Is the first difference of the V12IPCNT variable.

DV12TCRINE: Is the first difference of the V12TCRINE variable.

LCOLOC: Is the logarithm of the Financial System's Real Actual Credits. (Source: Superintendence of Banks & Financial Institutions)

LDHAB: Is the logarithm of working days (Source: own calculations).

LGASTO: Is the logarithm of Aggregate Spending expressed in millions of pesos of 1986 purchasing power. (Source: the Chilean Central Bank).

LIGPA: Is the logarithm of the real IGPA.

LIPCNT: Is the logarithm of the non-tradables' price index (Source: National Institute of Statistics INE).

LM1A: Is the logarithm of the money aggregate M1A (Source: The Chilean Central Bank).

LIBOR: Is the 90-day LIBO rate deflated by the United States inflation. (Source: The Chilean Central Bank).

LIPCSUB: Is the logarithm of the Core Price Index (Source: Catholic University's Data Base).

LPIB: Is the logarithm of the Gross Domestic Product in millions of pesos of 1986 purchasing power. (Source: Chilean Central Bank).

LTCN: Is the logarithm of the Nominal exchange rate. (Source: Chilean Central Bank).

LTCRINE: Is the logarithm of the Real exchange rate, defined as the ratio of the Tradables' price index to the Non-tradables' Price Index. (Source: INE).

LTTUC: Is the logarithm of the terms of trade. (Source: Catholic University's Data Base).

TASABC: Is the 90-day PRBC rate. (Source: Chilean Central Bank).

TBE: Is the 8-year PRC rate. (Source: The Chilean Central Bank).

VTCREXPOST: is the 90-day ex-post variation of the Real exchange rate, defined as the 90-day ex-post variation of the TCN, plus the 90-day variation of the United States' CPI, less the 90-day ex-post variation of the Chilean CPI. The term ex-post stands for the variables being advanced by one quarter.

V3IPC: Is the 90-day percentage variation of the CPI.

V3TCN: Is the 90-day percentage variation of the TCN.

V12COLOC: Is the 12-month variation of the Actual Credits in Real Terms.

V12DHAB: Is the 12-month variation of the working days.

V12GASTO: Is the 12-month variation of Spending.

V12IGPA: Is the 12-month variation of the Real IGPA.

V12IPCNT: Is the 12-month percentage variation of the Non-tradables' CPI.

V12IPCSUB: Is the 12-month variation of the core CPI.

V12M1A: Is the 12-month variation of the Money Aggregate M1A.

V12PIB: Is the 12-month variation of the Gross Domestic Product.

V12TCN: Is the 12-month variation of the Nominal exchange rate.

V12TCRINE: Is the 12-month variation of the Real exchange rate.

V12WUC: Is the 12-month variation of nominal wages. (Source: INE).

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