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FISCAL AND MONETARY POLICY RULES: THE RECENT CHILEAN EXPERIENCE

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Resumen

Este trabajo describe las reglas de política monetaria y fiscal utilizadas en Chile en años recientes. Sobre reglas de política monetaria, se presentan tanto el marco para los supuestos que guían la construcción de proyecciones de inflación y crecimiento como las características generales de reglas de tipo Taylor. El rol de los supuestos sobre la tasa neutral así como que tipo de índice u horizonte temporal a considerar se incluyen en la discusión. Sobre reglas fiscales, el trabajo presenta la metodología de balance estructural utilizada por el fisco desde el año 2001. Esta regla implica que los gastos evolucionan de acuerdo a la dinámica del ingreso estructural, el cual es consistente con pleno empleo y el precio de largo plazo del cobre. Los supuestos clave que subyacen la tendencia de crecimiento potencial y este precio de largo plazo del cobre no se fijan de manera discrecional sino que siguen las recomendaciones de paneles de expertos independientes. Concluimos con una evaluación positiva de la experiencia reciente en Chile con reglas de política fiscal y monetaria. En lo central, en esta experiencia el rol principal estabilizador del ciclo descansa en la política monetaria que se guía por un esquema creíble de metas de inflación, así como en evitar políticas fiscales que exacerban el ciclo. A pesar de las tumultuosas condiciones externas entre 1999 y 2003, la economía chilena logró mantener tasas de crecimiento positivas, muy reducidas tasas de interés y spread soberanos, deuda pública estable, así como baja inflación. El repunte cíclico en 2004 y 2005 se ha visto acompañado por un proceso gradual de normalización de la expansividad de las condiciones monetarias y una mejora sustancial de las cuentas fiscales.

Abstract

This paper describes monetary and fiscal rules used in Chile in recent years. On monetary policy rules, we present both the framework for monetary policy rate assumptions that guide the construction of inflation and growth forecasts, as well as the broad characteristics of Taylor-Type Rules that reflect recent monetary policy actions. The role of the assumptions on the neutral policy rate as well as issues as what inflation index or time horizon to consider are included in the discussion. On fiscal rules, this paper presents the structural balance methodology used by the Chilean public sector since 2001. This rule implies that expenditures should evolve according to the dynamics of structural fiscal income, which is consistent with full employment and a long-term copper price. The key assumptions underlying the trend GDP growth and the long-term copper price are not set in a discretional way but rather follow the recommendations of two panels of independent experts. We conclude with a positive assessment of the recent Chilean experience with monetary and fiscal policy rules. This positive assessment is driven by the prominent role of monetary policy as the stabilizing macroeconomic instrument under a credible inflation targeting regime, and the avoidance of pro cyclical fiscal policies. In spite of tumultuous external conditions between 1999 and 2003, the Chilean economy managed to sustain positive rates of growth, record-low domestic interest rates and sovereign spreads, stable external public debt, as well as low inflation. The recent upswing in 2004 and 2005 has been accompanied by a smooth normalization of monetary conditions and a substantial improvement in fiscal balances.

1. Introduction

The Chilean economy, and Latin American economies in general, have experienced in the past decades a high degree of macroeconomic volatility. This is apparent in the boom-bust cycles of economic growth, large movements in nominal and real exchange rates, as well as several, but thankfully nowadays less frequent, bouts of high and even hyperinflation. There can be little doubt that this has stemmed from an inherently volatile environment related to the large swings in commodity prices and the high weight of raw materials in the region's export basket. However, weak institutional frameworks have surely amplified the effects of external shocks, through procyclical macroeconomic policies. It has been forcefully argued[1] that in Latin America procyclical fiscal policies are related to a higher macroeconomic volatility, lower growth, and worse income distribution, while weak incentives as well as poorly managed monetary policy have also worsened the domestic impact of sudden-stops in capital inflows[2]. Therefore, one of the main challenges for Latin American economies, and Chile in particular, is the development of macroeconomic institutions that at least mitigate the exacerbation of the business cycle through economic policies, while hopefully moving to a modern countercyclical framework, that actually smoothes economic fluctuations.

These aspects highlight the practical importance of the theoretical discussion of rules versus discretion in economic policy making. Full discretion has a number of implications for the evolution of the macroeconomy over time and over the cycle. A prime channel over which these implications work out is on the beliefs of economic agents. It is likely that policy makers have very heterogeneous preferences, and strategic behavior might lead them to not communicate to these preferences to the agents. This need to not be related only to self-interest, via corruption or "crony-capitalism", but can arise from the political business cycle that makes incumbents react differently to shocks than in circumstances far from election dates. Also, different political parties do not share in principle the same views on how an economy should evolve, but the electorate might not be aware of these as all parties attempt to woo the same median voter. Moreover, even a benevolent policy maker with unchanging preferences will display time-inconsistent behavior if it is allowed to take for granted private agents expectations about the future.

All these very concrete features of political and economic life end up, at the best, reducing the private agents planning horizons and increase their discount rates of the future, given that uncertainty about future policies is high. At the worst, sudden shifts in expectations can lead to sharp movements in relative prices, such as the exchange rate, without a very clear linkage to fundamental variables. Hence, achieving a more predictable economic policymaking can reduce the risk of destabilizing macroeconomic policy.

Over time, however, the adherence to sound rules for the design of macroeconomic policy can actually improve the credibility of the institutions and the reputation of policymakers[3], therefore allowing more discretion and flexibility in the response to shocks. This has been labeled, in the inflation-targeting parlance, a shift in the credibility-flexibility tradeoff[4], or the allowance for constrained discretion in policy making[5]. In other words, the build up of credibility is that the macroeconomic policy institutions have clear objectives and that the policymakers that manage these institutions have reputations that are known and invariant. This shift allows eventually using macroeconomic policies in a countercyclical way, to smooth the business cycle, achieve price stability and maintain the financial soundness of the economy as a whole. This is the stage where most OECD economies are presently and the stage where emerging economies hopefully will converge over time.

The experience of Chile's institutional development in the last few years shows some of this convergence. First, the Chilean economy has been subject to large external shocks, including the lowest copper price since the Great Depression, financial turbulence in emerging and developed economies, and a recession in

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[1] See Perry (2002).
[2] See Caballero and Krishnamurthy (2003).
[3] It is generally understood that credibility is a quality of policies, while credibility of the policymakers is referred to reputation. In this sense, a credible policy is a policy that agents expect will have its intended effects, while a reputed policymakers is one for which his preferences are known by the public, and are expected to remain invariant (Drazen 2000).
[4] See Mishkin and Schmidt-Hebbel (2002).
[5] See Bernanke et al. (1999).

the US. However, in spite of these negative developments, the Chilean economy was managed to achieve positive, though modest, rates of economic growth, reduce interest rates at their historical lows, maintain annual inflation around the official target of 3%, notwithstanding a large real and nominal exchange rate depreciation, manage a 2% structural fiscal adjustment, and achieve the lowest sovereign spreads on record while improving creditworthiness.

This performance was supported by the aggressive monetary policy easing in the main economic areas. However, we think that the success in avoiding domestic financial instability and a large real effect of the worsening external conditions was due to the enhanced credibility in both monetary and fiscal policies. This credibility resulted from a clear set of objectives, a clear set of instruments, and a proper coordination between the fiscal authority and the autonomous Central Bank.

On the monetary policy side, the stated objective of the Chilean Central Bank (CB) since 2000 is to keep annual inflation close to 3%, and within a target range of 2 to 4%. This objective is to be achieved over a horizon of 12 to 24 months, recognizing therefore that monetary policy has an impact only over that period of time and not on a shorter horizon. This framework for monetary policy coincided with the abandonment of the exchange rate band in 1999, and the shift to a flexible exchange rate regime. Although there have been exceptional periods of intervention in the foreign exchange market, policy has accommodated large swings in the real exchange rate without noticeable negative effects either on financial stability or inflation.

In this macroeconomic framework, the exchange rate plays a fundamental role in absorbing external shocks. Therefore, an increase in the volatility of the exchange rate is to be expected, which may produce uneasiness in those agents whose income or debt service depend significantly on the behavior of the exchange rate. The development of a deep and liquid hedging market is necessary to lessen the effects of exchange rate volatility on exporters and foreign currency debtors. This has been the case in developed economies bound to the price of raw materials such as Australia and New Zealand[6].

On fiscal policy, the incoming government in 2000 announced a fiscal rule to guide budgetary discussions, based on public target for the structural surplus, that is for the fiscal balance at full employment and with the copper price at its long run level. The latter adjustment is crucial as copper income from Codelco, the large state-owned copper mining company, represents 5,4% of total on the budget income[7]. In simple terms, this framework implies that Central Government spending is tied to trend GDP growth, and therefore all transitory shifts in income accrue to public saving.

This monetary and fiscal framework recognizes that the brunt of the business stabilization role must be borne by monetary policy. This is consistent with the known precept that under an open capital account and flexible exchange rates, monetary policy is more effective than fiscal policy, as the exchange rate transmission mechanism to net exports bolsters the impulse of monetary policy but dampens the impulse of fiscal policy. Thus, although one can recognize a rule-based framework both for fiscal and for monetary policy, there is a substantial degree of discretion on the part of monetary policy. Comparatively, fiscal policy is more tightly structured around a few key parameters, such as the long run copper price and trend GDP growth. Moreover, nearly 75% of the total fiscal outlays correspond to inflexible expenditures, such as wages, pensions, subsidies determined by law, and other contracted spendings like debt interest payments. The relative activism that is asked to both policies is clearly defined and understood: monetary policy is the main countercyclical instrument. In other words, proper coordination stems naturally from a framework that explicitly recognizes the stabilization role of fiscal and monetary policies.

An issue we will not explicitly address in this paper is the optimality *de jure* versus *de facto* commitment to a monetary or fiscal rule. The commitment to the monetary policy rule comes both from the legal autonomy

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[6] There is discussion on whether unremunerated reserve requirements are a good tool to reduce exchange rate volatility produced by the volatile behavior of capital flows. The Chilean authorities believe this tool is no longer needed in Chile, because the level of institutional development has increased. Nevertheless, in economies that are in the process of building economic institutions it may be useful to use unremunerated reserve requirements when external volatility endangers this process, if the use of this instrument is transitory, and if it does not substitute for economic policies that are coherent and stabilize the economy.

[7] This includes both tax receipts and distribution of profits. Average 1995-2004.

enjoyed by the Central Bank as well as being held accountable by society as to whether it is fulfilling its self imposed inflation target. On the fiscal side, evidence indicates that there seems to be little to be gained by attempting to legally bind a sovereign state to a particular set of guidelines. Reputation and the costs of deviating from the self-imposed targets should be enough incentives.

The rest of this paper is structured as follows. The next section presents in detail the current fiscal rule and its rationale. The third section presents existing estimates of monetary policy rules for Chile, and its evolution over time. The fourth section summarizes the main policy actions and macroeconomic developments of the recent years, discussing the role of monetary and fiscal rules in the economic outcomes. Finally, the fifth section concludes.

2. The Fiscal Rule[8]

Regarding fiscal policy, the current government committed itself to conduct fiscal policy based on the rule of maintaining a structural surplus of 1% of GDP. The objective for adopting such a rule is to provide a signal to foreign and domestic investors that fiscal policy would be prudent, while at the same time providing the government with the necessary degree of flexibility. Briefly, the fiscal rule operates as follows: a target of a surplus of 1% of GDP is fixed for the structural balance, the level of expenditures follows the dynamics of structural fiscal revenue; that is, the level of revenue that would be achieved if the economy was using its productive resources normally —without generating internal or external imbalance— and the copper price was at its long–term level. This fiscal rule however did not arise in a vacuum. Chile's efforts in the fiscal front have been present for a substantial period of time. The Central Government achieved surpluses on a cash basis for twelve consecutive years, and in 1987 created a stabilization fund for fiscal revenues coming from copper. We first review the institutional preconditions that have predated the current fiscal rule, moving then to the description of the rule itself.

Institutional Preconditions

The situation of Chilean public finances can be classified as solid and healthy, thanks to the austerity and responsibility with which fiscal policy has been implemented during the last 14 years. The good performance can be attributed to several institutional factors, among which three can be specially highlighted: hierarchical and transparent budgetary institutions, solid and a broad based tax structure, and targeted social programs. These aspects have also been fundamental for the application of the fiscal policy rule currently in place; some of them reinforcing the countercyclical quality of the rule, and others facilitating the predictability of the rule by giving it credibility and sustainability. Thus, for example, transparent budgetary institutions provide continuity and credibility to the rule and a broad tax base provides greater effectiveness to fiscal policy, increasing its countercyclical capability.

Regarding the first aspect, in Chile the elaboration, approval and implementation of the budget is a hierarchical process, where the Ministry of Finance has a predominant role. The draft budget law for the Central Government is prepared each year in a centralized manner by the Budget Office for presentation to Congress. Congress cannot change the revenue estimates or increase expenditures. It can only reduce the amounts proposed by the executive. If Congress does not approve the budget law within 60 days after its presentation, the original budget is enacted. On the other hand, municipal governments cannot contract debts unless they are expressly authorized by the Central Government. The existence of a rigorous and efficient fiscal auditor (known as the Comptroller General), the prohibition to spend unless expenditures have been expressly authorized in the budget law or by a decree of the Ministry of Finance, and the centralization of any modification to the budget law during its application, generate greater transparency and control in the execution of the budget. Finally, the constitutional ban on CB financing of the treasury strengthens the fiscal institutions.

As a second aspect, it must be noted that tax rates in Chile are moderate and the tax base is broad which has resulted in stability of fiscal revenues, reducing incentives to elude or evade taxes. The tax burden in Chile

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[8] This section is based on Ministry of Finance (2004a).

reached over 17% of GDP[9] in 2004, with a VAT rate of 19%[10], and income tax rates that range between 0 and 40%. There are practically no exceptions in the application of these taxes, with VAT representing almost 53% of tax revenues and income taxes 26%. Evasion has decreased over time, reaching 18% for the VAT, and a little over 40% in the case of income taxes[11]. These figures are expected to decline over time as a result of the "tax evasion plan" initiated in 2001.

Finally, on the expenditure side, the improvement in its efficiency and targeting has allowed the government to implement its social programs aimed at providing better social safety nets, with a moderate fiscal burden. Since 1990, expenditures on social programs have increased their participation in total spending by more than 6%, representing 68% of total expenditures in 2004. Meanwhile, expenditures in general activities have declined from 13.7% to 7% over the same period. This has been possible in part due to the small size of the public sector in terms of employment, which represents 8% of total employment in the economy[12].

At the same time, the targeting of social spending has improved notably, as demonstrated by the evolution of monetary subsidies and basic social services provided by the government to the two poorest quintiles of the population. While in 1990 66% of the benefits reached quintiles I and II of the population, in 2003 almost 70% of these benefits reached the first two quintiles. Moreover, during this period, quintile I increased its participation in the benefits with respect to quintile II.

General Description of the Fiscal Rule

In 2001 the government implemented a fiscal policy based on a yearly structural surplus of 1% of GDP. The basic logic of the rule is to stabilize public expenditures over the business cycle and the swings of the copper price, preventing excessive adjustments in periods of recession or unsustainable expenditure levels in periods of prosperity. Hence, the rule is designed to generate savings in times of prosperity to pay debt contracted in times of recession, thus softening the economic cycle and granting sustainability to public finances. At the same time, because it is a known and transparent rule, it reduces uncertainty for economic agents regarding the future behavior of public finances, and stabilizes public expenditure in economic and socially sensitive areas such as investment and social spending. To establish the credibility of this rule, independent panels of experts have a substantial influence in establishing the reference long run value of the copper price as well as the trend growth of GDP.

Why a structural surplus of 1% of GDP and not a balanced budget? In general, it is difficult to establish the optimal public asset accumulation rate, since there is a natural tension between sustainability and inter–generational transfers. Nevertheless, empirical evidence indicates that the tolerance of markets to public debt is higher in more mature economies. In the case of emerging economies, which tend to suffer significant recurrent external shocks, empirical evidence tends to corroborate the fact that from a certain threshold ratio of public debt to GDP these economies tend to have high degrees of volatility —some studies place this threshold at between 25 to 30% of GDP. According to the World Economic Outlook of IMF of October 2003, even though Chile is below that threshold, the degree of risk aversion regarding sovereign debt, especially Latin American debt, is high due to the large debt ratios of the countries in the region. By decreasing the dependence on foreign savings and showing sustainable fiscal accounts, the vulnerability of the economy in the face of external shocks is decreased.

Moreover, net asset accumulation over time by the Central Government will help meet future public sector commitments that grow at a higher rate than fiscal revenues, and potential expenditures on contingent liabilities. Within the latter the most relevant are the guarantees for minimum revenues in infrastructure

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[9] Includes pension contributions to the old system.
[10] Since October 2003.
[11] Evasion figures could be overestimating the true evasion of the last two years, because they correspond to estimates of the Internal Revenue Office (Servicio de Impuestos Internos) for 1999 y 1997 respectively. In 2001 a plan to reduce tax evasion and increase tax collections was implemented with positive results. Its is important to distinguish tax evasion from tax elusion, which corresponds to legal tax strategies followed by taxpayers in order to reduce their tax burden.
[12] This figure includes the employment of Central Government, Local Government and the Armed Forces.

concessions, the state guarantees on deposits, liabilities originated in legal demands against the government, and the minimum pension guarantee in the pension system. To these factors one can add the Central Bank losses due to the carry-over of quasi fiscal implications of the rescue of commercial banks in the early eighties and the sterilization of large capital inflows in the nineties.

Therefore, consolidating by these aspects, it is likely that the structural surplus of 1% will allow increases in debt over time only to finance investment by public enterprises. Local or provincial governments are not relevant for this matter because they are not allowed to contract debt.

In order to calculate the structural balance, after the value of the key variables is established, the expenditure level for the current budget year is established as follows. Starting from the assumed macroeconomic scenario, an accrued level of revenues is projected. By definition, this level of expenditures is influenced by the phase of the economic cycle and the movements of the copper price. The projected revenues also reflect expected changes in tax collections derived from legal changes, such as changes in tax laws. Using the long–term reference copper price and the gap between the projected GDP and the estimate of trend GDP, the revenue is corrected to determine the level of structural revenues. This corresponds to the level of adjusted fiscal revenues that would exist if the projected copper price was equal to the reference price and GDP was equal to trend GDP. The latter is the level of activity that theoretically would exist if the productive resources were used with normal intensity —for example, if unemployment was equal to long-term unemployment. Having established the structural level of revenues, the expenditure level consistent with a surplus of 1% of GDP is calculated.

Therefore, the key equation to estimate the structural balance, which includes the cyclical correction of taxes revenues and pension contributions, and copper revenues is[13][14]:

$$(1) \quad SB_t = Bobserved_t - T_t + \left(T_t * \left[\frac{Y_t trend}{Y_t} \right]^\varepsilon \right) - CS_t * \left(P^{FOB}_t - P^{REF}_t \right) * \alpha$$

Where:
SB_t stands for the structural balance.
$Bobserved_t$ is the accrued balance of the Central Government.
T_t expresses the tax revenue plus actual pension contributions.
$Y_t trend$ represents the nominal trend GDP level, calculated by independent experts.
Y_t is the nominal GDP level.
ε represents the output elasticity of tax revenues, with a 1.05 value.
CS_t shows Codelco's sales of fine copper in metric tons.
P^{FOB}_t is the FOB copper price of Codelco's exports.
P^{REF}_t is the long–term copper price, calculated by independent experts.
$\alpha = 2,204.62/100,000$, factor used to convert price in U.S. dollars per metric ton to cents per pound.

To maintain transparency and avoid tinkering with the assumptions of trend output and a long–term copper price, both of these figures are estimated by a group of independent experts called by the government.

The Estimate of the Output Gap and the Long-Run Copper Price[15]

In the case of trend GDP, the experts have been convened for the elaboration of the 2003, 2004, 2005 and 2006 budget. The estimates, with a known and publicized methodology, are made using a Cobb-Douglas

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[13] See Marcel et al. (2001).
[14] Since 2005 the estimation of structural surplus will include an additional adjustment in the revenues coming from private mining due to the copper price cycle.
[15] For more details see Ministry of Finance (2004b).

production function with constant returns to scale, commonly used by the IMF and the OECD in the estimates of trend GDP, as shown in the following equation:

(2) $Y_t = A_t \cdot K_t^{\alpha} \cdot L_t^{(1-\alpha)}$

Where:

Y_t is the real GDP.

A_t stands for the total factor productivity, corresponding to the residual of the production function.

K_t represents the capital stock, constructed as $K_t = K_{t-1} \cdot (1-d) + GFCF_t$ where d is the annual depreciation rate and GFCF$_t$ is the gross fixed capital formation corrected for intensity of use.

L_t represents the employment adjusted by a quality of work indicator.

α expresses the production elasticity of capital, and $1-\alpha$ is the production elasticity of labor.

To calculate trend GDP, trend or long–term values for the basic elements of the production function are used. Experts are requested to provide projections for these variables over the next five years, which are then averaged eliminating the extreme values, and then filtered using the Hodrick–Prescott filter (table 1).

It is important to emphasize that even though there are other methodologies for the calculations of trend GDP, the chosen methodology is consistent with the structural balance rule formulated by the government. This is because by definition the observed fiscal balance through a cycle should average a surplus equal to 1.0% of GDP, which will only be achieved if the gap between trend GDP and real GDP averages zero through the cycle[16].

The results of the consultations carried out are shown in the following table[17].

Table 1
Trend output estimations, panel of experts
(percentage)

|	2003	2004	2005	2006	Average 5 years ahead
Output Gap: (Trend output-Effective output)/Effective output	5.0%	4.4%	2.5%	0.9%	-
Trend GDP growth	4.1%	3.9%	4.2%	5.0%	5.0%

Source: Ministry of Finance.

The methodology for the trend GDP calculations allows the incorporation of all the new information available year to year regarding the trend of GDP growth. In this sense, it is not possible to permanently underestimate or overestimate the trend GDP of the economy. As shown in the following graph, in the recent economic cycle the successive trend GDP estimates incorporated the lower growth trend in 1999 and 2000, and since 2001, when growth began to accelerate, the successive estimates of trend GDP have smoothly incorporated this new information regarding a greater trend in GDP growth (graph 1). Thus, this calculation method results in a more expansive fiscal policy in the higher part of the cycle and more restrictive one in the lower part of the cycle.

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[16] And if on average through the cycle the real copper price is equal to its long–term price.
[17] See Ministry of Finance (2002, 2003, 2004 and 2005).

Graph 1
Trend output
(annual growth, percentage)
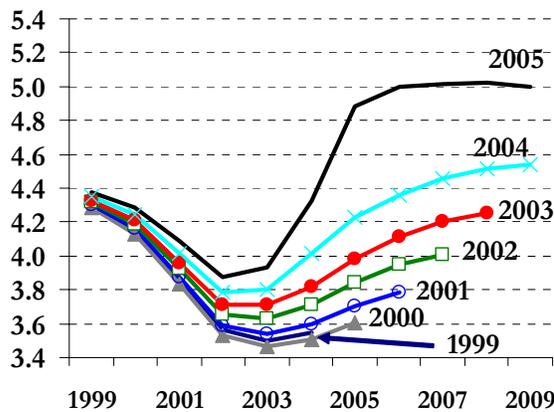
Source: Ministry of Finance.

For the copper price, the panel of independent experts has been convened on five occasions for the preparation of the 2002, 2003, 2004, 2005 and 2006 budgets (table 2). In this case, the experts are asked for their best projections for the average copper price for the next ten years. Extreme observations are eliminated and the remaining observations are averaged. The results are presented in the following table[18].

Table 2
Long–term copper price estimations
(U.S. dollar cents/pound)

	2002	**2003**	**2004**	**2005**	**2006**
Market copper price, LME	70.7	80.7	130.0	152.6 (e)	127.3 (e)
Long-term copper price, expert panel estimations	91	88	88	93	99

(e) Estimated.
Source: Ministry of Finance.

Although the structural balance rule cannot be characterized as simple, the government has made a continuous effort to explain its operation through publications, meetings with Congress and analysts, and presentations in various seminars.

The rule of structural surplus of 1% of GDP adopted by the current government has several advantages in terms of flexibility and its orientation toward growth.

In the first place, by construction it allows fiscal policy to smooth the economic cycle by allowing the automatic stabilizers to operate. Thus, in periods of low activity, even though observed current income decreases, fiscal spending is not downward adjusted, giving fiscal policy an expansive character in line with the requirements of the cyclical position of the economy. In the same manner, in periods of prosperity, fiscal spending will not follow the expansive cycle of revenues beyond what is allowed by its structural component, contributing to stabilize domestic activity.

Secondly, consistent with its countercyclical character, by stabilizing public spending in investment and social spending —particularly in education and innovation—, without having to reduce them in periods of

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[18] See Ministry of Finance (2001, 2002, 2003, 2004 and 2005).

economic downturn and falling fiscal revenues, it is possible to maintain the productive capacity necessary to regain high growth when the economy returns to its normal expansion path.

In the third place, the rule has a positive effect on country risk by giving predictability to fiscal policy, helping to decrease risk, keeping interest rates low and encouraging growth.

On the other hand, the use of the structural balance rule has allowed an orderly discussion of fiscal policy and the annual budget, isolating those discussions from the issue of the size of the State.

Finally, the formulation and execution of a policy rule imply an important effort in terms of institutional strength and transparency of the public finances so as to give credibility to the rule. Any genuine attempt to build more solid institutions benefits economic stability. In fact, it may well be that developing solid institutions is more important and permanent than the rule itself[19].

3. Monetary Policy Rules in Chile

The actual framework for the Chilean monetary policy is a coexistence of free exchange rate and inflation targeting. In this context, as in other countries, it is useful to frame the discussion on monetary policy in terms of a reaction function, or a Taylor Rule. This abstracts from a number of complex issues but allows to streamline the discussion around the key determinants of monetary policy actions. This section first reviews the institutional preconditions for the conduct of monetary policy in Chile, and then moves to present the main results from existing literature on CB reaction functions.

Institutional Preconditions

The 1989 CB Constitutional Organic Law (or CB Charter) establishes two goals: to provide for the stability of the currency and the stability of domestic and external payments. This statement has been interpreted as keeping inflation low and stable, providing an adequate regulation for the banking system, and stabilizing and maintaining the proper functioning of the country's external payments system. Although initially the latter objective has been interpreted as a sustainable current account deficit[20], more recently the Bank has moved to a formal financial stability analysis[21]. To achieve these objectives, the CB was given full instrument independence and a significant degree of goal independence.

Although since 1990 the CB has had an explicit inflation target, until 1999 this objective was coupled with a number of others, mainly the current account, as mentioned above, and the existence of an exchange rate band[22]. The actual inflation target has also evolved over time. At the beginning, the policy objective was to assure a specific inflation target or narrow range based on December year-on-year headline CPI inflation measures. But since the year 2000 this target means a symmetrical range between 2 and 4% at the end of the policy horizon. In practice, this has been interpreted as a 12-24 month horizon in which the inflation has to tend to 3%[23]. Along the first period, the target was adjusted to allow gradual reduction of inflation. In the second period, the target was to maintain it in lower levels. Effectively, in 1990 the target for the following year was 27%, and since 2001 the target is 3%.

In Chile, prices such as wages and housing rents are commonly indexed to CPI headline inflation. Noncore CPI shocks are likely to feed back into core inflation through this indexation process. Although the target measure has been all this period the headline CPI inflation measure, the CB has been giving increasing attention for analytical purposes to core CPI inflation. This, in an effort to better understand inflation dynamics from a structural point of view, where core inflation is more sensitive than other prices to the output gap. This also implies that monetary policy design is aware of the convenience of not overreacting

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[19] For more information about the usefulness of fiscal rules see Ministry of Finance (2004c).

[20] There is an operational objective of keeping this deficit, measured at trend terms of trade, between 4 and 5% of GDP.

[21] See http://www.bcentral.cl/eng/stdpub/publications/policies/polit05.htm.

[22] For further discussion see Cabrera et al. (2002).

[23] For further information see Central Bank of Chile (2000).

to price shocks that have no effects on the permanent inflationary path a priori[24] [25]. Besides, the slowly reduction of the inflation target during the first period responds to the interest of minimizing the risk of output cost due to a indexed economy.

The focus on the 12-24 month horizon is due to several reasons. The typical lag between monetary policy *innovations* and inflation is estimated at around four quarters; the neutral monetary policy affects in the long run, but not in the short run; the uncertainty on the economic model; and the monetary policy effects in the expectations.

A stand out issue is that this inflation rule has been accomplished almost every year since the beginning, even though it is not a legal mandate, but only a compromise from the monetary authority.

In relation to the monetary instruments, since 1985 it has been the interest rate. From 1985 to April 1995, it was used the three months real interest rate (indexed to headline CPI inflation). From May 1995 to the beginning of August 2001, the monetary policy instrument was changed to an overnight indexed interest rate. Since August 2001, the CB implements its monetary policy by defining a target level for the nominal interbank rate, known as the monetary policy rate (MPR), which is controlled through the use of several instruments: open market operations, buying and selling short-term promises and notes, and liquidity deposits and lines of credits (expanded facilities).

Identifying the Chilean Monetary Policy Rule

At the theoretical level, it can be assumed that the preferences of the group of people who conduct monetary policy, the Board, pursue the best for representative household. On the other hand, the representative household welfare criterion is averse to four elements: volatility of domestic inflation; volatility of the output; sudden not expected changes in the interest rate; and deviations of other macroeconomic variables that can be affected with the interest rate, like the current account balance, real exchange rate level or credit growth. Incorporating all these variables implies two elements in the management of monetary policy: a trade off between deviations of inflation and output with respect to their long-term level; monetary policy may be active even if expected inflation is on target.

In the Chilean case, the CB Charter does not include full employment as an objective for policy. However, there are good reasons to include the output gap in standard monetary policy reaction functions. The current output gap is *per-se* a good predictor of future output gaps, given the usual persistence that it shows over time. Thus, the current output gap is likely to be correlated with the whole path of annual inflation in the future, and not only at a specific horizon. Moreover, even though the Charter does not explicitly state that full employment should be a target for monetary policy, it is likely that this is indeed an objective for society as a whole, and the institutional framework should in practice not conflict with these deep-seated preferences. Other variables, like current account or real exchange rate deviations, are significant only as determinants of inflation pressures[26].

Several studies have tried to characterize and estimate the reaction function, applied to the CB monetary decisions. Even though this instrument is very useful, it is not a mechanical solution for the monetary decisions of the Board. The design of the monetary policy must lean on a permanent dialogue between economic models and judgments. A monetary policy settled by a simple rule, which can guarantee an average inflation similar to the target and a reasonable short run volatility, is suboptimal compared to a monetary policy based on an inflation target and projections that combines expectations and judgments[27]. In this context, the Taylor Rule is only a benchmark that generates relevant information for the decision process.

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[24] This measure of inflation consists in the exclusion of volatile products prices, like perishable agricultural products, fuels, regulated tariffs, indexed prices and financial services.
[25] For further discussion see García et al. (2002).
[26] For further discussion see Cabrera et al. (2003).
[27] Svensson (2002).

In the estimating process of the reaction function several difficulties has to be deal with: an unknown reaction function; an unknown real economy model; a high dependence between the optimal rule and the economy model; an unknown monetary policy transmission; doubts about the actual state of the unobservable macroeconomic parameters like the neutral real interest rate and the trend output; an important restriction coming from the information availability; and an extremely determinant role of the future unknown expectations.

Taking all of this into account, the appropriate monetary policy design requires a combination of qualitative and quantitative analysis. Even though keeping inflation near the target is the main determinant of monetary policy, the optimal policy rule depends both on the structure of the economy and on the preferences of the Board.

Particularly, there are different versions of what is called monetary policy rule based on inflation estimations. Several studies assume a forward-looking model for the monetary policy interest rate. Future expectations play an important role: future expected decisions have short run effects, and the monetary policy framework influence the way people determined their expectations. So, in this case, credible inflation targets have direct effect on inflation expectations. In the Chilean case, the inclusion of anticipate future inflation in the Taylor Rule is supported by empirical research[28].

Considering that for the CB "keeping inflation low and stable in no mere whim of the law, but rather serves the broader objective of moving the national economy along the path of sustained growth, full employment and, in general, progress and well-being for the population", the appropriate Taylor Rule has to include expected inflation, output and other macroeconomic variables misalignments[29]. In this context, the smoothness of the interest rate variability is also an implicit objective for the Board. Excessive interest rate variability is costly in terms of financial market stability, consumption, investment, and finally, in growth.

The output gap can be included in the reaction function not necessarily because full employment is among the direct and immediate objectives of the Board, but because the gap is one of the main variables that affect the medium term inflation pressures[30] [31].

Assuming that the MPR is able to affect contemporaneously all policy variables except inflation, the objective function that can be applied is the following:

$$(3) \quad r_t - \overline{r_t} = \rho\left(r_{t-1} - \overline{r_{t-1}}\right) + (1-\rho)\left[\beta E_t\left(\pi_{t+k} - 3\%\right) + \gamma_1\left(y_t - \overline{y}_t\right) + \gamma_2\left(z_t - z_t^*\right)\right]$$

Where:

r_t is the optimal monetary policy interest rate set by the central bank as the instrument of monetary policy (MPR in the Chilean case).

$\overline{r_t}$ stands for the neutral interest rate. In the long run the interest rate must converge to its neutral level.

ρ ($\rho \in [0,1]$) expresses the persistence or inertial behavior of the monetary policy. In other words, it captures the preference of the Board of smoothing changes in the interest rate. The higher the value, the slower the adjustment to its desired level, involving a more gradual monetary policy reaction to shocks in inflation and output.

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[28] See Parrado and Velasco (2002).
[29] Especially in open economies.
[30] The inclusion of the output deviation in the monetary policy rule is what Svensson (1997) considered a gradual approach to inflation targeting.
[31] See García et al. (2002).

k represents the considered horizon of the monetary policy.

$\left[E_t\left(\pi_{t+k}-3\%\right)\right]$ represents the expected headline CPI inflation deviation "k" periods ahead from the predetermined target the CB has in the current period (3% nowadays assuming perfect credibility). This rendering does not include possible non-linearity due to the fact that the actual target is represented by a range from 2 to 4%, centered in 3%.

β determines how aggressive is the monetary policy to annual inflation deviation from the target settled by the CB. If $\beta > 0$, the real interest rate increases whenever expected inflation is above the target level trying to stabilize inflation[32]. On the other hand, when β is less than one, the central bank moves the monetary policy interest rate in order to accommodate any increase in the expected inflation level instead of stabilizing the prices growth.

γ_1 describes the central bank concern about the output fluctuations from its trend level, not the output level itself. A positive value means that the central bank responds to the output gap independently of its concern for future inflation. According to the CB Constitutional Organic Law, this parameter can be considered null or positive. The differentiation between demand or supply shocks in the design of the monetary policy corroborates a positive parameter. A positive coefficient means, in the Svensson (1997) terminology, a gradual implementation of the inflation targeting. That is to say, even when the expected inflation equals the target, the central bank seeks to reduce the volatility of the output. There is no doubt about the clearly dominance of the inflation target over other nominal targets.

γ_2 captures the importance of deviations of other variables than inflation and output, like current account balance, real exchange rate or external interest rates.

This monetary rule guarantees that in the long run inflation converges and holds near its target. And taking into account the described monetary policy rule, the Board can choose the velocity of convergence to the inflation target considering the nature and intensity of the shock.

Contreras and García (2002), Corbo (2002), Schmidt-Hebbel and Tapia (2002), Caputo (2003) and the Structural Projection Model (MEP) used by the CB[33] attempt to estimate the reaction function for the Chilean case. Even though in all these cases the reaction function has been estimated like a policy rule based on inflation projections, the horizon (monthly or quarterly) considered for the expected inflation, the frequencies, and the additional variables included differs from one to another.

Table 3 describes the main findings of these estimations. All of them use the real interest rate as the policy instrument. As in Caputo (2003), in order to compare the coefficients of inertia in the monetary policy (ρ), this one has been expressed quarterly in all the specifications. The rest of the coefficients, as degrees of policy response to percentage deviations, can be compared in different frequencies.

As a general finding, the response coefficient to expected inflation deviation (β) is positive and significant, even though it differs from one to another. Besides, excepting Corbo (2002), the answer to the output gap (γ_1) is also positive and significant. Finally, the level of inertia (ρ) is different between the estimations, but it is high and significant (excepting MEP) (table 4).

It seems that the reaction degree to inflation deviations can be determined by simply looking at β. Under this criterion, the less aggressive answers is founded in Contreras and García (2002) and the highest is seen in Caputo (2003). This finding is not surprising if we consider that Contreras and García include in their estimation periods where the inflation target was not explicit. However, this analysis is not theoretical completely correct. Two elements complicate the analysis. First, estimated rules respond to expected inflation considering different horizons (k), which means that for identical β, the one who responds to a

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[32] In case of nominal interest rate, β should be greater than one when deviations form target inflation occurs for an active monetary policy.
[33] This rule is exposed in Central Bank of Chile (2003).

longer horizon will be less aggressive. Second, the monetary rule also considers some response to output deviations. So, even if two rules estimates the same β and consider the same horizon, the answer degree to inflation deviations will differ from one to another because of the response to the deviation of the output gap. To compare the answer degree to inflation deviations, a dynamic answer analysis of macroeconomic model is needed.

Taking into account the official projections of the CB, in the next table we present the effective real policy rate for the third quarter of 2004, and the one suggested by the reaction functions that have been considered. The results show that the effective rate has been more aggressive than the one suggested by the different estimated Taylor Rules. This reflects the Board's preference in moving the monetary policy rate gradually towards its optimal level in those moments when the reduction of the monetary policy aggressiveness is necessary. Corbo´s particular finding, a relatively more expansive interest rate, is accord with the inclusion of the current account deficit gap in the Taylor Rule as a positive determinant of the monetary policy rate. In this context, the important positive Chilean current account balance projected for next four quarters suggest a more expansive monetary policy (table 4).

Table 3
Real policy rate for 2004.III: effective and suggested by various reaction functions
(percentage)

	Suggested policy rate
Contreras and García	2.1
Corbo	0.7
Schmidt-Hebbel and Tapia	1.6
Caputo	2.0
MEP	1.6
Effective policy rate	-0.69

Table 4[34]

Studies	Persistence[35] ρ	Expected Inflation β	Output Gap γ_1	Variable Z_t (γ_2) Real Exchange Rate	Current Account	Other	Notes
Contreras and García (2002) Quarterly, 1986.Q1-2001.Q4 $\pi_{t+k}=\left(\pi_{t+1}+\pi_{t+2}+\pi_{t+3}\right)/3$	0.45 **0.51**	0.31 **0.37**	0.20 **0.48**	- -	- -	- -	First specification uses state-space form, while the second one OLS.
Corbo (2002) Quarterly, 1990.Q1-1999.Q4 $\pi_{t+k}=\pi_{t+3}$	0.84 0.73 **0.72** 0.70	0.24* 0.68 **0.74** 0.68	0.36* - - 0.58	- - - -	- 0.61 **0.56** -	- - **-0.07***[36] -0.35*[37]	Output gap is calculated with HP. Current account variable is expressed as a GDP percentage (in moving average) subtracting 4%.
Schmidt-Hebbel and Tapia (2002) Monthly, 1991.01-2001.12	**0.82** 0.71	**0.50** 0.60	**0.79** 0.40	**0.26** 0.18	- 1.68	- -	Uses HP-filtered value to calculate the output and real exchange rate misalignment.
Caputo (2003) Monthly, 1990.09-2002.04 $\pi_{t+k}=\pi_{t+4}$	**0.63** 0.68 0.79	**0.79** 0.70 0.77	**1.12** 1.39 1.83	**0.63** 0.86[38] 0.67	- -	- 0.56[39] -	First two specifications uses Kalman filters in order to obtain the output gap and exchange rate deviation. The last specification uses HP.
MEP Quarterly, not estimated $\pi_{t+k}=\left(\pi_{t+2}+\pi_{t+4}+\pi_{t+6}+\pi_{t+8}\right)/4$	**0.71**	**0.5**	**0.6**	-	-	-	

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* Not significant. The rest of the coefficients are significant.

[34] Underlined coefficients correspond to the estimation used afterward.

[35] Other things said, the monthly persistence is expressed in quarterly frequency.

[36] It corresponds to square of the inflation deviation.

[37] It corresponds to a dummy for the non-positive inflation gap.

[38] It corresponds to gaps wider than the average.

[39] It corresponds to gaps smaller than the average.

Source: Caputo (2004).

4. Recent Macroeconomic Developments

During the five years of application of the structural balance rule —2001 to 2005— fiscal policy ex ante has aimed at achieving a structural surplus equal to 1% of GDP. This means that in the preparation of the budget law for each one of those years and during its execution the limit on fiscal spending established by the rule has been respected. Nevertheless, due to subsequent revisions to the National Accounts that result in revised estimates of trend GDP, the structural surplus has averaged slightly less than 1% in these years (graph 2).

Graph 2
Accrual and structural balance of the Central Government
(as percentage of GDP)
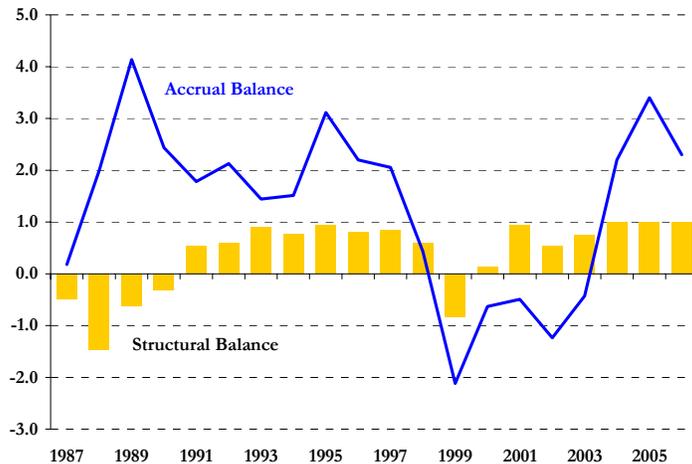
Source: Ministry of Finance.

To comply with the fiscal target in the years 2002 and 2003, as a result of unexpected changes in some of the variables estimated during the preparation of the budget law, adjustments to spending had to be made mid–year. In 2002, a lower than estimated inflation rate relative to the estimates in the budget resulted in lower than estimated nominal fiscal revenues and, therefore, to achieve the structural surplus of 1% of GDP expenditures were reduced by 0.3% of GDP. In 2003 events that were not considered in the preparation of the budget, such as lower fiscal revenues due to the free trade agreement with Europe, lower copper sales by Codelco, and almost no revenues from the capital gains tax, led to a decline in fiscal revenues. Again, to maintain credibility, a fiscal adjustment of 0.4% of GDP was applied.

At the same time, the structural surplus rule application has allowed to increase the stability of public spending, especially social and investment spending, without the typical deep fluctuations observed in the past. In fact, public investment spending grew in average 5.6% during the low growth period between 2001 and 2003, well above the 3.9% registered for private investment spending. At the same time, social spending remained at just below 70% of total public spending during the same period.

It can be observed that in the period 2000-2005, the macroeconomic policy framework has allowed a relative isolation of the economy from external shocks. In particular, fiscal policy has smoothed the economic cycle in the last few years, both due to the stability that public spending has shown, and the positive effects that fiscal credibility had on the level of risk of the Chilean economy as perceived by foreign investors. These elements, together with the credibility of the CB, have allowed domestic interest rates to remain low benefiting investors and consumers (graph 3).
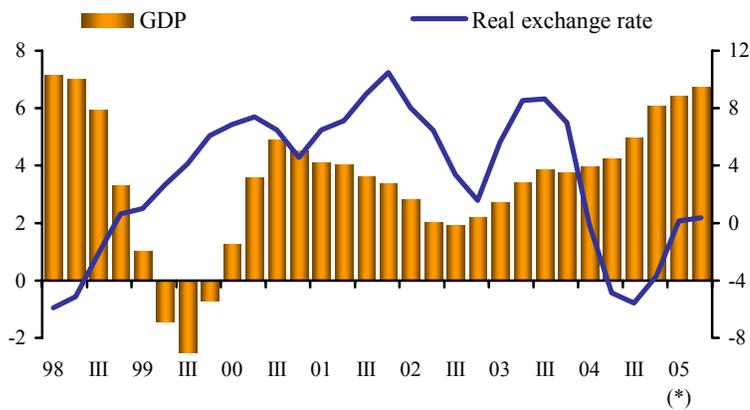
Graph 3
Interest rate and sovereign spread in Chile

Monetary Policy Rate
annual nominal %

Sovereign Spread
basis points

Sovereign spread

MPR

01/03/00   01/03/01   01/03/02   01/03/03   01/03/04   01/03/05
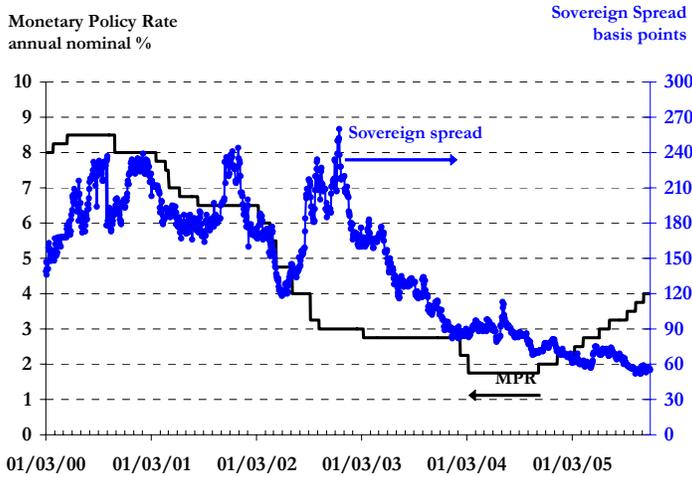
Source: Central Bank of Chile and JP Morgan.

The credibility on the monetary and fiscal framework has also allowed a large adjustment in the real exchange rate, without causing financial disruption through balance sheet effects, and allowing the economy to maintain positive growth rates and a stable inflation around the 3% target (graphs 4 and 5).

Graph 4
GDP and real exchange rate growth
(annual moving average growth, percentage)

GDP   Real exchange rate

98   III   99   III   00   III   01   III   02   III   03   III   04   III   05
                                                                                            (*)

(*) Until second semester of 2005.
Source: Central Bank of Chile.

Graph 5
Inflation and nominal depreciation
(annual growth, percentage)
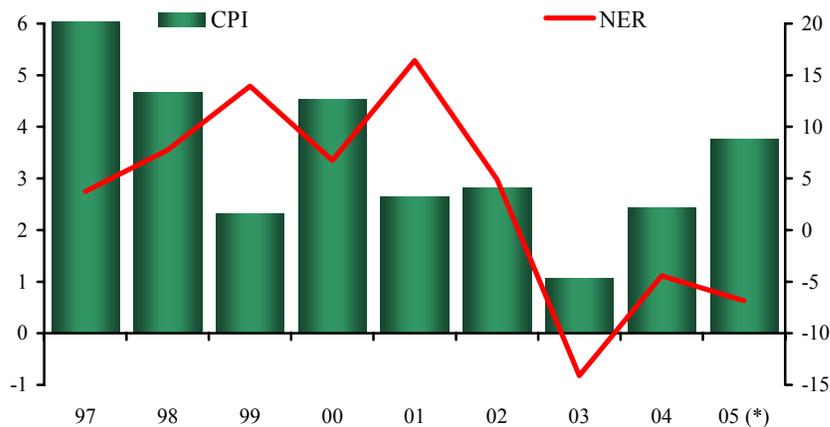
(*) Until September 2005.
Source: Central Bank of Chile.

5. Conclusions

Throughout its history, Chile and other Latin–American countries have shown high macroeconomic volatility, resulting from their vulnerability to external shocks and weak institutions for the design of policy. Conscious of this reality, in the last twenty years there has been a drive towards the creation and consolidation of the institutions needed to reduce the effect of external shocks on the economy, making monetary and fiscal policy instruments of output stabilization.

In an attempt to strengthen further the credibility of public finances, since 2001 the government follows a fiscal policy based on a pre–announced rule that guides spending decisions so as to achieve a structural surplus for the Central Government equal to 1% of GDP. This rule has achieved high credibility and is aimed at giving more stability to public spending, preventing over adjustments in recessive periods or unsustainable expenditure levels in periods of prosperity. At the same time, the adoption of a floating exchange rate has allowed more aggressive monetary policy easing in the face of external shocks.

It is important to point out that rules *per-se* are not enough, but that they require a commitment by the authorities towards sound policies, which builds up credibility over time. This shows up in a number of dimensions. First, building a track record. On the fiscal side, without doubt a track record of responsible fiscal management is needed; moderate debt levels and a structure of net liabilities that is not mismatched either in maturity or currencies; and a high degree of commitment to the fulfillment of the rule. Similarly, on the monetary policy side, achieving inflation targets over a medium term horizon and maintaining those targets in spite transitory deviations, bolsters the commitment to price stability, accepting even when the forecast and not shifting inflations. Second, transparency in implementation. On the fiscal rule, this appears in the role of the panels of independent experts that help calculate output gap and the long-term copper price. On the monetary policy side, a prompt and clear disclosure of the rationale for monetary policy decisions, which shows in the short delay in the publication of the minutes and the publication of a Monetary Policy Report. Finally, a deep commitment by society and the political system to sound macroeconomic policies is a necessary condition. In practice, this shows in current structural aspects of the design of both fiscal and monetary policy. On the fiscal side, a hierarchical and transparent budget process; a solid and broad based tax structure, and a permanent effort of improving the efficiency and targeting of public spending. On the monetary policy side, the autonomy of the Central Bank is a crucial element for the monetary policy.

An economy's capacity to absorb external shocks depends not only on a credible and countercyclical fiscal policy, but also on a consistent monetary and exchange rate policy and a well-supervised and regulated financial system. It should be highlighted that the current macroeconomic policy framework critically depends on the coordination between fiscal and monetary policy, because any deficiency in one

will impose limits on the other. This coordination stems from a clear understanding of the relative activism asked to both policies: monetary policy is the main countercyclical instrument. In other words, proper coordination stems naturally from a framework that explicitly recognizes the stabilization role of fiscal and monetary policies. Although the current formulation of monetary and fiscal policy could be improved upon in several dimensions, any change should not involve a radical revamping of the framework, particularly with respect to the key role of the floating exchange rate regime.

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