Banco Central de Chile
Documentos de Trabajo

Central Bank of Chile
Working Papers

N° 335

Noviembre 2005

MONETARY POLICY AND LONG-TERM INTEREST RATES IN CHILE

Mauricio Larraín

BANCO CENTRAL DE CHILE

CENTRAL BANK OF CHILE

La serie Documentos de Trabajo es una publicación del Banco Central de Chile que divulga los trabajos de investigación económica realizados por profesionales de esta institución o encargados por ella a terceros. El objetivo de la serie es aportar al debate temas relevantes y presentar nuevos enfoques en el análisis de los mismos. La difusión de los Documentos de Trabajo sólo intenta facilitar el intercambio de ideas y dar a conocer investigaciones, con carácter preliminar, para su discusión y comentarios.

La publicación de los Documentos de Trabajo no está sujeta a la aprobación previa de los miembros del Consejo del Banco Central de Chile. Tanto el contenido de los Documentos de Trabajo como también los análisis y conclusiones que de ellos se deriven, son de exclusiva responsabilidad de su o sus autores y no reflejan necesariamente la opinión del Banco Central de Chile o de sus Consejeros.

The Working Papers series of the Central Bank of Chile disseminates economic research conducted by Central Bank staff or third parties under the sponsorship of the Bank. The purpose of the series is to contribute to the discussion of relevant issues and develop new analytical or empirical approaches in their analyses. The only aim of the Working Papers is to disseminate preliminary research for its discussion and comments.

Publication of Working Papers is not subject to previous approval by the members of the Board of the Central Bank. The views and conclusions presented in the papers are exclusively those of the author(s) and do not necessarily reflect the position of the Central Bank of Chile or of the Board members.

Documentos de Trabajo del Banco Central de Chile
Working Papers of the Central Bank of Chile
Agustinas 1180
Teléfono: (56-2) 6702475; Fax: (56-2) 6702231

Documento de Trabajo
N° 335

Working Paper
N° 335

MONETARY POLICY AND LONG-TERM INTEREST RATES IN CHILE

Mauricio Larraín
Economista
Gerencia de Investigación Económica
Banco Central de Chile

Resumen

Este trabajo estima la reacción de corto plazo de un mercado financiero emergente a sorpresas de política monetaria. Usando información de la curva *forward* para obtener el elemento sorpresa de las decisiones de política, estimamos los efectos de un *shock* monetario en las tasas nominales y reales de largo plazo. Nuestros resultados indican que mientras la respuesta de las tasas nominales es fuertemente positiva y significativa, la respuesta de las tasas reales es pequeña y mayormente no significativa. También encontramos que la respuesta de las tasas de interés chilenas es bastante menor a la encontrada en la literatura internacional. Finalmente, encontramos que la compensación inflacionaria (la diferencia entre tasas nominales y reales) no es mayormente afectada por los *shocks* de política, lo que sugiere que el esquema de metas de inflación en Chile ha sido exitoso en anclar las expectativas de inflación a la meta.

Abstract

This paper estimates the short-run reaction of an emerging financial market to monetary policy surprises. Using forward curve data to obtain the surprise component of policy decisions, we estimate the effects of a monetary shock on long-term nominal and real interest rates in Chile. Our results indicate that while the response of nominal interest rates is strongly positive and significant, the response of real rates is small and mostly insignificant. We also find that the response of Chilean interest rates is quite smaller than the one found in the international literature. Finally, we find that inflation compensation (the difference between nominal and real rates) is largely invariant to policy shocks, which suggests that the inflation targeting framework in Chile has been successful in anchoring inflation expectations to the target.

I thank Igal Magendzo, Marcelo Ochoa, and Rodrigo Valdés for helpful comments and suggestions. Pedro Ossa, from *Riskamerica* kindly shared the data on the real and nominal term structures. I also thank participants at the LACEA Tenth Annual Meeting (Paris, France, 2005), and participants at seminars in the Central Bank of Chile and the University of Chile. This paper was motivated by an earlier work with Gabriel Fernández and Agustín Izquierdo. All remaining errors are mine.
E-mail: mlarrain@bcentral.cl.

1 Introduction

The relationship between monetary policy and market interest rates is a topic of great interest to monetary policymakers. The standard view of the transmission mechanism of monetary policy assigns a key role to market interest rates (see, e.g., Taylor 1995). According to the expectations hypothesis of the term structure of interest rates, long-term rates reflect market participants' expectations of future values of short-term rates. Since monetary policy largely sets the short-term rate, it will affect long-term rates by moving the expected path of future short-term rates. Long-term interest rates, in turn, determine private borrowing costs, which ultimately influence real economic activity. Therefore, having reliable estimates of the reaction of long-term rates to policy innovations is important for formulating effective policy decisions.

The purpose of this paper is to estimate the impact of monetary policy surprises on the term structure of interest rates in Chile. The novelty of the paper is twofold. First, although several studies have investigated the relationship between monetary policy and long-term interest rates in developed countries, the study of such relationship in emerging market economies remains largely unexplored. Chile, as an open and developing economy, represents an interesting case study. Compared to other emerging market economies, Chile presents a high degree of financial development (see Hernández and Parro 2004). During the past decade Chile's consistent monetary policy, based on an inflation targeting framework, has been reflected in a process of steadily declining inflation. Furthermore, monetary policy discipline has avoided financial crises that could have destabilized the linkages between policy actions and financial markets, as in some emerging markets in the region (e.g., Brazil in 1999 and Argentina in 2002).

Secondly, Chile has an important market for index-linked debt, which allows us to estimate the response of both nominal and real interest rates to policy shocks. Much of the literature has concentrated solely on nominal interest rates, due to the lack of index-linked markets. Moreover, using the difference between nominal and real rates as an indicator of compensation for expected inflation and inflation risk, we are able to estimate the response of inflation compensation to policy shocks. If the response is relatively weak, then we could infer that financial markets have a fairly stable view of

long-term inflation outcomes, precisely the outcome we might expect in the presence of an explicit inflation target.

Since bond prices are determined in forward-looking markets, policy actions anticipated by financial markets should affect little, if all, market interest rates. Therefore, in our analysis we concentrate on the reactions to the surprise component of the policy move. Following the recent literature, we use financial market data to separate changes in the monetary policy rate into anticipated and unanticipated components, and refer to the unanticipated element of the change as the monetary surprise.

Two additional considerations complicate the identification of the responsiveness of market interest rates to monetary policy. First, policy actions are simultaneously influenced by movements in market interest rates, since policymakers extract information about the state of the economy from the current term structure to make decisions . This results in a difficult endogeneity problem. Second, a number of other variables, such as international interest rates, likely have an impact on market interest rates too. As explained below, we rely on the characteristics of the implementation of monetary policy in Chile to alleviate both problems.

We find that a monetary surprise has a positive and very significant impact on nominal interest rates. Indeed, in response to an unanticipated 100 basis point increase in the policy rate, the one-year rate increases by 40 basis points, and the effect gradually diminishes as the horizon lengthens. On the other hand, the effect of monetary surprises on real interest rates is relatively small. Although all responses are positive, not all of them are statistically significant. Our results also indicate that Chilean interest rates are quite less sensitive to monetary surprises than US interest rates are. Finally, we find that inflation compensation doesn't move significatively in response to policy surprises, which allows us to infer that the inflation targeting framework in Chile has been successful in anchoring inflation expectations to the target.

The paper proceeds as follows. Section 2 presents the methodology used in the study. Section 3 shows the data. Section 4 documents the impact of the policy shock on long-term interest rates and inflation compensation. Section 5 reports two robustness checks performed, and section 6 concludes. An appendix contains definitions, data sources, and

tables.

2 Methodology

Economists have attempted to quantify the effects of monetary policy on market interest rates for a long time. The first paper to assess the markets' reaction to policy actions was Cook and Hahn (1989). Their procedure was to regress the change in bond rates on the change in the Fed's funds rate target:

$$\Delta r_{nt} = \alpha_n + \beta_n \Delta r_t + \varepsilon_{nt}, \tag{1}$$

where Δr_t denotes the change in the fund rates target announced, and Δr_{nt} denotes the change in the yield of the bond of maturity n immediately after the announcement. Equation (1) was estimated separately for each yield of maturity n. At least three basic econometric issues arise in the estimation of this regression:

(1) Since market rates should respond only to monetary surprises, using actual policy moves induces a major errors-in-variables problem,

(2) The policy move is simultaneously influenced by movements in market rates, resulting in an endogeneity problem, and

(3) A number of other variables likely have an impact on market interest rates.

With forward-looking agents, at any point in time the term structure implicitly incorporates agents' expectations of future policy actions. Changes in the policy rate that are widely expected will be already priced into the market before the actual change in the policy rate takes place, and will cause no effect on market interest rates . We decompose the change of the policy rate in its two components:

$$\Delta r_t = \Delta r_t^u + \Delta r_t^a, \tag{2}$$

where Δr_t^u represents the unanticipated component and Δr_t^a the anticipated component of the move. Following the recent literature (see Kuttner 2001) we use financial market instruments to measure near-term expectations of the policy rate. As explained in more

detail below, we use the short end of the forward curve to extract information about the surprise component of the policy decision.

To deal with the endogeneity problem (2), we rely on the characteristics of the implementation of monetary policy in Chile. The Chilean Monetary Policy Committee (MPC) makes policy decisions at monthly meetings, which are publicly announced six months in advance. A statement corresponding to the MPC meeting is announced after financial markets have closed. Daily data solves the endogeneity problem, since market interest rates react the day after the decision is made, and therefore the decision cannot be influenced by the movement of those rates

Finally, to alleviate problem (3), variables other than monetary surprises, we rely again on the timing of policy decisions in Chile. Excluding relevant variables in a regression will bias the estimation of the coefficients, unless the excluded variable is not correlated with the regressor of interest. We can divide relevant variables in two categories: those that might be affected by the policy action (e.g. the exchange rate) and those that cannot be affected (e.g. international interest rates). Daily data eliminates the correlation between the variables of the second category and the policy move, since these variables change the day after the MPC meeting, and therefore cannot affect the policy action. Since the correlation between the variables in the first category and the policy move may still arise, problem (3) is ameliorated though not completely solved.

3 Data description

Our sample runs from August 8, 2002 to July 12, 2005. The size of our sample is limited by the fact that long-term nominal bonds began to be issued by the Central Bank of Chile only since 2002. Our sample includes 36 policy dates. The frequent nature of monetary policy decisions allows us to obtain relatively precise estimations, even though our sample spans only a few years.

The monetary policy rate in Chile is set as the target level for the nominal interbank interest rate. Due to the indexation of the Chilean economy, an important fraction of financial instruments are linked to past inflation. Inflation-linked bonds are denominated in *unidades de fomento* (UF). The UF is an accounting measure, whose value is daily

adjusted according to the previous month inflation. Given that the UF is adjusted to past inflation and not current inflation, indexed bonds do not fully compensate their holders for inflation, and therefore index-linked yields do not provide an exact measure of real interest rates. However, as noted by Chumacero (2002), this difference vanishes as the maturity of the instrument increases.

An appendix gives a complete description of the variables and the data sources used in the paper.

3.1 Monetary policy surprises

As discussed above, we use information from the short end of the forward curve of interest rates to distinguish between anticipated and unanticipated changes of the policy action.

The short end of the nominal forward curve is computed by the Central Bank of Chile using the Nelson and Siegel methodology. We use the instantaneous forward rate as a measure of the market's expectation of the future policy rate (see Svensson 1995). Therefore:

$$\Delta r_t^a = f_{t-1} - r_{t-1}, \tag{3}$$

where f_{t-1} is the instantaneous forward rate in $t-1$. We define the monetary surprise as the difference between the change in the actual policy rate and the anticipated change. That is:

$$\Delta r_t^u = \Delta r_t - \Delta r_t^a = r_t - f_{t-1}. \tag{4}$$

Table 1 in the Appendix lists the 36 MPC meetings that took place in our sample and reports the decomposition of the policy action into anticipated and unanticipated components.

[Insert Table 1]

The decomposition reveals some interesting patterns. For example, the final round of cuts in late 2003 and early 2004 didn't seem anticipated by the market. Finally, while the beginning of the process of "normalization" of interest rates in late 2004 seemed to have taken the market by surprise, the following actions where (partially) anticipated by the market.

3.2 Long-term interest rates

The long-term interest rates considered in this study include the zero-coupon nominal and real yields with maturities of one, two, three, four, five, ten, fifteen, and twenty years. The company `Riskamerica` provided the data for the nominal and real term structures.

4 Results

We proceed to estimate the effect of a monetary surprise on the term structure of interest rates. That is, we estimate the following equation:

$$\Delta r_{nt} = \alpha_n + \beta_n \Delta r_t^u + \varepsilon_{nt}, \tag{5}$$

for nominal and real interest rates. The results for nominal interest rates are shown in table 2.

[Insert table 2]

There is a clear positive relationship between nominal interest rates of all maturities and policy surprises. The effect becomes smaller at longer maturities: an unanticipated 100 basis point increase in the policy rate is on average associated with an increase in the 1-year nominal rate of 40 basis points, and in the 20-year nominal rate of 7 basis points. In addition, all of the coefficients are highly statistically significant (at a 1% confidence level). [1]

The stronger response of short-term interest rates compared to the long-term ones is consistent with the expectations theory of the term structure of interest rates. Since changes in the policy rate affect long-term rates to the extent that they lead to revisions in expectations of future short-term rates, more persistent changes will have larger effects on expectations. As noted by Cook and Hahn (1989), mean reversion in the monetary policy rate therefore guarantees smaller responses for rates farther out the yield curve. In our sample, the monetary policy rate presents mean reversion (a serie of tests strongly

[1] We also estimated the reaction of market interest rates to both the anticipated and unanticipated changes in monetary policy (see Kuttner 2001). As expected, the response to the anticipated component was small and statistically insignificant. These results are available on request.

rejected the null hypothesis of a unit root in the policy rate) and thus the pattern of decaying coefficients was expected.

Table 3 reports the results of the regression of the real term structure on the policy surprise.

[Insert Table 3]

The evidence indicates that unanticipated policy actions also have a positive impact on real interest rates, and that the effect gradually diminishes as the horizon lengthens. However, although all coefficients are positive, they are relatively small in size and mostly statistically insignificant (only the four, five, and ten-year real rates are significant at conventional levels of confidence).

Our results indicate that nominal rates are much more sensitive to policy shocks than real rates. For example, in response to an unanticipated 100 basis point increase in the policy rate, the one-year real rate increases by 15 basis points, which corresponds to approximately one-third of the response of the one-year nominal rate. Moreover, while the coefficients associated to nominal rates are highly significant, the ones associated to real rates are mostly not.

It is interesting to note that the responses obtained here are lower than the ones found in the previous literature. Table 4 reports the results found in some recent papers that have studied the impact of monetary policy shocks on the term structure of nominal interest rates in the US.

[Insert table 4]

Table 4 indicates that the response of market rates to a policy shock in Chile is roughly one-half of the response found in the US. One possible interpretation of this result relies on the fact that policy actions in the US have a substantial effect on international markets. When the Fed moves it's policy rate, long-term interest rates move in the rest of the world. Market rates in the US would respond not only directly to the domestic shock, but also indirectly to the movements in interest rates abroad. Since Chile is a small and open economy, it's policy actions have no effect on international markets, and therefore market rates would respond only directly to the domestic shock.

An alternative interpretation is that since Chile is a small and open economy with a flexible exchange regime, the nominal exchange rate plays an important role in absorbing the monetary policy shock. Given that the US is a large economy, markets interest rates would have to make most of the adjustment and hence respond more to the shock.

Finally, in order to gauge the extent to which inflation targeting has helped anchoring expected inflation, we estimate the impact of policy surprises on inflation compensation for several maturities. Inflation compensation, defined as the difference between the nominal and indexed yields, provides a market-based indicator of average expected inflation and inflation uncertainty at different horizons. We estimate the following regression:

$$\Delta ic_{nt} = \alpha_n + \beta_n \Delta r_t^u + \varepsilon_{nt}, \tag{6}$$

where ic_{nt}, the inflation compensation for horizon n, is defined as the difference between the nominal and indexed-linked yields of maturity n. Results are reported in table 5.

[Insert table 5]

The results show a positive (in all but one case) reaction of inflation compensation to the policy shock. Asymmetric information between the authority and financial markets might provide an explanation for this positive response. When the Central Bank has access to information not available to market participants, an unanticipated increase in the policy rate might be interpreted as a response to an unobserved inflationary shock, which would lead the market to correct its inflation expectations upwards.

However, even though the responses are mostly positive, the coefficients are statistically insignificant. This weak response allows us to infer that the inflation targeting framework in Chile has been successful in anchoring inflation expectations to the target.

These findings are consistent with the results found by Gürkaynak et al. (2005b). The authors evaluate the behavior of daily bond yield data for two inflation-targeting countries (Sweden and the UK) and for the US. They find that while US inflation compensation exhibits highly significant movements in response to economic news, inflation expectations are firmly anchored in Sweden and the UK. In sum, our results bolster the

international evidence that finds that credibility in inflation targeting countries allows long-term inflation expectations to be largely unaffected by policy shocks.

5 Alternative Definitions of the Policy Variable

The results presented above measure the response of interest rates to a monetary surprise, using forward curve data to disentangle changes in the policy rate into anticipated and unanticipated components. Of course, other measures of monetary policy shocks are also available. This section considers the results under two alternative measures: the change in a short-term market interest rate, and the unexpected component of the policy move obtained from survey data.

There is a group of papers that define the policy surprise as the change in a specific observable short-term market interest rate on the event day. The notion is that this policy variable moves only to the extent that there is a policy surprise. For example, Cochrane and Piazzesi (2002) use the change in the 30-day eurodollar rate, Rigobon and Sack (2004) the change in the 30-day eurodollar futures rate, and Ellingsen and Söderström (2001) the change in the three-month T-bill rate. In this paper, we use the PDBC-90 rate as the measure of the policy innovation. This rate corresponds to the yield of the 3-month nominal instrument issued by the Central Bank of Chile. The regression results appear in tables 6, 7, and 8.

[Insert tables 6, 7, and 8]

Table 6 shows that the coefficients obtained for the nominal rates are numerically very similar to the ones obtained in the benchmark estimation. They gradually diminish as the horizon increases and are highly statistically significant.

Table 7 indicates that although the numerical values of the coefficient for the real rates are somewhat higher for shorter maturities and somewhat lower for longer maturities, the qualitative results stay unchanged. The coefficients of the middle range are again the only ones that remain significant, and the coefficients gradually diminish as the horizon lengthens.

The response of inflation compensation, as reported in table 8, is again positive, and statistically not different from zero.

Finally, we estimate our regressions using survey data to separate changes in the policy rate into anticipated and unanticipated components. The Central Bank of Chile realizes a monthly survey that summarizes the forecasts of economists from industry, government, banking, and academia. Among the variables forecasted is the policy rate. We compute the difference between the actual realization and the forecast, and use this variable to consider the results of an alternative measure of monetary surprise.

[Insert tables 9, 10, and 11]

The results are shown in tables 9, 10, and 11 . Again, the main results remain unchanged.

6 Concluding remarks

Standard views of the monetary transmission mechanism rest on a reliable relationship between monetary policy actions and long-term interest rates. Since the first link in the transmission of monetary policy is from the policy rate to other market interest rates, having reliable estimates of the reaction of market rates to the policy action is an important step in formulating effective policy decisions. This article has investigated empirically the relationship between policy actions and the term structure of nominal and real interest rates in Chile, during the period 2002-2005. Using the difference between nominal and real rates as an indicator of compensation for expected inflation and inflation risk, we also measure the extent to which inflation targeting helps anchor inflation expectations.

Using forward curve data to derive a measure of the unanticipated component of the policy move, we estimate the immediate effects of policy surprises on long-term interest rates and inflation compensation in Chile. The characteristics of the implementation of monetary policy in Chile allow us to control for possible feedback relationships between policy actions and market interest rates, and to control for the fact that a number of other variables may affect market rates as well.

The results indicate that policy shocks have a positive and very significant impact on nominal interest rates. For example, in response to an unanticipated 100 basis point increase in the policy rate, the yield curve shifts up by 40 to 20 basis points for maturities up to five years. On the other hand, the effect of policy shocks on real interest rates is relatively small. Although all responses are positive, not all of them are statistically significant. In fact, the response of real rates corresponds to roughly one-third of the response of nominal rates for short-term maturities. Our results also indicate that Chilean interest rates react less to policy shocks than US interest rates do.

With respect to the inflation compensation, we find that it doesn't move significatively in response to policy surprises. This allows us to infer that the inflation targeting framework in Chile has been successful in anchoring inflation expectations to the target.

Our results are robust to using two alternative measures of the policy variable: the change in a short-term market interest rate, and the unexpected component of the policy move obtained from survey data.

We conclude by raising the question of whether the effects of monetary policy actions can be adequately characterized by a single factor, namely the unanticipated component of the move. In august 2004, a month before the process of "normalization" began in Chile, long-term interest rates jumped several basis points after the MPC statement. This reaction was not caused by what the MPC did, but instead by what the statement said:

> "The Board believes that the moment is approaching when it will be necessary to reduce the marked monetary impulse, in order to make compatible the strengthened economy with an expected annual inflation rate of 3% over the usual policy horizon of 12 to 24 months".

The statement was read by financial markets as indicating that the MPC would begin tightening policy sooner than previously expected, which led interest rates to jump. Treating the action on this date as a zero surprise change in the policy rate would be misleading. In a recent paper, Gürkaynak et al. (2005a) found that a second factor -future path of policy- accounted for more than three-fourths of the explainable variation in the movements of long-term yields around MPC meetings in the US. This

second factor was found to be associated with significant changes in MPC statements. Therefore, an interesting direction to extend our analysis would be to estimate the effects of these two dimensions of policy actions on market interest rates in Chile.

References

[1] Chumacero, R.A. (2002). "Arbitraje de Tasas de Interés." Mimeo, Central Bank of Chile.

[2] Cochrane, J. and M. Piazzesi (2002). "The Fed and Interest Rates-A High-Frequency Identification." *American Economic Review* 92(2): 90-5.

[3] Cook, T. and T. Hahn (1989). "The Effect of Changes in the Federal Funds Rate Target on Market Interest Rates in the 1970s." *Journal of Monetary Economics* 24(3): 331-51.

[4] Ellingsen, T. and U. Söderström (2004). "Why are Long Rates Sensitive to Monetary Policy?" CEPR Discussion Paper No. 4360.

[5] Gürkaynak, R.S., B. Sack, and E. Swanson (2005a). "Do Actions Speak Louder Than Words? The Response of Asset Prices to Monetary Policy Actions and Statements." *International Journal of Central Banking* 1(1): 55-93.

[6] Gürkaynak, R.S., B. Sack, and E. Swanson (2005b). "Inflation Targeting and the Anchoring of Long-Run Inflation Expectations: International Evidence from Daily Bond Yield Data." Mimeo, Riksbank.

[7] Hernández, L. and F. Parro (2004). "Sistema Financiero y Crecimiento Económico en Chile." Working Paper No. 291, Central Bank of Chile.

[8] Kuttner, K.N. (2001). "Monetary Policy Surprises and Interest Rates: Evidence from the Fed Funds Futures Market." *Journal of Monetary Economics* 47(3): 523-44.

[9] Rigobon, R. and B. Sack (2004). "The Impact of Monetary Policy on Asset Prices." *Journal of Monetary Economics* 51(8): 1553-575.

[10] Svensson, L.E.O. (1995). "Estimating Forward Interest Rates with the Extended Nelson and Siegel Method". *Sveriges Riksbank Quarterly Review* 3: 13-26.

[11] Taylor, J.B. (1995). "The Monetary Transmission Mechanism: An Empirical Framework." *Journal of Economic Perspectives* 9: 11-26.

Definitions and data sources

MPC meeting dates: monetary policy decisions at the Central Bank of Chile are made at monthly meetings, which are publicly announced six months in advance. Data source: `http://www.bcentral.cl/esp/politicas/reunionespolitica/`

Monetary policy rate: the Central Bank of Chile implements its monetary policy by defining a target level for the nominal interbank interest rate, which is known as the monetary policy rate. Data source: `http://www.bcentral.cl/esp/infoeconomica/`

Monetary policy surprise: the research department of the Central Bank of Chile computes the short end of the forward nominal curve, using the prices of the nominal instruments PDBC and BCP. The surprise is defined as the difference between the actual change of the policy rate and the change of the instantaneous forward rate of the previous day. Data source: Central Bank of Chile

Nominal and real term structures: the company `Riskamerica` computes the long end of the nominal term structure using the nominal instruments PDBC and BCP, and the long end of the real term structure using the UF denominated instruments PRC and BCU. Data source: `http://www.riskamerica.com/`

PDBC: the PDBC-90 is the yield of the 90-day nominal instrument. Data source: `http://www.bcentral.cl/esp/infoeconomica/`

Survey data: the research department of the Central Bank of Chile realizes a monthly survey that summarizes the forecasts of economists from industry, government, banking, and academia. We use the policy rate forecast as a proxy of the market's expectation of the future policy rate. Data source: Central Bank of Chile

Table 1: Actual, anticipated and unanticipated changes in the monetary policy rate

MPC Meeting date	Actual	Unanticipated	Anticipated
8-Ago-02	-25	-6.83	-18.17
5-Sep-02	0	14.92	-14.92
8-Oct-02	0	12.44	-12.44
7-Nov-02	0	0	0
10-Dic-02	0	1.14	-1.14
9-Ene-03	-25	-25.00	0
18-Feb-03	0	0	0
13-Mar-03	0	0	0
8-Abr-03	0	0	0
8-May-03	0	0	0
10-Jun-03	0	0	0
10-Jul-03	0	0	0
12-Ago-03	0	-1.93	1.93
4-Sep-03	0	-4.15	4.15
14-Oct-03	0	3.84	-3.84
13-Nov-03	0	3.87	-3.87
11-Dic-03	-50	-50.96	0.96
8-Ene-04	-50	-53.78	3.78
10-Feb-04	0	3.53	-3.53
11-Mar-04	0	4.65	-4.65
15-Abr-04	0	9.80	-9.80
13-May-04	0	23.08	-23.08
10-Jun-04	0	15.37	-15.37
8-Jul-04	0	3.53	-3.53
12-Ago-04	0	4.56	-4.56
7-Sep-04	25	27.83	-2.83
12-Oct-04	0	2.25	-2.25
11-Nov-04	25	15.08	9.92
09-Dic-04	0	-13.73	13.73
11-Ene-05	25	14.69	10.31
10-Feb-05	25	8.85	16.15
10-Mar-05	0	-10.70	10.70
07-Abr-05	25	14.62	10.38
12-May-05	25	8.76	16.24
09-Jun-05	0	-0.41	0.41
12-Jul-05	25	22.76	2.24

* Source: Central Bank of Chile

The table shows daily changes in basis points

Table 2: The response of the nominal term structure to a monetary surprise

Nom Yield	Coefficient	Std. Error	P-value
1-yr	0.405	0.058	0.000
2-yr	0.295	0.038	0.000
3-yr	0.236	0.035	0.000
4-yr	0.202	0.034	0.000
5-yr	0.178	0.035	0.000
10-yr	0.119	0.038	0.004
15-yr	0.090	0.034	0.012
20-yr	0.071	0.029	0.018

Table 3: The response of the real term structure to a monetary surprise

Real Yield	Coefficient	Std. Error	P-value
1-yr	0.150	0.246	0.545
2-yr	0.171	0.168	0.318
3-yr	0.163	0.115	0.167
4-yr	0.152	0.083	0.074
5-yr	0.142	0.065	0.035
10-yr	0.109	0.056	0.060
15-yr	0.090	0.056	0.122
20-yr	0.076	0.053	0.158

Table 4: Effect of monetary policy on the nominal term structure from recent US literature*

Impact on nominal yields	1-yr	2-yr	5-yr	10-yr
Kuttner (2001)	0.716	0.614	0.481	0.315
Cochrane and Piazzesi (2002)	0.720	0.670	0.481	0.520
Ellingsen and Söderström (2004)	0.860	0.710	0.570	0.310
Rigobon and Sack (2004)	0.716	0.732	0.872	0.474

* The table shows the slope of the regression of the change of the term structure of nominal interest rates on the monetary policy action

Table 5: The response of inflation compensation for different maturities to a monetary surprise

Compensation	Coefficient	Std. Error	P-value
1-yr	0.255	0.239	0.293
2-yr	0.124	0.159	0.440
3-yr	0.074	0.107	0.496
4-yr	0.049	0.077	0.525
5-yr	0.036	0.064	0.577
10-yr	0.010	0.066	0.883
15-yr	0.000	0.066	1.000
20-yr	-0.005	0.060	0.939

* Inflation compensation for maturity n is defined as the difference between the nominal and indexed-linked yields of maturity n

Table 6: The response of the nominal term structure to a change in the short-term interest rate*

Nom Yields	Coefficient	Std. Error	P-value
1-yr	0.348	0.078	0.000
2-yr	0.272	0.050	0.000
3-yr	0.230	0.043	0.000
4-yr	0.203	0.040	0.000
5-yr	0.184	0.039	0.000
10-yr	0.129	0.041	0.004
15-yr	0.099	0.036	0.010
20-yr	0.079	0.031	0.015

* The short-term interest rate corresponds to the yield of the 90-day nominal instrument issued by the Central Bank of Chile (PDBC-90)

Table 7: The response of the real term structure to a change in the short-term interest rate*

Real Yields	Coefficient	Std. Error	P-value
1-yr	0.239	0.264	0.372
2-yr	0.241	0.180	0.190
3-yr	0.216	0.123	0.087
4-yr	0.193	0.088	0.034
5-yr	0.174	0.069	0.016
10-yr	0.120	0.061	0.056
15-yr	0.094	0.061	0.134
20-yr	0.077	0.057	0.183

* The short-term interest rate corresponds to the yield of the 90-day nominal instrument issued by the Central Bank of Chile (PDBC-90)

Table 8: The response of inflation compensation for different maturities to a change in the short-term interest rate*

Compensation	Coefficient	Std. Error	P-value
1-yr	0.109	0.262	0.681
2-yr	0.031	0.173	0.861
3-yr	0.013	0.116	0.909
4-yr	0.010	0.084	0.906
5-yr	0.010	0.069	0.886
10-yr	0.009	0.072	0.897
15-yr	0.005	0.071	0.944
20-yr	0.001	0.065	0.982

* The short-term interest rate corresponds to the yield of the 90-day nominal instrument issued by the Central Bank of Chile (PDBC-90)

Table 9: The response of the nominal term structure to a monetary surprise measured from survey data*

Nom Yields	Coefficient	Std. Error	P-value
1-yr	0.436	0.059	0.000
2-yr	0.316	0.039	0.000
3-yr	0.253	0.036	0.000
4-yr	0.215	0.036	0.000
5-yr	0.190	0.037	0.000
10-yr	0.127	0.040	0.003
15-yr	0.095	0.036	0.011
20-yr	0.076	0.030	0.016

* Survey data is used to obtain the unanticipated component of a change in the monetary policy rate

Table 10: The response of the real term structure to a monetary surprise measured from survey data*

Real Yields	Coefficient	Std. Error	P-value
1-yr	0.250	0.256	0.336
2-yr	0.227	0.175	0.204
3-yr	0.185	0.121	0.134
4-yr	0.151	0.087	0.092
5-yr	0.126	0.069	0.079
10-yr	0.064	0.061	0.304
15-yr	0.042	0.061	0.500
20-yr	0.031	0.057	0.593

* Survey data is used to obtain the unanticipated component of a change in the monetary policy rate

Table 11: The response of inflation compensation for different maturities to a monetary surprise measured from survey data*

Compensation	Coefficient	Std. Error	P-value
1-yr	0.186	0.253	0.466
2-yr	0.089	0.167	0.597
3-yr	0.068	0.112	0.551
4-yr	0.064	0.081	0.434
5-yr	0.064	0.066	0.339
10-yr	0.063	0.069	0.369
15-yr	0.054	0.069	0.438
20-yr	0.045	0.063	0.476

* Survey data is used to obtain the unanticipated component of a change in the monetary policy rate

Documentos de Trabajo
Banco Central de Chile

Working Papers
Central Bank of Chile

NÚMEROS ANTERIORES

PAST ISSUES

La serie de Documentos de Trabajo en versión PDF puede obtenerse gratis en la dirección electrónica: www.bcentral.cl/esp/estpub/estudios/dtbc. Existe la posibilidad de solicitar una copia impresa con un costo de $500 si es dentro de Chile y US$12 si es para fuera de Chile. Las solicitudes se pueden hacer por fax: (56-2) 6702231 o a través de correo electrónico: bcch@bcentral.cl.

Working Papers in PDF format can be downloaded free of charge from: www.bcentral.cl/eng/stdpub/studies/workingpaper. Printed versions can be ordered individually for US$12 per copy (for orders inside Chile the charge is Ch$500.) Orders can be placed by fax: (56-2) 6702231 or e-mail: bcch@bcentral.cl.

DTBC-334 Noviembre 2005
Brechas de Ingreso entre Hombres y Mujeres: ¿Perpetuadas o Exacerbadas en la Vejez?
Solange Berstein y Andrea Tokman

DTBC-333 Noviembre 2005
Sovereign Spread in Emerging Markets: A Principal Component Analysis
Mónica Fuentes y Sergio Godoy

DTBC-332 Septiembre 2005
***Spreads* Soberanos: ¿Diferencian los Inversionistas Internacionales entre Economías Emergentes?**
Valentín Délano y Felipe Jaque

DTBC-331 Septiembre 2005
Business Cycle Dynamics and Shock Resilience in Chile
Helmut Franken, Guillermo Le Fort, y Eric Parrado

DTBC-330 Septiembre 2005
Sovereign Debt, Volatility and Insurance
Kenneth Kletzer

DTBC-329 Septiembre 2005
Contingent Reserves Management: an Applied Framework
Ricardo Caballero y Stavros Panageas

DTBC-328 Septiembre 2005
Why are Capital Flows so much more Volatile in Emerging than In Developed Countries?
Fernando A. Broner y Roberto Rigobon

DTBC-327 Septiembre 2005
Probability Of Insolvency
Marcelo Reyes y Eugenio Saavedra

DTBC-326 Agosto 2005
Exchange Rate Interventions and Insurance: is "Fear of Floating" a Cause for Concern?
Francisco Gallego y Geraint Jones

DTBC-325 Agosto 2005
Is the Fx Derivatives Market Effective and Efficient in Reducing Currency Risk?
Esteban Jadresic y Jorge Selaive

DTBC-324 Julio 2005
No Estaba Muerta, ... : la Teoría Cuantitativa y la Relación Entre Dinero e Inflación
Rómulo Chumacero y Jorge Hermann

DTBC-323 Mayo 2005
Mixed Tactical Asset Allocation
Alejandro Corvalán

DTBC-322 Mayo 2005
International Borrowing, Capital Controls and the Exchange Rate: Lessons from Chile
Kevin Cowan y José De Gregorio

DTBC-321 Mayo 2005
Policy Responses to External Shocks: the Experiences of Australia, Brazil and Chile
Luis Felipe Céspedes, Ilan Goldfajn, Phil Lowe, y Rodrigo Valdés

DTBC-320 Mayo 2005
La Curva de Salarios en Chile
Pablo García y Paulina Granados

DTBC-319 Mayo 2005
El Dinero Como Indicador de Actividad e Inflación en Chile – ¿Ya No?
Tobias Broer