Retail Bank Interest Rate Pass-Through: Is Chile Atypical?

by

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First draft: October, 2002
This draft: December, 2002

Abstract

This paper estimates the pass-through of changes in money market interest rates to bank retail deposit and lending rates in Chile, the United States, Canada, Australia, New Zealand, and five European countries. The estimation procedure is based on a standard error-correction specification. We find that the speed of pass-through in Chile is comparable to its speed in the United States and Canada. The size of the pass-through, however, is slightly lower than in the United States, Canada or Australia: it is comparable to that of New Zealand, Australia and the European countries. We also look for asymmetry and instability in the pass-through mechanisms, but we find little evidence of either.

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[1] Paper prepared for the BCCh's Sixth Annual Conference. We are grateful to Alain Ize, Saul Lizondo, Steve Phillips, Steve Russell and seminar participants at the central bank of Chile for useful discussions and comments. Andy Swiston provided outstanding research assistance. The views expressed in this paper are those of the authors and do not necessarily represent those of the IMF or IMF policy, or those of the Central Bank of Chile. Remaining errors are ours. Corresponding author: Marco Espinosa (mespinosa@imf.org).

I. Introduction

There is little disagreement among economists that monetary policy affects the rate of inflation and, at least in the short-run, the level of real economic activity. From an operational perspective, there have been times when many central banks have targeted monetary aggregates. More recently, the modus operandi of most central banks has shifted toward targeting a short-term market interest rate. A question that currently occupies a number of researchers is how monetary-policy-induced changes in short-term interest rates can affect an economy's inflation and output outcomes – the so-called "transmission mechanism" of monetary policy.

Most of the literature that looks at specific transmission mechanisms, such as the literature on the "credit channel" (e.g., Bernanke and Gertler, 1995 and Bernanke and Gilchrist, 1999), implicitly assumes that once the monetary authority's target rate is changed, short-term market and banking retail rates will follow suit almost immediately – that is, that there will be quick and complete "pass-through". It seems clear that if pass-through was sluggish and/or incomplete, the effectiveness of the monetary policy transmission mechanism could be reduced quite significantly.

Stickiness of deposit banking rates in the United States was first documented in Hannan and Berger (1991) and Neuman, and Sharpe (1992). These papers study bank deposit rate setting using econometric models that were motivated by theoretical models developed to analyze price stickiness in markets for goods and services. The data available to these authors are large surveys of banks with different degrees of market power. The authors viewed these data as well-suited to test the prediction that bank market power affects the degree to which deposit rates are sticky. Implicit in their analyses is the notion that banks cannot influence the behavior of lending rates because they are atomistic players in the loan market. Hence, these papers assume that there is speedy and full pass-through from money market rates to retail lending rates. Among other things, both sets of authors find that there is asymmetry in the degree of pass-through: the pass-through to deposit rates is lower when the t-bill rate increases than when the t-bill rate decreases. The presence of asymmetric pass-trough seems to support their theoretical model's prediction that deposit price setting would be characterized by monopolistic competition.

Cottarelli and Kourelis (1994) are the first researchers we know of to try to measure and compare the degrees of lending rate pass-through in a number of different countries, developed and developing. They investigate the effects of alternative financial structures on the degree of pass-through. Their empirical analysis is based on an autoregressive distributed-lag model. They estimate the responses (multipliers) of lending rates to changes in money market rates at different lags. The estimated multipliers are then regressed against various indicators of financial structure. They find that the magnitude of pass-through differs across countries, and they conjecture that this difference is due to differences in the structure of these countries' banking systems. In particular, they suggest that the following factors

might reduce the degree of stickiness: (i) the existence of a market for negotiable short-term instruments, (ii) relatively limited volatility of money market rates, and (iii) relatively weak barriers to entry. However, they find that market concentration (iv) does not affect loan rate stickiness. Based on these empirical findings, the authors suggest that if a government wishes to enhance the power of monetary policy, then its policies should aim at (i) enriching the menu of short-term marketable instruments, and (ii) removing barriers to competition, rather than trying reduce the level of market concentration.

Most recent studies of the interest rate pass-through rely on error correction specifications and concentrate on euro-area countries. Mojon (2000), for example, measures the degree of pass-through for lending and deposit rates in five of these countries: Belgium, Germany, France, Netherlands and Spain. He *assumes* that there is full pass-through in the long run and concentrates on estimating the degree of pass-through on impact. He goes on to study interest rate cycles, trying to uncover possible pass-through asymmetries. Some of his findings are that (i) retail rates respond sluggishly to changes in the money market rate, (ii) short-term rates generally respond faster than long-term rates to changes in the money market rate, and (iii) there is asymmetry in the degree of pass-through: the pass-through to lending rates is higher when the money market rate increases than when the money market rate decreases, while the opposite is true for the deposit rates. He also find that (iv) pass-through is not homogeneous across countries. He conjectures that pass-through heterogeneity could be causes by differences in the structure of the countries' banking systems.

Bondt (2002) estimates an aggregate error correction model for the euro area. In his analysis, deposit and lending rates of different maturities are paired with government bond yields of similar maturities. He performs sub-sample estimation and a VAR estimation in order to examine the robustness of his results. He finds that (i) for both lending and deposit rates, pass-through on impact is incomplete: in one month it reaches 50 percent, at its highest. However, (ii) for lending rates, pass-through is complete in the long run.

This paper compares the dynamic relationship between the money market interest rate and retail bank rates for Chile, Canada, the United States, Australia, New Zealand and a number of European countries. To this end, we estimate pass-through in the short run (on impact, within a month) and in the long run (in a steady state), as well as the number of months it takes, on average, for the retail rate to reach its long-run level after a change in the money market rate (the mean lag).

These estimates are obtained from an auto-regressive distributed lag model re-parameterized as an error correction specification. For Chile, we also investigate whether there are any asymmetries in the pass-through process, and whether there is any instability. The scope of our investigation is limited: we attempt to determine whether interest rate pass-through is different, in Chile, than in more mature economies, but we do not try to analyze how differences in the degree of interest rate pass-through may affect the monetary policy transmission mechanism. Although the paper suggests an alternative to banking structure differences, as the source of cross-country differences in the degree of pass-through, we do not try to fully explain the differences we detect.

A distinctive feature of Chile is that there are two different types of deposits and loan instruments: standard nominal instruments, and instruments denominated in the *Unidad de Fomento* (UF), a unit of account that indexes the principal of financial contracts and transactions to the previous month's inflation rate. Our findings indicate that in the long run, the size of the pass-through for the interest rates on both types of instruments is fairly similar. In the short run, on the other hand, the pass-through for most UF rates is smaller than the pass-through for nominal rates.

Comparing Chile to the other countries in our sample, we find that the long run pass-through for Chile is smaller than for Australia, Canada and the United States, for most interest rates. Its size is comparable to that for New Zealand and the European countries in our sample. In the short run, the size of pass-through for Chile is lower than for the United States and Canada. It is higher than the pass-through for Australia, for some rates, and for New Zealand and the European countries, for most rates. We also find that for Chile, as for the other countries, the size of the pass-through declines as the maturity of the bank instruments increases. For most countries, including Chile, the mean lag also increases as the maturity of the bank instruments increases, regardless of whether one considers lending or deposit rates.

We do not find evidence of significant asymmetry or instability of interest rate pass-through for Chile. In particular, we do not find any evidence that there has been a slowdown or weakening in the pass-through process following the nominalization of Chile's interest rate targets.

We interpret our findings as indicating that during the period we study (April 1993 – September 2002) the properties of interest rate pass-through in Chile have not been atypical, relative to those of the other countries in our sample.

The remainder of the paper proceeds as follows. In section II, we describe the data we use, and we present a brief review of key cross-country similarities and differences in these data. Section III describes the model we estimate. Section IV reports the estimation results, and Section V concludes.

II. The Data and a Few Stylized Facts

In this section, we highlight the main features of the data set we constructed, and we present a few summary statistics.

A. Sources and Definitions

In addition to Chile, the countries we consider are the United States, Canada, Belgium, Germany, France, Netherlands, Spain, Australia and New Zealand. In all cases except Chile, the sample period is April 1993 to June 2002; for Chile, the sample ends in September 2002.

The data are from national central banks, the European Central Bank, and the International Monetary Fund. A complete list of the interest rate series used is presented in Table 1.

For almost all of the countries considered, the money market rate is an overnight inter-bank lending rate. The only exception is Australia, for which we use the 13-week Treasury bill rate due to apparent anomalies in the data for the inter-bank lending rate.

Retail interest rates are classified into three maturity buckets. Retail interest rates on instruments with maturities of less than three months were classified as short-term rates, rates on instruments with maturities of three months to a year were classified as medium-term rates, and rates on instruments with maturities of one to three years were classified as long-term rates.

The lending rates are for commercial loans only, with three exceptions. Canada's medium and long-term lending rates are for mortgages, and the German long-term lending rate is for consumer loans. For Chile, the rates are for both consumer loans and commercial loans. For the United States, the only lending rate we considered is the prime rate, which is the base upon which many other loan rates are calculated. Canada's short-term lending rate is defined similarly, while its long-term lending rate is for one-year and three-year conventional mortgages. The lending rates for Germany and Spain are averages for transactions that took place throughout the month, while for Belgium, France, and the Netherlands they are end-of-period rates. For Australia and New Zealand, we do not have lending rates by maturity. For New Zealand, we used the weighted average base business rate charged by the six largest banks (each bank reports the average rate on new loans of all maturities weighted by amount). For Australia, we used the weighted average rate charged by banks on business loans.

For Chile, we analyze the relationship between the money market rate and retail banking interest rates, both for nominal rates and for UF rates (see above). Studying UF interest rates is important because prior to August 2001, most bank intermediation was based on this unit of account. In August 2001, the Chilean central bank gave up targeting the money market rate in UF terms and switched to more conventional nominal interest rate targeting – a change called "nominalization" in the rest of the paper.

Our deposit rate series are generally more homogenous. Most of them are for demand deposits, certificates of deposit, or time deposits with maturities in the three maturity buckets described above.[2]

[2] We do not use short-term deposit rates for Belgium, France and the Netherlands, even though they are available, because they do not appear to be market-determined.

B. Summary Statistics for the Raw Data

Preliminary analysis of the data reveals some noteworthy differences between Chile and the other countries, along with one important similarity. Over our sample period, Chilean interest rates were higher, more volatile and less persistent than the interest rates for the other countries. On the other hand, the degree of co-movement between Chile's retail bank interest rates and its money market rate was approximately the same as for the other countries. These "stylized facts" are highlighted in Tables 2 through 5, which report summary statistics for the interest series for all the countries.

Chilean data display the highest sample average, even when we look at UF rates. (The Netherlands has the lowest average level of interest rates.) This situation may reflect a difference in the speed and timing of the disinflation process in Chile, and/or a higher average country risk premium (Table 2). How these circumstances may have affected interest rate pass-through in Chile is not clear.

Chile is the country in our sample with the highest interest rate volatility, both for UF rates and for nominal rates (Table 3). At all maturities, the interest rates for Canada, the United States and Australia exhibit the lowest volatility.

In theory, interest rate volatility may be caused by a volatile external environment and/or by domestic macroeconomic volatility. Edwards (1998) emphasizes the role of external factors in explaining interest rate volatility in emerging economies. In the case of Chile, Caballero (2000) argues that the financial reforms the country has adopted in recent years may have produced speeder transmission of external shocks. At the same time, and in spite of these financial reforms, Chile does not appear to be able to rely on international financial markets to smooth these shocks. Thus, somewhat paradoxically, financial reform in Chile may have exacerbated the volatility of its interest rates.

It is interesting to note that except for the United States, Canada, and Australia, money market rates appear to be more volatile than the retail rates. This observation suggests that for most of the countries in our sample, changes in money market rates are not completely transmitted to retail banking rates.

Chile is also the country in our sample with the lowest interest rate persistence; again, this is true whether we look at UF rates or nominal rates (Table 4). Standard macro/finance theory predicts that changes in market interest rates should be linked to changes in economic agents' marginal rates of intertemporal substitution. The high persistence of interest rates in the face of relatively volatile estimated intertemporal substitution rates is a well-documented empirical puzzle. One possible explanation for the high persistence of interest rates in many economies (Table 4) may be the policy of interest rate smoothing adopted by most central banks. If this explanation is correct, then the low persistence of interest rates in Chile may suggest that there have been long periods during which its central bank has opted against smoothing rates.

As Figure 2 indicates, prior to the recent switch to nominal interest rate targeting, the UF money market rate – the old target rate – followed a fairly smooth pattern, except during the Asian financial crisis. During the crisis, exchange rate defense seems to have had priority over interest rate smoothing. Over our sample period, the null hypothesis that Chilean interest rates have a unit root without drift can be rejected with 99 percent confidence for all rates except the nominal long-term deposit rate. (The regression includes a constant, a linear trend, and a number of lags between one and five.) For most of the other countries, this hypothesis cannot be rejected. (These results are not reported in the paper, but they are available from the authors.)

In all the countries in our sample, retail rates exhibit a relatively high degree of contemporaneous correlation with the relevant money market rate (Table 5 and Figures 1 through 7). For Chile, the first principal component explains more than 90 percent of the variability of the 10 series considered, suggesting that a single common factor explains most of the co-movement of these data (results not reported).[3] The relatively high value of the simple correlation between the money market rate and retail bank rates suggests that this common factor could be domestic monetary policy. Interestingly, Table 5 also shows that the strength of this correlation tends to decline with the maturity of the retail rate. In addition, an analysis of the lagged autocorrelation between the money market interest rate and retail bank rate (results not reported) shows that for most of the countries considered, it is highest within the first month.

As we pointed out in Section I, most studies of interest rate pass-through emphasize bank structure considerations as the key source of incomplete and/or sluggish pass-through. Taken together, the stylized facts we have just described may suggest that (as long as the volatility and persistence of interest rates is not directly linked to the banking structure) there is an alternative source of incomplete pass-through: namely, volatility and persistence of interest rates. In the rest of the paper, we shall try to assess this conjecture more formally. The next section presents a brief discussion of the econometric model we use, while Section IV reports the estimation results.

III. The Econometric Model

In order to analyze the dynamic relationship between retail bank interest rates and the money market rate, we first specify and estimate the following simple auto-regressive distributed lag (ADL) model:

[3] Since the Chilean series appear to be stationary around a linear trend, co-integration tests would not be informative on the degree of co-movement between the money market interest rate and retail bank rates.

(1) $$RtailR_t = \alpha_0 + \alpha_1 t + \alpha_2 MMR_t + \alpha_3 RtailR_{t-1} + \alpha_4 MMR_{t-1} \ .$$

Here *RtailR* is the relevant bank interest rate, *MMR* is the money market rate, and *t* is a time trend. The trend is intended to capture the disinflation process and other factors that change slowly over time, but affect interest rates in the same direction. Examples include financial market liberalization and structural reforms.

For all the countries considered, we specify equation (1) to include only one lag of both the endogenous and the exogenous variables. For Chile, standard lag-length selection criteria (over the entire sample period; results not reported) cannot reject the one-lag specification. For the other countries, we impose this lag structure without testing its adequacy,[4] in order to assure full comparability with the Chilean specification. Following Hendry (1995), we re-parameterize and re-estimate the ADL in (1) as the following error correction model (ECM):

(2) $$\Delta RtailR_t = \alpha_2 \, \Delta MMR_t + \beta_3 \, (RtailR_{t-1} - \beta_0 - \beta_1 \, t - \beta_2 \, MMR_{t-1})$$

where

(3) $$\beta_0 = \frac{\alpha_0}{(1-\alpha_3)}, \ \beta_1 = \frac{\alpha_1}{(1-\alpha_3)}, \ \beta_2 = \frac{\alpha_2 + \alpha_4}{(1-\alpha_3)}, \ \beta_3 = (\alpha_3 - 1) \ .$$

The parameters of equation (2) are linked to the parameters of equation (1) in the manner described by equations (3). Hence, estimating the former equation allows all the parameters of the latter to be recovered, or vice-versa, without altering the estimated residuals. However, from a statistical point of view the two representations are not equivalent. If the series are stationary, or non-stationary but co-integrated, then the parameters of (2) may be estimated more efficiently, because the error correction term and individual series represented in first differences are less likely to be collinear. If the series are integrated but do not co-integrate, then neither representation is statistically satisfactory.[5]

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[4] In principle, one could try to determine the most appropriate lag length for each country, or each interest rate series, and then select a different lag specification for each country or each series. However, we opted for a common parsimonious specification across all the countries and all the interest rates.

[5] As we have noted, all the Chilean interest series are stationary, while most of the non-Chilean series appear to have a unit root. Therefore, in the case of Chile it would be pointless to investigate the presence of co-integration between money market and retail interest rates. For the other countries, we find that a standard ADF test on the estimated long-run relation $RtailR - \beta_0 - \beta_1 t - \beta_2 MMR$ rejects the null of unit root in most of the cases, suggesting the presence of co-integration.

In equation (2), the term $RtailR - \beta_0 - \beta_1 t - \beta_2 MMR$, the lagged deviation of the retail rate from its steady state equilibrium value, can be interpreted as the solution of an optimization problem of a representative bank – as, for instance, in the model developed by Bondt (2000). Since we do not have any particular banking model in mind, we use equation (2) simply to characterize the reduced form of the dynamic relationship between retail interest rates and money market rates. The parameters of special interest in our empirical analysis are α_2, the degree of pass-through on impact (within a month), β_2, the degree of pass-through in the long-run (or the size of the pass-through), β_3, the speed of adjustment to the long-run value, and $1-\alpha_2/\beta_3$, the average number of months needed to reach this long-run value (the mean lag).

IV. Results

In this section, we report and discuss the estimation results. In the first subsection, we present a set of benchmark results for all the countries considered. In the second and third subsections, we check whether these results are robust across different states of the interest rate cycle, and over time. We perform these checks only for Chile. These robustness checks are interesting partly because they help us interpret the small cross-country differences in pass-through that we detect in our benchmark results.

A. Is Chile's Interest Rate Pass-Through Atypical?

The benchmark set of estimation results is reported in Table 6, which reports the parameters of interest discussed in the previous section.[6]

For Chile, pass-through appears to be incomplete, even in the long-run. This is also true for most of the European countries, and for Australia and New Zealand. It is not true for Canada and the United States, where long-run pass through seems to be complete. For Chile, however, the size of the short-term pass-through is larger than in Europe, Australia or New Zealand. As a result, the mean lag for Chile, which is the average length of time it takes Chilean interest rates to reach their steady state level following a change in the money market rate, is markedly smaller than for Europe; it is comparable to the mean time lags for the United States and Canada, on the one hand, and for Australia and New Zealand on the other.

[6] The reported estimate for Europe is an average of the individual country estimates. As known in the literature on dynamic panel data models (e.g., Pesaran and Smith, 1995), such an average may yield a consistent estimate of the typical relation in the cross section. Indeed, its efficiency may be questioned in this case given the small number of country estimates available. In any case, such averaging is statistically legitimate, in principle, and economically sensible.

In fact, the mean lag for Chile is at most four months, depending on the interest rate, compared with mean lags of at most two months for the United States and in New Zealand.

We see in Table 6a that, as one might expect, the shorter the maturity of the bank lending or deposit rate, the larger and faster the pass-through. For given maturities, there do not appear to be major differences between deposit rates and loan rates. In the case of Chile, moreover, we find little difference between pass-through properties of UF rates and nominal interest rates.

This first set of benchmark results, therefore, seems to suggests that Chile's interest rate pass-through mechanism is not a-typical: as in most countries considered, the pass-through is less than full in the long-run but it is faster than in most countries, with a length of adjustment comparable to that in the US and New Zealand—the countries displaying the fastest transmission mechanisms among those considered.

These results lend themselves to the following tentative interpretation: Chile has a financial structure in which capital markets have played a progressively more important role over the last decade, including exercising competitive pressure on banks. But domestic banks operate also in a volatile external environment. It is possible that banks react promptly to monetary policy impulses, but external shocks have forced sharp policy changes, resulting in a fast but less than full pass-through on average.

More formally, as we can see from equation (3), for a given size of the short-term pass-through $(\alpha_2 + \alpha_4)$, the size of the pass-through in the long-run (β_2) is an increasing function of the persistence parameter, α_3. As explained in Section II.B, the temporary decisions to stop smoothing rates on the part of the Central bank, may explain the volatility and persistence, as measured by α_3, of the retail and money market rates. As noted in the previous section, Chile's short-term pass-through is higher than that in Europe but the persistence of both the money market and retail interest rates is lower than in Europe (Table 4), with contemporaneous correlations between money market and retail interest rates comparable to those in other countries (Table 5). If we are willing to assume that lower persistence in the policy rate is primarily due to external shocks, it follows that incomplete but relatively fast pass-through, in Chile, is more likely due to external macroeconomic factors than to market power in the banking system.[7]

Our conjecture is not incompatible with a more prominent role of the banks in the explanation of incomplete pass-through. It simply de-emphasizes the monopolistic power aspect of the banking channel. For example, it could be the case that bank intermediation may be riskier than in advanced economies in a more volatile economic environment (Chile,

[7] This interpretation is consistent with Cottarelli and Kourelis'observation that reducing the fluctuations in money market rates could help enhance the size of pass-through. Although they tie a reduction in the money market rate volatility to structural regulatory changes.

for example, has the highest average level of interest rates among the countries considered even after adjusting for inflation [in UF terms]). Indeed, banks' pricing decisions might be slowed down by such higher uncertainty. However, this would suggest that the residency and not the structure of the banking system, would work to exacerbate the external volatility, and to observe incomplete pass-through in the long-run.

If incomplete pass-through were due mainly to market power in the banking system, one would expect (as Hannan and Berger (1991) report) that this would result in an asymmetric pass-through while analyzing separately periods of increase and decrease of interest rates. On the other hand, if external shocks were the main factor affecting pass-through incompleteness, one would expect to find evidence of a more complete pass-through before the Asian, Russian, Brazilian, and Argentine crisis that buffeted Chile after June 1997. Therefore, without pretence to be able to discriminate between these two competing hypothesis based only on macroeconomic data, in the next two subsections, we try to assess the robustness of the benchmark estimation results and their interpretation by investigating whether the Chilean pass-through mechanism is characterized by asymmetries across states of the world and/or instability over time.

B. Is Chile's Interest Rate Pass-Through Stable Over Time?

Our first goal is to determine whether Chile's interest rate pass-through mechanism seems to have changed in recent years due to international crises, changes in the exchange rate regime, and, most recently, the nominalization of monetary policy. Table 6b reports estimates of our parameters of interest, for Chile, over three different sub-samples: a sub-sample that excludes the Argentine crisis and the nominalization of monetary policy (so that it ends in June 2001), a sub-sample that excludes the entire free-float period (it ends in June 1999), and a sub-ample that excludes the entire Asian-Russian financial crisis period (it ends in June 1997).

As we can see from the table, the estimates based on the two sub-samples through June 2001 and June 1999 are essentially identical to that based on the entire sample period (through September 2002). However, the estimates for interest rates *denominated in UF terms* based on the sample through June 1997 are slightly different, displaying larger pass-through in the long-run than those based on longer sample periods.[8] At the same time, we note from Table 2, that the standard deviation of interest rates in UF terms through June 1997 is about a third of that computed on longer sample periods, while persistence of the money market rate was

[8] Note that those estimates of the long-run pass-through based on the shortest sample period appearing equal to zero result from an estimated α_4 of the equal size but opposite sign than α_2; thus, annihilating the term $(\alpha_2 + \alpha_4)$ and hence also the long-term pass-through. These are cases in which a different, possibly even shorter, lag-length would likely be appropriate. As explained earlier, however, changing lag-length for each interest rate series analyze would prevent a simple and transparent comparison of different bank instruments and across countries.

about 25 percent higher. This evidence, therefore, seems bring support to the view that pass-through incompleteness, in the case of Chile, is likely to be due to the chosen policy response to external shocks rather than market power in the banking system.

These additional results suggests also that the change in exchange and monetary regimes that took place in September 1999 and August 2001, respectively, do not appear to have had major effects on the interest rate pass-through over and above the impact of the external environment. In particular, even though it might be early to assess the effects of nominalization of monetary policy, these results seem to suggest that nominalization has had no impact on the interest rate pass-through, despite perhaps some initial confusion in the market.

Indeed, a simple out-of-sample forecasting exercise (based in the model estimated up to June 2001, confirms this view: as we can see in Figure 8, the estimated model (based on nominal interest rates, which is the most relevant denomination in post-nominalization period) tracks the data fairly well, suggesting that there is no structural break in the estimated relation. Interestingly, the estimated model tends to over-predict deposit rates (and increasingly so the longer the maturity of these deposits) pass-through, pointing to some "atypical" stickiness in deposit rates, but does not under-predict lending rates, suggesting essentially "typical" stickiness in these rates.

C. Is Chile's Interest Rate Pass-Through Asymmetric?

If incomplete pass-through were due to market power in the banking sector, one would expect to find an asymmetric response of retail rates to changes in the money market rate (as found, for example, by Hannan and Berger (1991) for deposit rates in the US).

To investigate this hypothesis, following Sarno and Thornton (2002), we create a dummy variable that is equal to one if the retail rate is above or equal to its long-run equilibrium level—given by the estimated error correction term $(RtailR - \beta_0 - \beta_1 t - \beta_2 MMR)$—and zero otherwise. We then re-estimate the model in (2) by interacting its coefficients (α_2 and β_3) with this dummy.[9] As a result, we obtain estimates for the size of the short-term pass-through and its speed of adjustment in the two states of the interest rate cycle, which we shall call an interest rate contraction and expansion respectively.

Quite surprisingly, we find that there is little evidence of asymmetry in the pass-through for Chile (Table 7). In most cases, either the estimates of the parameter of interest in an

[9] Note that β_2 is kept constant in the exercise.

expansion are not statistically different from those in a contraction, or the significant differences have the wrong sign.

The approach used by Sarno and Thornton does not take a stand on whether the deviations from the long-run equilibrium relationship studied this way are caused by changes in the stance of monetary policy or other temporary shocks. To explore the possibility that the deviations from the long run equilibrium are associated with policy shocks, we experimented with a different dummy variable that tracks expansions and contractions in the monetary policy stance more closely, based on the publicly announced targets for the money market interest rate target.[10] Again, we find little evidence of asymmetry in the pass-through for Chile. This evidence seems to suggest that regardless of the source of the deviation from the long run equilibrium there is little evidence of interest rate pass-through asymmetry. This suggests that the Chilean banking system may not have significant monopolistic power. If this is the case, one should assess more carefully the hypothesis that banks' market power explains why retail bank rates in Chile display incomplete pass-through in the long run.

VI. Conclusions

In this paper, we conduct an econometric analysis of the pass-through of changes in money market rates to changes in bank retail deposit and lending rates. We compare results for Chile to results for the United States, Canada, Australia, New Zealand, and five European countries.

Based on comparable data and identical, standard error-correction econometric specifications, we show that Chile's pass-through properties are not atypical. For example, although our results indicates that pass-through in Chile is less than full in the long-run, this same result holds for most of the countries we study.

We find that in Chile, the pass-through mechanism has remained rather stable over time. In particular, our results indicate that neither the switch to a flexible exchange rate regime in 1999 nor the adoption of nominal interest rate targeting in August 2002 seems to have affected pass-through markedly. However, we do find some differences with the pass-through estimated through June 1997, before the Asian crisis, and especially for the estimates of interest rates in UF terms. We also find little evidence of asymmetric behavior across

[10] This approach is similar to the one used by Mojon (2000), who identifies interest rate cycles directly, by inspecting plots of retail interest rates. We also considered the possibility of disentangling the impact of banking structure on the speed of pass-through by comparing the retail bank rates with money market interest rates (e.g., rates on public securities) of similar maturities. Unfortunately, problems of data availability prevented us from carrying out this type of analysis.

states of the interest rate cycle, regardless of the criterion used to identify different states of the cycle.

Slow but complete pass-through is usually attributed to market power in the banking system. However, this paper suggests that external volatility should be considered more carefully, as a possible cause of friction in the pass-through mechanism. It is possible that external volatility may be responsible for the fact that interest rates pass-through in Chile is fast but incomplete.

Our results seem consistent with the view that the differences between Chile and the other countries we have studied are due mainly to external shocks, rather than differences in market power in the banking system. We find no evidence of asymmetric behavior in interest rate pass-through in Chile, and nominalization does not seem to have affected the Chilean pass-through mechanism.

It is important to mention, however, that the evidence we have collected relies on pairing retail interest rates of different maturities with an over night money market rate. This could bias our emphasis on the external shocks explanation. Additional work, based on disaggregated data, will be needed to produce firmer conclusions.

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