The Effect of Cross-industry Ownership on Pricing: Evidence of Common Ownership between Banks and Pension Funds in Chile

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The Chilean pension fund system has become a key participant in the domestic capital market. Pension funds accumulate and administer the retirement savings of a large share of the work force. Pension funds have grown substantially since their inception in 1980, accumulating resources amounting to more than 50 percent of domestic GDP in 2002. They thus constitute the second-largest component of the financial industry, after the banking sector.[1] During this same time period, financial conglomerates have gained increasing relevance in Chile, and it is now common to find holding companies controlling a pension fund and a commercial bank, as well as other providers of financial services, such as insurance companies and mutual funds.[2]

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1. For a detailed history of the Chilean pension fund industry, see Salomon Smith Barney (2002).

2. The term financial conglomerate is used only for illustration purposes, since the concept of financial conglomerate is actually missing in the Chilean financial legislation. There is no "consolidated" supervisor, either. These characteristics of Chilean financial regulation make studying the potential interactions that could arise among financial institutions belonging to the same group even more interesting.

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These financial conglomerates are part of prominent domestic- and foreign-owned economic groups that have interests in various industrial sectors.[3]

Banking institutions within these conglomerates arguably may benefit from the association with pension funds, which are the largest providers of funding in the economy, through the generation of competitive advantages in the markets for banking products. Pension funds are, in fact, required by law to invest a fraction of their managed funds in bank deposits. Moreover, a pension fund is allowed to allocate resources to a bank that is part of the same financial conglomerate. Despite the existence of important regulatory restrictions (discussed in detail later), pension funds are extremely large customers of the banks with which they share common ownership. This is clearly indicated if one looks at the holdings of a particular bank's instrument by the pension fund belonging to the same conglomerate (see tables 1 through 3). For instance, AFP Cuprum, the third-largest pension fund, was responsible for 2 percent of Banco de Chile's total deposits in December 1998 (table 3), which represented nearly 16 percent of the bank's capital (table 1); both companies at that time belonged to the domestically owned Penta group. As shown in the tables, the reported figures are not the exception and are certainly nontrivial. Even holdings on the order of 1–2 percent of a bank's capital —among the lowest numbers in table 1— would certainly qualify as representing very large bank customers.

One could speculate that the relationship between the bank and such a large customer would allow for instances of cross-subsidization that would be beneficial to both parties and fulfill the broader interests of the conglomerate. For example, the bank could offer a higher rate of return on the accounts managed by the affiliated pension fund. In exchange, the bank could count on a more stable supply of deposits, which would support a more aggressive lending strategy. Taking on riskier investment projects could generate a higher rate of return on the lending portfolio, together with broader interest margins and higher profitability.

3. LeFort and Walker (2000) document that by 1998, nearly 74 percent of companies listed in the official records of the securities regulatory agency belong to an economic group. They show that percentage is increasing over time, and it underestimates the importance of economic groups in terms of total market capitalization, because it does not consider banks or other financial institutions.

Table 1. Holding of Bank's Instruments by Related Pension Funds as Percentage of Bank's Capital[a]

Bank	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*
Banco del Estado	1.2	1.4	1.5	3.2	2.4	2.6	
Banco Santander Chile		8.2	11.9	5.8	5.3	4.3	3.2
Banco de Chile	19.3	21.7	35.1	16.3	9.5	8.8	*31.6*
Banco O'Higgins		0.4					
Corpbanca			2.3	3.0	*64.4*	*67.7*	*85.6*
Citibank N A.	13.0	12.3	9.7	13.5	18.2	12.7	16.4
Banco Security	3.6	2.3	14.1				
BBVA Banco BHIF			*25.0*	*42.2*	37.8	27.5	30.1
Banco Santiago	*23.9*	*32.8*	*19.6*	*27.0*	19.4	15.8	12.8

Source: Authors' computations, using Superintendence of Pension Fund Administrators (SAFP) database.
a. Data are for December of each year. Bank's instruments include demand and time deposits, mortgage letters of credit, subordinated bonds, and stocks. Numbers in italics indicate that the pension fund has no common ownership with the bank.

Table 2. Holding of Bank's Issued Instruments by Related Pension Funds as Percentage of Value Administered by the Pension Fund[a]

Bank	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*
Banco del Estado	3.7	3.6	2.3	4.9	3.1	3.1	
Banco Santander Chile		1.9	1.5	1.1	0.7	0.6	0.5
Banco de Chile	3.4	2.7	4.0	1.8	1.0	0.8	*2.7*
Banco O'Higgins		4.5					
Corpbanca			0.1	0.1	*1.2*	*1.3*	*1.6*
Citibank N A.	0.4	0.4	0.3	0.7	0.9	0.5	0.7
Banco Security	0.1	0.1	0.4				
BBVA Banco BHIF			*0.7*	*1.8*	1.0	0.9	0.9
Banco Santiago	*3.8*	*5.0*	*7.0*	*6.2*	3.6	2.8	2.1

Source: Authors' computations, using SAFP database.
a. Data are for December of each year. Bank's instruments include demand and time deposits, mortgage letters of credit, subordinated bonds, and stocks. Numbers in italics indicate that the pension fund has no common ownership with the bank.

We test this hypothesis using a unique panel of data containing information on new deposits and loans and their corresponding interest rates reported daily by each bank operating in the Chilean financial system. The dataset spans financial observations over a period of more than six years, beginning on 2 May 1995 and ending on 29 June 2001.

Table 3. Deposit from Connected Pension Funds as Percentage of Total Bank Deposits[a]

Bank	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*
Banco del Estado	0.1	0.1	0.1	0.3	0.2	0.3	
Banco Santander Chile		0.9	1.5	0.7	0.5	0.5	0.3
Banco de Chile	3.1	3.2	5.2	1.9	1.1	0.8	*2.9*
Banco O'Higgins	0.3	0.4	0.1				
Corpbanca	0.5	0.3	0.2	0.3	*8.2*	*7.9*	*10.3*
Citibank N A.	2.0	1.7	1.5	2.8	3.3	2.4	3.2
Banco Security	0.5	0.2	1.5	0.8			
BBVA Banco BHIF			*2.6*	*7.8*	5.6	5.2	4.9
Banco Santiago	*3.3*	*4.6*	*3.0*	*3.6*	2.6	2.1	1.6

Source: Authors' computations, using SAFP database.
a. Bank's deposits include demand and time deposits, mortgage letters of credit, and subordinated bonds. Numbers in italics indicate that the pension fund has no common ownership with the bank.

Controlling for bank-specific fixed effects and for bank and market characteristics, we test whether banks with a pension fund affiliation have different overall pricing strategies and interest margins than nonaffiliated banks. We also look at the behavior of deposits and loan volumes. Finally, we test whether these banks display a different response than the rest of the banking system to monetary policy changes and whether they reacted differently during the liquidity shock suffered by the Chilean economy in 1998.

Our methodology is based on Berger and Hannan (1989) and Hannan and Berger (1991). Deviation from competitive conduct is one of the reasons given in the literature for the existence of conglomerates. Another is the creation and development of internal capital markets (Stein, 1997). Tarziján (1999) argues that internal capital markets might provide a suitable explanation for the rise of conglomerates in emerging markets, because these economies are characterized by a weak institutional framework, an excessive number of regulations, and imperfect capital markets. In the case of Chile, domestic financial regulations require that compulsory pensions have to be channeled exclusively through pension funds and that these funds must be allocated mainly with local investors. This creates an artificial relationship whereby pension funds become natural providers of savings resources. This framework offers clear incentives for bank owners to have access to the administration of pension funds.

The implications of this investigation into patterns of bank deposit and loan pricing within the context of cross-industry ownership are relevant beyond the boundaries of Chilean financial markets. In the United States, for instance, the Gramm-Leach-Bliley Act of 1999 lifted barriers to the consolidation of financial service providers of different industries. Furthermore, these patterns of cross-industry ownership are not uncommon in other Latin American countries that have adopted the model of private pension fund accumulation, where the dynamics of the pension fund industry structure is evolving into more concentrated markets.

The very high frequency of the dataset is especially useful, in that it allows us to track precisely the response of banking institutions to changes in monetary policy. We find evidence consistent with the hypothesis that cross-industry common ownership generates beneficial effects for both banks and pension funds and, in particular, that banks affiliated with pension funds enjoy some form of competitive edge in the market place. Deposit rates are found to be disproportionately higher at such banks, but their interest rate spreads are also higher than average. Controlling for size and other bank-specific characteristics, we find that such banks also have access to a larger deposit base. Finally, the evidence also supports the prior assumption that such banks are able to pursue riskier lending strategies. These results were amplified during the 1998 liquidity shock to the Chilean economy. There is no evidence, however, of a differential response of banks affiliated with pension funds to changes in monetary policy during normal periods. At the same time, the process of deregulation, which has made pension funds less dependent on domestic sources of investment, seems to have reduced the importance for banks of being tied to a pension fund via common ownership.

Section 1 briefly describes some of the relevant pension fund regulations related to portfolio allocation restrictions prevailing during the sample period. Section 2 describes the dataset and the methodology employed. Section 3 presents and discusses the results and also elaborates potential explanations for the findings. Section 4 concludes.

1. The Chilean Pension Fund System

The private pension fund system was created in the early 1980s to replace the state-owned, state-operated pay-as-you-go pension

scheme.[4] The private pension system is characterized by the compulsory accumulation of savings in individuals capitalization accounts, managed by the so-called pension fund administrators (*Administradoras de Fondos de Pensiones*, or AFPs). Participants are allowed to choose their fund administrator. To guarantee a sustainable return to the funds, the AFPs are subject to multiple regulations in terms of their portfolio construction. The numerous limitations on the portfolio diversification of the pension fund system are established in Decree Law DL 3500 (Government of Chile, 1980). This legislation created the Risk Classification Committee, an entity that determines the set of instruments subject of investment by the AFPs, although recently a small percentage of their portfolio was opened to the fund administrator's discretion.

The government retained functions and responsibilities within the private pension system. For instance, a government-insured minimum pension is guaranteed, and the government monitors AFPs to ensure that, in a given period, the portfolio's real return during the past thirty-six months falls within the average real return of the system for that same period.[5] In the event of a bankruptcy of an AFP, the state will honor the obligations related to pensions for the disabled and for retirement-aged beneficiaries of deceased employees. The same benefit applies to insurance companies that are paying annuities to employees under a retirement plan.

The restrictions on portfolio diversification established in the law can be divided into limits by instrument and limits by issuer of a particular financial instrument. The limits by instrument have usually been set by the Central Bank at the maximum allowed within these ranges. For instance, the limits on investment in instruments issued by the government or financial institutions, currently set at 50 percent, varies within a range of 35 percent to 50 percent of the

4. The private pension fund system was established in November 1980 under Decree Law 3500 (DL 3500); it then began operations on 1 May 1981. The system replaced a nearly bankrupt, state-owned, and state-operated pay-as-you-go pension system with mandatory retirement savings. Until 1983, individuals entering the labor market had the option of remaining in the former public system. Thereafter, membership in the new system became mandatory for dependent workers.

5. Article 37 of the DL 3500 establishes that every month, the annualized return of the previous thirty-six months of the portfolio administered by AFPs should not be lower than the minimum of: the average return of the pension fund system, or the average return of a particular fund administered less the absolute of the 50 percent of that return.

value of the fund.[6] The range for shares of domestic companies varies between 10 percent and 40 percent, and the limit is currently set at 40 percent. The percentage allocated to variable income instruments has been on a decreasing trend, following the downside behavior of the domestic stock market.[7]

A notable exception to the regulatory pattern of setting limits at their attainable maximum is the treatment of investment in instruments issued in foreign markets. The authorization for pension funds to diversify their portfolio by holding worldwide instruments was the result of a gradual policy followed throughout the 1990s, possibly to avoid a sustained depreciation of the exchange rate with their implications for inflation or to support financial stability. At the beginning of that decade, AFPs were not allowed to invest their administered resources in foreign markets. In January 1992, the first maximum limit on investment in foreign markets was set at 1.5 percent of the value of the fund, and it was raised to 3.0 percent later that year. In January of 1995, the limit on investing abroad was raised to 6.0 percent. It was soon raised again to 9.0 percent of the value of the fund, but this time the regulator established a particular restriction for variable income instruments of 4.5 percent of the total value managed by the pension fund.

Around that period, pension funds were allowed to enter the formal exchange market, which comprises the Central Bank, the financial institutions, and a few exchange houses, in order to manage the transactions with foreign instruments in foreign currencies.

This gradual rise in the limit on the foreign exposure of pension funds continued with the April 1997 increase to 12.0 percent, keeping the restriction of 4.5 percent for variable income instruments. However, the continuing pressure to diversify the portfolio by holding foreign instruments led authorities to raise the maximum limit attainable in these instruments to 20 percent of the fund's value, with a restriction on variable income instruments of 10 percent of the fund's value. Since then, the limit has been gradually increased by

6. These ranges are applied to the "Fondo 1," which is the fund that contains the bulk of all savings of dependent workers compelled by law to save for retirement. There is also a "Fondo 2" that establishes larger maximum limits for fixed income instruments issued by government or financial institutions, and lower maximum limits for positions in variable income instruments, in order to guarantee a safer return for workers near retirement.

7. DL 3500 also prohibits the use of the same name for the bank and the pension fund, and it forbids managers of any financial intermediaries authorized to operate in the local market from assuming board responsibilities with an AFP.

the Central Bank, within the range dictated by the law. A major reform in the pension fund system at the beginning of 2002 set the maximum limit on investing abroad at 20 percent and temporarily removed the faculty given to the Central Bank.[8]

The regulatory restrictions summarized thus far fall within the class of restrictions imposed on broad types of instruments, where the limits are set by the Central Bank as dictated by DL 3500. Restrictions on the type of issuer, however, are directly dictated in the DL 3500; they control the exposure of pension funds to financial institutions and firms affiliated with the controlling group of a given pension fund. In general, article 47 establishes that the exposure of a pension fund to the sum of investments on demand or time deposits, as well as other debt instruments issued or collateralized by a financial institution or a firm affiliated with the bank, cannot be more than the lesser value of the Tier I plus Tier II capital of a bank (adjusted by a risk factor) and 10 percent of the fund's value (adjusted by additional risk factors set by the Central Bank). The same article, in its second paragraph, establishes that the sum of direct and indirect investments of a pension fund in shares, demand and time deposits, as well as any other debt instrument issued or collateralized by a financial institution, cannot represent more than 7 percent of a particular fund.

In particular, article 47 bis of DL 3500 establishes restrictions on the portfolio allocation of a pension fund, based on the affiliation of the pension fund with a particular issuer. For instance, the minimum risk rating for debt instruments issued by connected firms to be eligible for investment is AA. The total sum of investment according to this criterion cannot be more than 5 percent of the fund's value. More importantly, the article commands pension funds to invest a maximum of 1 percent of the fund's value on instruments issued or

8. This reform, Law N° 19795 of February 2002, also increased the limit for investing in variable income instruments; the limit was raised in two steps, first to 13 percent and then to 15 percent of the fund's value, over six months starting in March 2002, and this restriction was finally removed completely in September 2002. Finally, the limit on investing abroad could potentially be set at 30 percent of the fund's value by March 2004. This reform also raised the number of funds administered from two to five funds. These new funds, identified with the capital letters A through E, have different risk profiles owing to different limits on investments in fixed and variable income instruments, with fund A the potentially riskiest. Nonetheless, the percentage of foreign investment by the AFPs has to comply with the overall limit, currently fixed at 25 percent of the total value of the fund.

collateralized by a related firm. Finally, it mandates pension fund administrators to limit to less than 5 percent of the fund's value the sum directly or indirectly invested on instruments issued or collateralized by all firms related to a pension fund. However, if the pension fund administrators should trespass the regulatory limits on portfolio diversification, the adjustment period is thirty-six months. It is therefore not unusual to observe actual portfolio allocation percentages well above those imposed by regulation, as illustrated in tables 1 through 3.

2. Description of the Dataset and Methodology

The analysis is based on panel data with daily observations for deposit and loan interest rates and related quantities for each bank operating in the Chilean financial system over the period from 2 May 1995 to 29 June 2001.[9] There were thirty-five banking institutions at the beginning of the period, but the number of banks decreased to twenty-eight over the sample period as a result of mergers and acquisitions and exit from the market. Pulling all the information together for each bank over the sample period generated a dataset with up to 51,665 observations.

In July 2001, the Central Bank of Chile decided to change the monetary policy rate from UF-denominated to peso-denominated terms. This nominalization of the monetary policy had a sensible impact on UF deposit and loan rates and on the volume of operations. Given the sizeable change in the balance sheet structure of banking institutions, we decided to set this period aside for the purposes of the estimation.[10]

Before we describe the main dependent variables studied in the document, it is worth describing, at least succinctly, the so-called *Unidad de Fomento*, or UF. This is a unit of account indexed to changes in the domestic consumer price index. The UF is calculated daily from the 10th of each month to the 9th of the following month, according to the variation of the previous month on the consumer price index.

9. The information on daily volumes and interest rates is transmitted electronically by commercial banks to the Superintendence and the Central Bank of Chile every day after the closing of bank business.

10. For a detailed description of the nominalization process of the monetary policy and its effects in the Chilean financial system, see Fuentes and others (2003).

The UF was introduced in 1967 by the Superintendence of Banks and Financial Institutions (SBIF), the government agency that supervises legally established banking institutions. It is used mainly on the pricing of financial contracts for real estate transactions, long-term Central Bank instruments, and the lending and deposit operations of banking institutions.[11]

The empirical exercise is based on regressions of the following model specification:

$$y_{it} = \text{CONS} + \alpha \text{BANKS}_i + \beta \mathbf{X}_{it} + \gamma \mathbf{W}_{it} + \delta \mathbf{Z}_{it} + \varepsilon_{it}$$

where y_{it} is either (1) the UF-denominated deposit rate for each bank i on day t, (2) the daily UF loan rate, (3) the rate spread, (4) the daily deposit volume, or (5) the daily loan volume; BANKS_i is a vector of dummy variables capturing bank specific fixed effects; $\mathbf{X}_{it}$ is a vector of market and bank characteristics varying over time; $\mathbf{W}_{it}$ a vector of indicator variables capturing banks' response to changes in monetary policy; and $\mathbf{Z}_{it}$ is a vector of indicator variables capturing the effect of a bank–pension fund affiliation through common ownership. Following is a more precise description of the dependent variables and some of the regressors.

The UF deposit rate variable, DR, for bank i on day t is a volume weighted average of daily UF-based operations from ninety days to one year.[12] Hence, the rate reported on a particular date does not include rates settled previously, but it reflects current market interest rate conditions. The operations included in the computation of this rate are UF-denominated time deposits and other debt instruments issued by commercial banks in that unit of account. The UF loan rate, LR, is also calculated for lending operations from ninety days to one year. Unlike the UF deposit rate, however, it is constructed as a weighted average of all lending operations of a bank, except for interbank operations, including consumer, mortgage, and commercial lending.[13] Correspondingly, the quantity variables are the volume of deposit and lending operations (DV and LV, respectively) denominated in UF accounts for all new operations in which a

11. Only recently did the government decide to issue sovereign debt instruments.

12. Regulatory restrictions on deposit operations preclude contracts in UF-denominated deposits, or any other indexation scheme, with a maturity lower than ninety days.

13. Loan operations in UF represented nearly 50 percent of all lending operations by July 2001.

bank engaged on a given day with their clients. They thus represent the outflow of credit to companies and the inflow of deposits from the public and the institutional investors.

Our market and bank characteristics include the daily interbank rate (IBR), which corresponds to the overnight rate charged among banks during their daily or weekend operations. The Central Bank aims at providing the liquidity in the banking system so that the interbank rate daily approaches the *instancia* rate.[14] Over the sample period, the difference between the interbank rate and the *instancia* rate was no greater than 5 basis points, on average. Another included market variable is the Herfindahl-Hirschman index (HHI) of market concentration, calculated on total bank assets.

The variables capturing bank-specific characteristics included in the model are bank size (SIZE), measured in terms of total assets; profitability (PROFIT), proxied by the monthly operational return, on an annual basis, over total assets; liquidity (LIQ), proxied by the ratio of liquid funds plus fixed income instruments issued by the Central Bank of Chile over total assets; the riskiness of the loan portfolio (RISK), proxied by nonperforming loans over total loans; and a measure of the capital strength of the institutions (CAP), measured by Tier I capital over total bank liabilities. Apart from the interbank rate, the above mentioned controls have monthly rather than daily variation.

A dummy variable controls for whether the bank is foreign or domestically owned (FOREIGN); it takes the value of 1 if the bank is a foreign bank and 0 otherwise. Another dummy variable controls for episodes of merger or acquisition of a bank (FUSION); it takes the value of 1 for a bank that maintains control after the merger and 0 if the bank has not been involved in a merger. Additional control variables are introduced and described in the following section.

3. Results

Table 4 presents the results of a set of regressions in which the dependent variables are the deposit rate, the loan rate, the rate spread, the deposit quantities, and the loan quantities. All regressions were run including bank fixed effects, although their coefficient estimates

14. The *instancia* rate is the objective policy interest rate defined by the Central Bank to conduct the monetary policy, in order to achieve an inflation target schedule.

are not reported. The first group of regressors includes the interbank rate, also at daily frequency, and a set of dummy variables for each day of the week (the excluded category was Friday), days before a holiday (HOLIDAY) and days before a long weekend (WEEK). These variables attempt to control for time-specific events and time regularities in a bank's daily activity.

The Herfindahl-Hirschman index is positive and significant in both price regressions, but it is negative in the spread regression. This suggests that market concentration in Chile is the result of a dynamic evolution during which the relatively efficient firms have grown and gained market share. This improvement in overall market efficiency is reflected in the higher deposit rates offered to customers and the overall narrower spreads corresponding to periods of higher market concentration. Nonetheless, for a given level of concentration, larger banks and those with higher measures of profitability still exhibit higher spreads than smaller banks. This finding is consistent with the hypothesis of the existence of dominant firms in the market, which are able to exercise some degree of market power. This result does not necessarily contradict that suggested by the estimated coefficient of the Herfindahl index: this latter result may be capturing the evolution of the industry over time, thus indicating that markets exhibit more competitive conditions in periods of higher concentration. The coefficient of size and profitability instead provides cross-bank information on industry conduct, so that at any given time some banks may be exercising more market power than others. Also, foreign banks have lower prices and lower-than-average spreads vis-à-vis domestic banks. This may be due to the fact that many of the foreign banks are actually relatively smaller than domestic ones (the median foreign bank is about 20 percent the size of the median domestic bank).

Next, we focus on the potential role played by the possibility for banks to be affiliated to pension fund companies through common ownership. We tracked the history of common ownership between banks and pension funds and generated a corresponding bank-specific indicator variable, PF. This variable takes a value of 1 if a bank and an AFP share common ownership, 0 otherwise. Over the entire sample period, ten out of the thirty-five banks had, continuously or for a limited time, a common ownership relationship with a pension fund.

As the regression results in columns 4 and 5 of table 4 show, banks with a pension fund affiliation display a broader deposit and loan base, as indicated by the positive and significant coefficients of

Table 4. Panel Estimation of Bank Prices and Related Quantities to Bank-Specific and Market Variables, with Pension Fund Affiliation[a]

Explanatory variable	*(1)* *DR*	*(2)* *LR*	*(3)* *Spread*	*(4)* *DV*	*(5)* *LV*
IBR	0.140***	0.115***	–0.034***	0.022***	0.001
	(0.002)	(0.003)	(0.003)	(0.003)	(0.001)
Monday	0.633***	0.270***	0.086**	1.687***	0.253***
	(0.028)	(0.042)	(0.043)	(0.046)	(0.021)
Tuesday	0.457***	0.238***	0.006	1.086***	1.182***
	(0.028)	(0.041)	(0.043)	(0.046)	(0.021)
Wednesday	0.363***	0.167***	–0.033	0.558***	0.116***
	(0.028)	(0.041)	(0.043)	(0.046)	(0.021)
Thursday	0.315***	0.115***	–0.071*	0.222***	0.117***
	(0.028)	(0.041)	(0.043)	(0.046)	(0.021)
HOLIDAY	–0.305***	–0.119***	0.062	–0.851***	0.241***
	(0.064)	(0.095)	(0.098)	(0.107)	(0.049)
WEEK	0.248***	0.264**	0.252*	0.651***	–0.108***
	(0.087)	(0.130)	(0.135)	(0.145)	(0.067)
HHI	0.011***	0.005***	–0.005***	0.004***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SIZE	0.076***	0.134***	0.087***	1.138***	0.506***
	(0.021)	(0.033)	(0.031)	(0.035)	(0.016)
PROFIT	–8.836***	–13.713***	17.037**	–0.425	–0.134
	(2.564)	(4.413)	(6.716)	(4.272)	(1.979)
RISK	–11.109***	2.973**	6.275***	–0.467	–4.745***
	(0.851)	(1.424)	(2.025)	(1.417)	(0.656)
CAP	0.070***	0.075***	0.075***	0.012	0.008**
	(0.005)	(0.007)	(0.008)	(0.008)	(0.004)
FOREING	–0.644***	–1.190***	–0.305***	0.738***	0.044
	(0.068)	(0.102)	(0.094)	(0.112)	(0.052)
FUSION	–0.118*	0.392***	0.461***	1.582***	0.662***
	(0.063)	(0.096)	(0.089)	(0.105)	(0.049)
PF	1.271***	1.184***	0.267**	1.668**	0.743***
	(0.080)	(0.123)	(0.118)	(0.132)	(0.061)
DEREG	–0.063***	–0.067***	0.018***	–0.011**	–0.009***
	(0.003)	(0.005)	(0.005)	(0.005)	(0.002)
DEREG·PF	–0.083***	–0.087	–0.040***	–0.099***	–0.044***
	(0.007)	(0.010)	(0.010)	(0.011)	(0.005)
Estimation method	Fixed effects	Fixed effects	Fixed effects	Random effects	Random effects
No. observations	51,665	49,456	38,098	51,665	51,665
R^2	0.21	0.07	0.02	0.62	0.47

a. Breush-Pagan LM and Hausmann specification tests were used to select the model estimation technique for each dependent variable. Banks' fixed effects are included in fixed-effects regressions, but coefficient estimates are not reported. Standard errors are in parentheses.

* Significant at the 10 percent level.

** Significant at the 5 percent level.

*** Significant at the 1 percent level.

the PF dummy in the quantity regressions. This is true, once again, even after controlling for measures of size, risk, and profitability of the individual banks. This result is consistent with the hypothesis formulated in the introduction, namely, that banks enjoying a common ownership relationship with a pension fund can count on a broader, more stable supply of funds, which can be translated into a higher volume of loans. Moreover, as indicated in the first two columns of the same table, the banks with a pension fund affiliation also appear to offer higher deposit rates and charge higher loan rates. Finally, the evidence in column 3 indicates that such banks also enjoy higher spreads. This is all consistent with the original hypothesis that common ownership can give rise to cross-subsidization from which both parties can benefit.[15]

We also added an indicator variable tracking the history of deregulation of pension funds, which, as discussed earlier, have experienced a gradual relaxation of restrictions on investing abroad. The variable, DEREG, thus captures the evolution of the percentage allowed for foreign investment by AFPs. Gaining increasing access to an additional venue for portfolio diversification should imply that pension funds become progressively less dependent on bank deposits. All else equal, the potential tie between banks and affiliated pension funds may have gradually loosened over time. As the quantity regressions in table 4 show, banks —in particular, banks affiliated with a pension fund, DEREF*PF— reduced their deposit and loan base as a consequence of pension fund deregulation. In addition, the spread for those banks became narrower as a result of deregulation, thus somewhat reverting the direction of the basic results embedded in the pension fund indicator variable. The regression results seem to be consistent with this hypothesis and therefore reinforce the assertion that common ownership with pension funds may generate competitive advantages for banks, but that the importance of this edge has fallen as deregulation has allowed pension funds to allocate more resources abroad.

Next, we analyze the response of banks to changes in monetary policy rates and the response around a period of extraordinary changes

15. We have also run regressions to test the corollary statement that banks affiliated with pension funds could take advantage of a more stable deposit base to undertake risky lending strategies. The dependent variable in these regressions was two alternative measures of nonperforming loans. In all cases, the results (not reported in the paper) strongly indicate that banks with a pension fund affiliation display a much riskier lending portfolio than banks without such an affiliation.

in policy rates while the country experienced significant economic turmoil. Financial fragility experienced in some Asian countries in 1997, deriving from their deteriorated international liquidity position, generated pressures over the exchange rate in the domestic markets of Latin American countries. Chile could not isolate itself from the misalignment of the exchange rate, but the Central Bank's efforts to stand by the Chilean peso and the 1998 inflation rate target led to a dramatic increase in the interbank rate in 1998 and to a subsequent liquidity shock. Other international events, possibly part of the aftermath of the Asian crisis (the Russian moratorium and the depreciation of the Brazilian currency), are also deemed responsible for the domestic shock, which further affected the level of capital inflows and the terms of trade.[16]

We look at changes in policy rates during normal periods to explore the response of banks to increases and decreases in the policy rates separately. As suggested in Hannan and Berger (1991), an asymmetric bank response may be an indication of less-than-competitive conduct. The first three columns of tables 5 and 6 present the results of regressions in which we added indicator variables capturing banks' responses to increases and decreases in the policy rate with a delay of one, two, three, and four weeks. In these regressions, we excluded the period of extraordinary changes in policy rates (the shock period). With the shock period thus excluded, the mean decrease in the policy rate was about 30 basis points, while the mean increase was 40 basis points.

There is no evidence that banks affiliated with a pension fund display any difference in behavior relative to other banks in instances of either increasing or decreasing policy rates. Hence, this exercise does not offer additional evidence on the effects on competitive conduct of common ownership among banks and pension funds. There is, however, some evidence of asymmetric behavior common across *all* banks, at least with regard to the market for deposits. As indicated in the first column of table 5, banks respond with a two-week delay to increases in policy rates (the indicator variable is only positive and significant for weeks three and four). In contrast, deposit rates are lowered immediately after a decline in the policy rate, and they continue to be low for at least four weeks after the event.

16. For further details on the facts of the 1998 adjustment of the Chilean economy, see Morandé and Tapia (2002).

Table 5. Panel Estimation of Bank Rates and Spread Sensitivity to Changes in Monetary Policy[a]

Explanatory variable	*(1)* *DR*	*(2)* *LR*	*(3)* *Spread*	*(4)* *DR*	*(5)* *LR*	*(6)* *Spread*
PF	0.660***	0.600***	0.509***	1.023***	0.772***	0.112
	(0.070)	(0.115)	(0.114)	(0.077)	(0.122)	(0.118)
DEREG	–0.041***	–0.042***	0.008	–0.0073***	–0.071***	0.025***
	(0.003)	(0.005)	(0.005)	(0.003)	(0.005)	(0.005)
DEREG·PF	–0.044***	–0.049***	–0.054	–0.078***	–0.091***	–0.049***
	(0.006)	(0.010)	(0.009)	(0.006)	(0.010)	(0.009)
Up1week	–0.084	–0.107	–0.144			
	(0.057)	(0.090)	(0.099)			
Up2week	0.023	0.168*	–0.088			
	(0.057)	(0.091)	(0.099)			
Up3week	0.163***	0.160*	–0.128			
	(0.059)	(0.095)	(0.101)			
Up4week	0.245***	0.048	–0.302			
	(0.059)	(0.094)	(0.102)***			
Up1·PF	0.156	–0.137	–0.166			
	(0.134)	(0.208)	(0.204)			
Up2·PF	0.196	–0.067	0.002			
	(0.134)	(0.209)	(0.205)			
Up3·PF	0.079	0.115	0.223			
	(0.134)	(0.209)	(0.205)			
Up4·PF	0.169	0.336	0.233			
	(0.139)	(0.218)	(0.212)			
Down1week	–0.201***	–0.125***	0.085			
	(0.037)	(0.060)	(0.064)			
Down2week	–0.260***	–0.058***	0.089			
	(0.037)	(0.060)	(0.064)			

Table 5. (continued)

Explanatory variable	*(1)* *DR*	*(2)* *LR*	*(3)* *Spread*	*(4)* *DR*	*(5)* *LR*	*(6)* *Spread*
Down3week	–0.122***	–0.073	0.006			
	(0.036)	(0.059)	(0.063)			
Down4week	–0.116***	–0.028	0.123			
	(0.036)	(0.058)	(0.062)**			
Down1·PF	–0.080	–0.020	–0.015			
	(0.084)	(0.133)	(0.127)			
Down2·PF	0.041	–0.154	–0.083			
	(0.084)	(0.133)	(0.127)			
Down3·PF	–0.101	–0.079	0.064			
	(0.084)	(0.133)	(0.127)			
Down4·PF	–0.068	–0.166	–0.113			
	(0.083)	(0.132)	(0.126)			
Shock				1.656**	–1.185***	–0.480
				(0.030)	(0.045)	(0.050)
Shock·PF				0.755***	2.062***	0.286***
				(0.060)	(0.090)	(0.087)
Estimation Method	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects	Fixed effects
No. observations	43,812	41,521	32,069	51,665	49,456	38,098
R^2	0.12	0.03	0.02	0.27	0.10	0.02

a. Breush-Pagan LM and Hausmann specification tests were used to select the model estimation technique for each dependent variable. Banks' fixed effects are included in fixed-effects regressions, but coefficient estimates are not reported. The market and bank-specific variables displayed in table 1 are included in all regressions, but coefficient estimates are not reported. Standard errors are in parentheses.

* Significant at the 10 percent level.

** Significant at the 5 percent level.

*** Significant at the 1 percent level.

Table 6. Panel Estimation of the Response of Bank Activity and Size to Changes in Monetary Policy[a]

Explanatory variable	*(1)* *DV*	*(2)* *LV*	*(3)* *DV*	*(4)* *LV*	*(5)* *Size*
PF	0.355***	0.666***	1.390***	0.714***	–1.306***
	(0.127)	(0.063)	(0.133)	(0.062)	(0.016)
DEREG	0.003	–0.005**	–0.008*	–0.009***	0.061***
	(0.005)	(0.002)	(0.005)	(0.002)	(0.001)
DEREG·PF	–0.073***	–0.044***	–0.105***	–0.045***	0.158***
	(0.011)	(0.005)	(0.011)	(0.005)	(0.001)
Up1week	0.014	0.118**			
	(0.108)	(0.052)			
Up2week	–0.181*	0.058			
	(0.108)	(0.052)			
Up3week	0.506***	0.113**			
	(0.112)	(0.054)			
Up4week	0.305**	–0.010			
	(0.110)	(0.053)			
Up1·PF	–0.131	–0.008			
	(0.252)	(0.121)			
Up2·PF	–0.921***	–0.144			
	(0.252)	(0.121)			
Up3·PF	–0.097	0.032			
	(0.252)	(0.121)			
Up4·PF	0.336	0.565			
	(0.262)	(0.126)			
Down1week	0.036	–0.063*			
	(0.069)	(0.033)			
Down2week	–0.195***	–0.018			
	(0.069)	(0.033)			

Table 6. (continued)

Explanatory variable	*(1)* *DV*	*(2)* *LV*	*(3)* *DV*	*(4)* *LV*	*(5)* *Size*
Down3week	–0.053	0.076**			
	(0.068)	(0.033)			
Down4week	0.209***	0.015			
	(0.068)	(0.033)			
Down1·PF	0.159	0.069			
	(0.157)	(0.076)			
Down2·PF	0.090	0.042			
	(0.158)	(0.076)			
Down3·PF	0.086	0.116			
	(0.157)	(0.076)			
Down4·PF	0.096	–0.043			
	(0.157)	(0.075)			
Shock			0.097*	0.056**	–0.007
			(0.052)	(0.024)	(0.007)
Shock·PF			1.74***	0.160***	0.147***
			(0.104)	(0.049)	(0.013)
Estimation Method	Random effects	Random effects	Random effects	Random effects	Random effects
No. observations	43,708	43,708	51,665	51,665	51,665
R^2	0.56	0.0842	0.58	0.46	0.47

a. Breush-Pagan LM and Hausmann specification tests were used to select the model estimation technique for each dependent variable. Banks' fixed effects are included in fixed-effects regressions, but coefficient estimates are not reported. The market and bank-specific variables displayed in table 1 are included in all regressions, but coefficient estimates are not reported. Standard errors are in parentheses.

* Significant at the 10 percent level.

** Significant at the 5 percent level.

*** Significant at the 1 percent level.

On the loan side, rates seem to adjust up and down more or less symmetrically (in the second week for increases, in the first week for decreases), although the magnitude of the response seems to be lower than average in either direction. The regression in the third column indicates, although the evidence is not very strong, a narrowing of the rate spread during periods of rate increases and a broadening during periods of decreases.

Finally, we specifically examine the response of banks during the shock period. Banks' rates exhibit an expected strong reaction during the shock period.[17] Interestingly, banks with a pension fund affiliation seem to have experienced rate changes of larger magnitude, as indicated in columns 4 and 5 of table 5. Also, while nonaffiliated banks experienced a reduction in the rate spreads, affiliated banks document an increase in the spread as a result of the shock. This last group of banks also registered a large increase in their deposit base and an increase of lower magnitude of the loan base. This evidence is still consistent with the argument that the affiliation with a pension fund may at least partially insulate banks from market events. Such banks seem to have attracted a relatively larger share of funds at the expense of the other banks, perhaps because they are recognized in the market as less exposed to the effect of the economic shock. To confirm this, a final regression (column 5 in table 6), in which the dependent variable was bank size and the regressors were the interbank rate, the market Herfindahl, the measure of profitability, the foreign or domestic ownership dummy, the merger and acquisition dummy and the different pension fund indicators, shows that banks affiliated with a pension fund increased their size substantially during the shock period.

4. Conclusions

This paper has used a unique dataset containing daily frequency information over a seven-year period on deposits and loan prices and related quantities for each individual bank operating in Chile. The level of detail of the dataset has allowed a first exploration of some basic relationships between market and bank characteristics and prices and quantities settings. It has also allowed us to focus on the response of

17. The mean increase in the policy rate during the shock period was 350 basis points, while the mean decrease was more than 100 basis points.

banks to monetary policy action at a frequency level typically unattainable with more customary datasets. An additional and innovative aspect of the analysis has been the focus on the common ownership between some banks and pension fund companies. Given the significant role played by pension funds as among the largest customers of banks, we have explored whether banks affiliated with pension funds through common ownership experience some form of insulation from market forces, with a consequent manifestation of competitive advantages.

The results of the econometric analysis seem to support the argument that banks benefit from such ties. In particular, affiliated banks exhibit a substantially larger deposit base and enjoy higher spreads overall than unaffiliated banks. Also, during the economic shock of February 1998 to March 1999, such banks experienced a marked increase in size and higher spreads, while the other banks' spreads narrowed. There is no evidence, however, of a differential response of affiliated banks to normal changes in monetary policy. Nonetheless, the regression results have highlighted a generalized asymmetric response on the part of banks to increases or decreases in the policy rate. Banks appear to adjust deposit rates quickly and with consistent magnitude in the case of decreases in the policy rate, while they are slower in circumstances of policy rate increases. The overall effect associated with common ownership has been reduced in magnitude as pension funds have gradually been allowed to expand their portfolio allocation opportunities to include international markets, thus loosening their ties with domestic banking institutions.

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