

# Institutional arrangements, credit market development and loan repayment in Chile<sup>\*</sup>

*Rodrigo Fuentes*

*rfuentes@econ.facea.uchile.cl*

*Phone: (56-2) 6650796*

*Fax: (56-2) 222-0775*

*Carlos Maquieira*

*cmaquie@admin.facea.uchile.cl*

*School of Business and Economics  
Universidad de Chile*

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In this paper, we study the effect of legal reforms and institutional changes on credit market development and the low level of unpaid debt in the Chilean banking sector. Using time series data on yearly basis (1960-1997), we conclude that both information sharing and deep financial market liberalization during the seventies are positively related to the credit market development. Moreover, using monthly data we find that information sharing is very important to explain the steady decrease in the level of arrears in the credit market during the nineties. Looking at the time series, we also report less dependence of unpaid loans with respect to the business cycle of the Chilean economy.

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# 1 Introduction

La Porta et al. (1997, 1998) classified Chile as a French Civil Law country, which according to them have poorer creditor rights protection and, consequently, higher levels of unpaid debt and narrower financial markets. We will concentrate in the first issue but we will also consider what are the determinants of the Chilean capital market development.

Despite Chile is classified as French Civil Law country, we show in this paper that this constraint has not been a major impediment to the development of the capital market and also to preclude having an outstanding performance in terms of bad debt. We want to find what other elements, beside the legal system, determine the low level of unpaid debt. In fact, looking at the international evidence, Jappelli and Pagano (1998) showed that the ratio between non-performing loans and total loans is lower in Chile than in other economies at a similar stage of development. Even more interesting, Fuentes and Basch (1998) showed that Chile experienced a process of banking disintermediation during the nineties. As expected, this led to lower bank margins and then banks moved into riskier market segments during the nineties, i.e., lending to individuals and to small business. Yet, defaulted loans have not increased. Why was this so? More generally, what are the determinants of loan repayment in Chile?

We study different institutional arrangements that may determine the level of loan repayment. To accomplish this goal it is necessary to control for macroeconomic variables to discern between ability and willingness to repay.

Willingness to repay in the financial market is key to the existence of a healthy financial system. Specifically, the institutional arrangements to assure the debtor's payment should be one of the main concerns of policy-makers that oversee the operation of the banking system, since credit market failures generally derives from imperfect information and/or limited enforcement (see Besley, 1995). On the one hand, there is asymmetric information that translates into moral hazard and adverse selection problems, as creditors are only able to partially observe the behavior of the debtor. These issues may be exacerbated in a situation where creditor rights are hard to enforce, since this increases the

probabilities that debtors can get away with default even in cases where they could repay their debts.

On the other hand, there are risks to the debtor's project, such as, economic shocks, that may impair her ability to repay her loans. In Latin America many external crises over the last twenty years have been generated by difficulties in the financial sector. For instance, that was the case in Chile (1982), in Mexico during the recent so-called "tequila effect" and in Argentina, etc. Sometimes, these external crises lead to a local currency devaluation (at least in the case of Chile and Mexico), that unleashes the crisis and demonstrated the weakness of the financial system, in which debtors are unable to pay their obligations. In this case, the economy faces a generalized crisis.

We examine three important variables, namely: the macroeconomic environment, financial market regulation and information sharing. Using monthly data for 1986-1997 we find that good macroeconomic performance and the introduction of white information sharing is negatively related with past due loans. We explore the determinants of credit market development considering yearly data. We show that good macroeconomic performance plus major financial market reforms and information sharing explained the credit market development.

The structure of the paper is as follows. Section 2 shows international and national evidence to motivate this research. Section 3 considers the analysis of the major determinants of loan repayment and credit market development. The paper ends with our concluding remarks.

## **2 International Comparisons**

Chile was classified by La Porta et al. (1998) as a French Civil Law country. According to their study, these countries are generally characterized by poor creditor rights protection and less developed capital markets. However, looking at individual country data, the Chilean capital market is relatively more developed than the rest of the countries in the French Civil Law group.

The following table shows statistics on creditor rights protection and capital market development as presented by La Porta et al. Panel A shows what they called measures of law enforcement: efficiency of judicial system, index of rule of law, index of corruption and risk of repudiation. All indices are measured on a scale from 0 to 10, where the higher value means higher efficiency of the judicial system, higher tradition of law and order, lower level of corruption and lower risk of contract repudiation by the government.

**Table 2.1**  
**Law Enforcement and Financial Development**

Panel A: Rule of Law				
Country	Efficiency of judicial system	Rule of law	Corruption	Risk of contract repudiation
Chile	7.25	7.02	5.30	6.80
French Origin Avg.	6.56	6.05	5.84	6.84
English Origin Avg.	8.15	6.46	7.06	7.41
German Origin Avg.	8.54	8.68	8.03	9.47
Scandinavian Origin Avg.	10.00	10.00	10.00	9.44
Sample Average	7.67	6.85	6.9	7.58
Panel B: External Capital Markets				
Country	External Cap/GNP	Domestic firms/Pop	IPO's/Pop	Debt/GNP
Chile	0.80	19.92	0.35	0.63
French Origin Avg.	0.21	10.00	0.19	0.45
English Origin Avg.	0.60	35.45	2.23	0.68
German Origin Avg.	0.46	16.79	0.12	0.97
Scandinavian Origin Avg.	0.30	27.76	2.14	0.57
Sample Average	0.40	21.59	1.02	0.59

Source: La Porta et al. (1997, 1998)

Chile does not feature appreciable difference in the enforcement variables (Panel A) with respect to the average of the French Civil Law countries except for the rule of law variable, where it scores higher than other countries of this group. With the exception of this variable, however, it scores lower than English origin countries. For all four enforcement variables, it scores far worse than German and Scandinavian origin countries.

Accordingly, the development of the Chilean capital market should be comparable with the rest of the French Civil Law countries. Panel B shows different indicators for capital market development and Chile is above the average of the French Civil Law countries in all the indexes, and it could be comparable to the countries with an English, German or Scandinavian law.

More connected with the main topic in the paper is the data related to bad loans. This is hard to measure for cross-country comparisons, because each economy has its own regulation as to when a bank rates a loan as non-performing or past due. For example in Chile banks rate a loan as a past due after 90 days while in Brazil it is after 60 days. If loan loss reserves are measured as a proxy of non-performing loans, once again no single criteria will be found. The following table shows statistics on past due loans and loan loss reserves for different countries as reported in Jappelli and Pagano (1998).

**Table 2.2**  
**International Comparisons on Non-Performing Loans**

Country	Non-performing loans/total loans	Number of banks used to estimate non-performing loans	Loan loss reserves/total loans	Number of banks used to estimate loan loss reserves
Argentina			3.79	97
Brazil	6.31	94	3.63	95
Chile	0.93	29	0.34	31
Colombia	7.34	24	1.74	27
Mexico	7.09	22	2.88	22
Peru	8.93	23	3.45	18
Australia	3.70	12	0.34	34
Canada	2.34	7	0.79	17
Germany			0.60	1596
Italy	5.21	235	1.74	250
Spain	4.74	19	0.98	163
Sweden	7.02	15	1.12	16
United Kingdom			0.16	59
United States	1.65	495	0.56	497

Source: Jappelli and Pagano (1998)

Again Chile shows very low levels of defaulted loans and it is more comparable to developed countries than to the other Latin American countries. By way of an example, non-performing loans in Chile were in the order of 1% over the last few years, which is more similar to the US and Canada than to Peru or Brazil.

### **3 Major determinants of loan repayment and credit market development**

Institutional arrangements *per se* do not always adequately warrant the enforcement of payment. That is, creditor's rights are not completely protected. They could fail for many reasons: an inefficient judicial system, a bad policy of third-party collateral or guarantees, a lack of public dissemination of default data, etc.

We can identify at least three large groups of potential factors, which determine loan repayments. The first one includes macroeconomic determinants. On the one hand, macroeconomic stability could be the reason for a low level of non-performing loans. On the other hand, credit rationing could explain the low level of overdue loans, since banks will lend money only to the high quality borrowers (Stiglitz and Weiss, 1981).

The second group of determinants is related to regulation and enforcement system. The main changes in the financial market regulation are among the key element to explain development of the credit market and the low level of arrears. If a country has a clear set of rules that protect creditor's right combined with an efficient supervision of the rules then the creditors will have incentive to create some mechanism to ensure the repayment of a loan. On the other hand, elements like efficiency of the judicial system and bankruptcy code will be analyzed in section 4. If the rules of enforcement are inefficient, the cost of not paying a debt could be lower than the benefit. Among the inefficiencies we can mention a slow legal system and costly judicial proceedings.

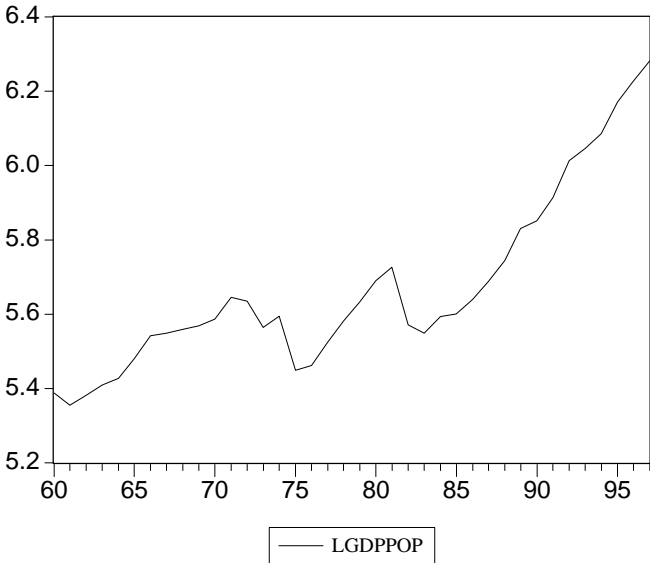
The third set of variables is what we call private solutions to face the unwillingness to repay a loan. This group includes information sharing system, prescreening techniques, collection technology and private contracts. In many situations the financial system does not have the information on either the level of the debt or the history of the debtor and then the system is not in a position to limit the amount of loans. This is intensified by the lack of

a good supervisory system within the financial sector (Edwards, 1995). In this paper, we will measure the impact of information sharing on past due loans and credit market growth.

### 3.1 Macroeconomic stability

A key issue in this study is to separate willingness to repay from the ability to repay in the case of an unpaid loan. After the 1982 crisis, the Chilean economy experienced a high growth rate of GDP (annual rate of 7.7% since 1986) attended by a decreasing inflation rate. Figure 3.1 shows the evolution of per capita GDP since 1960 up to 1997. After the big drop in 1982-83, the economy started to recover with a strong upward trend ever since.

**Figure 3.1**  
**Log of Per Capita GDP 1960-1997**



The next table shows the inflation rate for different decades. This statistic has been steadily decreasing since 1990, showing the lowest inflation rate in the whole period. This explains why the standard deviation of the inflation rate in the nineties is higher than that in the eighties, when the inflation rate fluctuated less but with a higher average.

**Table 3.1**  
**Inflation rate**

Decades	Average	Std. Dev.	Coef. of Var.
60-69	24.85	12.11	0.4873
70-79	175.21	174.42	0.9955
80-89	20.69	6.28	0.3037
90-98	11.68	7.28	0.6234

Therefore, in the last decade Chile shows a more stable macroeconomic pattern, a feature that coincides with the development of the financial market. Part of the explanation for the low level of non-performing loans and the increasing development of the credit market is likely to reside in the greater ability to repay associated with macroeconomic stability.

### **3.2 *Financial market regulation and the banking sector***

It is well known that during the eighties the Latin American economies underwent a deep financial and macroeconomic crisis. Chile was no exception. At the time of the Chilean financial crisis that started in the middle of 1981 the economy was open to international trade and to foreign financial markets. This dependence originated from all the reforms implemented during the first years of the military government that took power in 1973. The main features of the reform were the deep trade reform carried out in 1974-1979, the opening of the capital account that started in 1978, the reduction in the size of government in order to control inflation, the privatization of state-owned firms and commercial banks (many of them expropriated by the former government) and the elimination of price controls including the interest rate.

After several decades of financial repression, characterized by credit ceilings and interest rate controls that generated a negative real interest rate, financial liberalization brought about an overshooting of the interest rate and a high spread in the banking system. According to De la Cuadra and Valdés (1992), banks were not prepared in terms of

technology, human capital and managerial ability to handle the new situation of a free financial market. Therefore they tended to have riskier portfolios, higher interest rates and spreads owing to a poor risk evaluation.

On the other hand, the same was true for the Superintendency of Banks and Financial Institutions. Prior to the liberalization, the objective of this regulatory agency was focused on enforcing credit and interest rate control. The agency lacked the know-how required to monitor and control risk, primarily due to the absence of a prudential regulation (De la Cuadra and Valdés).

Almost concomitantly with the complete opening of the capital account, Chilean authorities implemented a fixed exchange rate system in June 1979, which brought about a real appreciation of domestic currency and a substantial current account deficit financed with foreign capital. In spite of the high amount of capital that entered Chile in 1981, the real interest rate was as high as 35 per cent in pesos. By 1982 the supply of foreign capital declined abruptly, the real interest rate remained high and the economy experienced a deep recession<sup>1</sup>. The fixed exchange rate system was finally abandoned in June 1982.

The Chilean financial sector was not ready to face the fast reform implemented. The existence of implicit insurance to deposits created the well-known moral hazard problem in bank lending and the absence of prudential supervision allowed banks to intermediate funds toward related companies. Economic groups owned banks and related companies that went bankrupt when external financial resources became scarce. These economic groups were especially affected by the devaluation of the peso during the second semester of 1982, with the exception of export-oriented groups and with a low leverage in dollars<sup>2</sup>.

Until 1982 the external debt crisis was a private sector crisis, but in 1983 the government was forced by foreign banks to guarantee private external debt. Given the dimension of the crisis, the economic authorities decided to bail out the banking system. In 1982, the Chilean Central Bank began to buy delinquent loans at their face value in order to postpone banks' losses. The banks had the obligation to repurchase those loans over time. This, however, did not improve the banks' solvency, it only was a makeshift solution to make up the balance sheet of the banks.

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1 GDP growth rate fell from 5.5 per cent in 1981 to -14.1 per cent in 1982, the unemployment rate increased from 13.5 per cent to 21.3 per cent in those years (data from Institute of Economy, Universidad de Chile)

2 See Maquieira and Sierralta (1990).

It is worth asking why the banks did not try to make good with the collateral before the crisis worsened. Among the main reasons, according to De la Cuadra and Valdés, there were the absence of any control by banks, the sluggish and inefficient judicial system and the relationship between banks and the so-called economic groups (the owners of the bank would not try to liquidate collateral that also belonged to them).

By 1980 the Superintendency of Banks and Financial Institutions ascertained that independent auditing firms were not doing their job properly in rating the bank loans. There were severe problems in terms of rating self-granted loans (i.e., loans to related firms). In 1980, a more transparent and efficient credit system began to be implemented. As a first step, loans were rated in four categories (A, B, C and D)<sup>3</sup>. In August 1981, the Superintendency was vested with more power to control banks through an amendment to the law that was intended to bring an end to self-granted lending. This empowered the regulatory agency to obtain information from the banks on the 300 most important debtors in the case of each institution (paid and unpaid loans). It also required banks to classify the loans (consumer loans, mortgage loans, etc.). In 1982 the law incorporated a new category which is riskier than former category B.

As from that date, the system to rate loans has been operating smoothly, and for the first time the regulator spelled out rules with respect to loan loss reserves and past due loans. As regards past due loans, at the end of the year, the loan loss reserve had to be equivalent to 100 per cent of all loans which were past due during the first semester and 50 per cent of those that were past due during the second semester. The regulation kept a general reserve of 0.75 per cent of the total amount of loans. However, economic groups found ways to bypass the law (see De la Cuadra and Valdés).

All these efforts came too late to prevent the banking crisis. In 1983, following the new risk rating, the authority liquidated three banks and intervened the administration of

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3 Category A: Normal loans, not presenting any doubts regarding recoverability (principal and interests).  
Category B: Loans below normal quality, because of weakness in the conditions under which they were granted or granted under normal conditions but after all they had the worst performance. This does not mean that they have a high likelihood to become bad debts.

Category C: Uncertain recovery, includes all loans granted under conditions which greatly depart from normal conditions to make a loan.

Category D: Defaulted loans, i.e., loans not repaid.

five other banks. This situation took place in the middle of the deepest recession since the thirties in Chile.

During 1983-1984 an intense debt rescheduling process was in place, and in which the interest rate and term conditions for debtors were changed. The banks that were bailed out were “re-privatized” during 1985-1986, through the so-called system of *popular capitalism*, whereby the ownership of the banks was sold to small stockholders who had access to governmental credit under very special conditions.

A new institutional framework for banking in Chile was set up in 1986, when a new banking law was enacted. This law was established along lines similar to the changes introduced by the Superintendency in 1981. Some of the objectives of the new legal framework were to prevent a new banking crisis and to provide more transparency to the banking business<sup>4</sup>. To accomplish this goal, the law required a more active role for the Superintendency in rating banks’ risk, according to loan classification, a higher degree of disclosure of information to the public and a strict restriction on banks’ business with related parties. In addition, the law established an active role for private risk rating agencies and, as a complement, the Security Market Law set limits to “bank secrecy” (Ramirez and Rosende, 1992). Furthermore, the government restricted the insurance to depositors, as a way of inducing depositors to seek more information on bank risk.

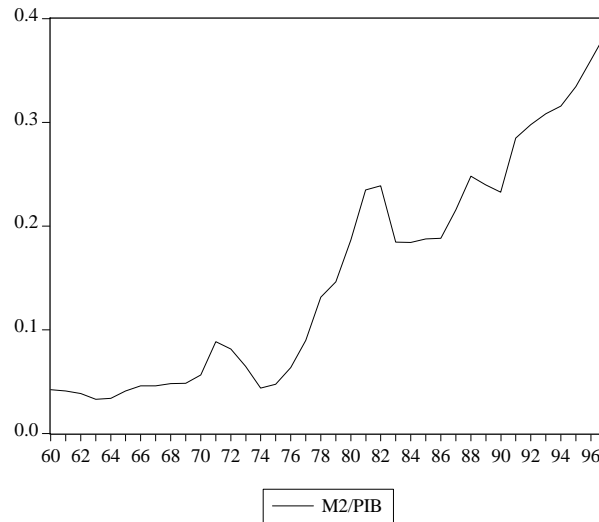
This new banking law included two important changes to protect creditor’s interests. First, a bank cannot lend money under better conditions (period of grace, interest rate and guarantees), compared to other individuals and firms, to parties that have any direct or indirect relationship with the owners or with officials of the bank (insider trading). Second, the bank is not allowed to grant a loan either directly or indirectly to any member of the board of directors or any representative of the bank.

The expected results of all these changes were to improve the efficiency of the banking system. As an outcome, the financial market developed very fast. A usual measure of the depth of capital market is M2/GDP. Looking at the following figure, it is possible to see that after the liberalization in place in 1975 this measure increased very fast from below 5 per cent to almost 25 per cent in 1981. Then it dropped until 1986 when it started increasing again at a very fast rate, reaching 40 per cent of GDP.

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<sup>4</sup>See Ramírez and Rosende (1992) for a summary of the changes in the Chilean banking legislation.

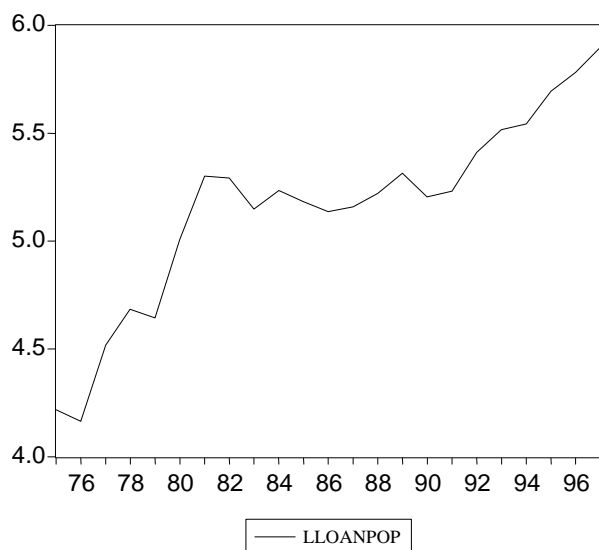
**Figure 3.2**  
**Evolution of M2/GDP, 1960-1997**



Source: Central Bank

The same conclusion can be reached when we look at total loans per capita. In 1975 the Chilean government liberalized the interest rate. This was the beginning of a free financial market. The following figure shows the evolution of the log of total loans per capita from 1975 to 1997.

**Figure 3.3**  
**(Per capita loans)**



The composition of banks' ownership structure changed as a consequence of the new environment. Foreign banks increased their importance in the banking system, while only the State-owned bank lost importance. As it may be expected, finance companies also increased their participation (see Table 3.2). In terms of ownership concentration, the main 5 banks (C5) concentrate 61 per cent of loans in 1986, which went down to 49.7 per cent in 1994 and increased to 62 per cent again in 1997, as a result of two large mergers in 1996. The latter movement could be interpreted as an outcome of increased competition.

**Table 3.2**  
**Banking Sector Composition**  
**(% of total amount of loans of banking sector)**

Year	Private National Banks	Banco del Estado	Foreign Banks.	Finance Companies
1986	64%	22%	13%	1%
1990	60%	19%	19%	2%
1994	64%	16%	17%	3%
1997	62%	14%	21%	3%

Source: Superintendency of Banks and Financial Institutions

The banking disintermediation process, as pointed out by Fuentes and Basch (1998), brought about a reduction in banks' margin during the nineties. This process is related to the pension fund reform in 1981, the creation of leasing companies in 1986, the access to foreign credit market, public debt issues and the more aggressive competition of department stores in the nineties (see next section). The market share, measured through total amount of assets, of the banking sector<sup>5</sup> in the financial system went down from 91 per cent in 1986 to 66 per cent in 1997, considering mutual funds, pension funds, leasing companies, insurance companies, stock brokers and investment funds among the agents in the financial sector

To sum up, all this led to a more concentrated market. Banks also had to resort to the retail market, i.e., households and small and medium-sized business lending. This should probably increase the risk of bank portfolios, and therefore could lead to an increase in non-performing loans. As we will see in the next section this has not been the case. As we said, this is the second reason why the Chilean case is interesting.

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<sup>5</sup> Department stores were excluded because the corresponding data was not available, but at present their volume of intermediation is as large as that managed by leasing companies.

### **3.3 Information sharing**

Information sharing may be an important mechanism to mitigate both adverse selection and moral hazard. According to Pagano and Jappelli (1993), information sharing can be used as a prescreening element by the financial market, so as to partially solve the adverse selection problem. This institutional arrangement is more likely to arise when borrowers are heterogeneous, the credit market is large and the cost of sharing information is low.

On the other hand, information sharing reduces the moral hazard problem, since it increases the borrower's willingness to repay the loan. In this case, banks provide incentives to the borrower to do his or her best effort to repay the loan since the debtor knows that the bank is going to share default information with other lenders in the future, and therefore reveal the borrower's quality to the market. This mechanism ensures a lower default rate and interest rate.<sup>6</sup>

On the empirical side, Jappelli and Pagano (1998) find evidence that supports the positive relationship between the existence and the quality of information sharing with the ratio of total debt to GNP. With respect to default rates they found weak evidence that information sharing is negatively associated with those rates. The data does not show that larger size of consumer credit market statistically precede the creation of credit bureaus. At this point Jappelli and Pagano state: "However, international comparisons fail to convey all the information that can be gleaned from the detailed history of specific countries. The historical evidence from the United States, Japan, Spain and Italy suggests that credit bureaus tend to be created in the wake of consumer credit booms".

Concerning the regulation on the information market in Chile, there are three main principles that are to be abided by; banking secret, tax secret and statistical secret. The information provided by banks can be released only to the banking system. The tax secret prevents divulging information on companies' revenues and households' income. Finally, the statistical secret protects demographic information relative to the family (age, sex, religion, political affiliation, etc.).

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<sup>6</sup> See, for instance, Padilla and Pagano (1997).

Consistent with one of the conclusions obtained by Jappelli and Pagano in Chile the main credit bureau (DICOM) began its operation in 1979. The Chilean Chamber of Commerce (with a 50% stake in ownership) and a group of entrepreneurs set up this bureau, at the suggestion of a group of international issuers of credit card who were introducing this instrument in the Chilean financial market. Although the Chilean Chamber of Commerce had a Commercial Bulletin that listed bad checks and overdue bills of exchange, these international companies required more, better and updated information to evaluate creditworthiness. In 1986 the Chilean Chamber of Commerce sold its ownership to the rest of the group. In August 1994, Equifax bought 25 per cent of DICOM shares. Subsequently, in December 1995 Equifax became the controller of DICOM with 50 per cent of ownership, and in March 1997 Equifax became the owner of DICOM holding 100 per cent of the shares.

DICOM started with four products: information drawn from the Commercial Bulletin (Chilean Chamber of Commerce), address verification, job verification and a consolidated system of defaulted verification for credit issued by department stores (called SICOM). At the beginning of the eighties, the Chilean Association of Banks called a public tender to contract information services, which was awarded to DICOM. At the time this firm provided the four products mentioned above, in addition to information on individuals interdicted from opening checking accounts and information available from the Official Bulletin.<sup>7</sup>

In 1989 DICOM started signing individual contracts with each bank to provide “white” and “black” information of debtors. This information was available (and still is) only for the banking system, i.e., DICOM was processing information supplied by the banks. In addition, department stores and the so-called Real Estate Mutual Funds only provide “black” information to the system.

With respect to the banking system, banks and financial institutions are under the obligation to provide information on individual customers (both households and companies) to the Superintendency of Banks and Financial Institutions. This information is processed by the Superintendency of Banks and Financial Institutions, so as to have

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<sup>7</sup> Information in the Official Bulletin includes company charters, names of partners, equity of companies, bankruptcy filings, laws enacted and amended, etc.

information on the total debt and the unpaid debt by each customer.<sup>8</sup> Subsequently, the consolidated figures are returned to the banks and they know the total debt and the outstanding debt in the banking system of any customer or prospective customer. They do not have access to the information of who is (are) the creditor(s) of each economic agent.

The cost of processing the data for the banks was very high when the system began to operate; important economies of scale derive from centralizing all information in only one processing unit. Due to the development of the data processing industry, the cost of processing the information by each bank itself has gone down. For this reason DICOM has diversified both the information services provided and the portfolio of customers<sup>9</sup>.

Among the main technological changes in this industry it is worth mentioning that initially (1979) microfiches were used. By 1980 DICOM installed a computer main frame and in 1984 it installed a network. Finally, the major change comes in 1991, with the establishment of a computer-based system, which allows to give information directly from DICOM to its connected client.

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<sup>8</sup> It is important to notice that each individual and company is identified by a CUSIP (Individual Identification Number) that is used to consolidate the information. In the case of individuals, this number also corresponds to the Identification Card Number, Passport Number, diver's license number and Social Security Number.

<sup>9</sup> The main services provided by DICOM to its customers are:

- a) Data on the consolidated system of past due loans by individual and companies in the banking system. This information is revised on a daily basis. This information is useful in evaluating credit risk, opening current accounts, collection of overdue debts, acceptance of bills of exchange, etc.
- b) Black information from Department Stores. These are reluctant to share white information.
- c) Information on bad checks and overdue bills of exchange in the financial system, published by the Chilean Chamber of Commerce in the Commercial Bulletin. It covers the last five years. This information is revised on a weekly basis and it fulfills the same purposes as the information in (a).
- d) Information on people who are under an interdiction to open a current account and the corresponding period for which it is in effect pursuant to instructions from the Superintendency of Banks and Financial Institutions.
- e) Name of individuals and companies who have defaulted payment of fines or who have been prosecuted due to violations of International Trade and International Exchange Laws. This information is updated periodically by the Chilean Central Bank. It is useful for banks in determining credit facilities for international trade purposes.
- f) Statistics on the number of times that DICOM has been resorted to in order to obtain information on an individual or company over the last three months. This is updated on a daily basis. This information permits the detection of changes in the pattern of leverage and contributes relevant information for evaluating credit risk (due to a higher likelihood that the individual or the company is increasing the leverage).
- g) A record of new companies and amendments to charters and by-laws of existing companies, list of individuals and companies who are or have been partners in a given firm. This information helps to detect higher risk due to related business activities between individuals and companies.
- h) Information on past due debts with state agencies.
- i) Records of people and firms who have filed a bankruptcy.

DICOM has a competitive advantage in processing information, mainly due to the existence of economies of scale and of scope, and in spite of the cost reduction in the data processing industry, banks still hire its services. This is consistent with theoretical arguments that given the increasing returns to scale of information sharing it will bring about a natural monopoly (Pagano and Jappelli, 1993), which is seemingly the case of DICOM. Actually, DICOM has a 67% share of the information market considering the market in which it provides services. It is important to notice that there are about 60 smaller companies in the market. Only considering the commercial reports, providing information on creditworthiness, DICOM has a 75% of market share.

At present DICOM issues the equivalent of 1.4 million full credit reports per month<sup>10</sup> demanded by 20,000 clients. This company has grown between 15 per cent and 20 per cent annually over the last 10 years measured in terms of report requirements. Its scope may explain the low price of a full report, which is only US\$ 0.40, as compared to the US (US\$ 1.5), Peru (US\$ 2) and Argentina (US\$ 3).

### **3.4 Empirical analysis**

This section develops an econometric exercise seeking to summarize the discussion presented in this section. The analysis will consider the effects of institutional changes on two variables: a measure of banking system development and the performing loans in the banking system. First let's look some statistics of the Chilean credit market.

#### **3.4.1 The Chilean credit market: 1993-1997**

This section will show some of the key statistics on capital market size and non-performing loans for the formal Chilean credit market, by type of debtor and contract. Information on

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<sup>10</sup> DICOM receives 120 million calls, 67% of which are related to credit.

those under the control of the Superintendency of Banks and Financial Institutions is easy to obtain. Table 3.3 shows the stock of loans at the end of each year for the period 1993-1997.

**Table 3.3**  
**Size of the Chilean Credit Market**

(Millions US\$)

Type of Loan	1993	1994	1995	1996	1997
<b>Net Bank Loans</b>	31,002	33,123	38,764	43,622	49,340
Growth rate (%)	13.0	6.8	17.0	12.5	13.1
<b>Leasing Contracts</b>	1,130	1,421	1,670	1,777	1,976
Growth rate (%)	47.7	25.7	17.6	6.4	11.2
<b>Bonds</b>	1,468	1,851	1,770	1,750	1,408
Growth rate (%)	24.6	26.1	-4.4	-1.1	-19.6
<b>Credit cards</b>	454	582	739	886	1,025
Growth rate (%)	31.7	28.1	26.9	19.9	15.7
<b>Department Stores</b>	204	427	664	880	1,165
Growth rate (%)	NA	109.1	55.4	32.6	32.4
<b>TOTAL</b>	<b>34,259</b>	<b>37,404</b>	<b>43,608</b>	<b>48,915</b>	<b>54,913</b>
<b>As % of GDP</b>	<b>62.4</b>	<b>64.5</b>	<b>68.0</b>	<b>71.0</b>	<b>74.5</b>

Source: Superintendency of Banks and Financial Institutions, Superintendency of Securities and Insurance and Chilean National Chamber of Commerce.

As Table 3.3 shows, the credit market has grown very quickly compared to the economy as a whole, thus corroborating the M2/GDP trend shown in Figure 3.2 and per capital loans showed in Figure 3.3. While GDP increased by about 7.7% during 1993-1997, the credit market grew by 12.5% over the same period. The bank loan is, by far, the most important type of contract in the credit market. However, the type of contract, with the highest growth rate, has been credit from Department Stores and Credit Cards. This is only another evidence of banking disintermediation (Fuentes and Basch, 1998).

The fast growth of the credit card and Department Stores credit market reflects a more general trend in consumer loan. The share of consumer loans plus housing loans in total bank loans increased from 19% to 25.4%. This type of loans shows a higher growth

rate than corporate loans. The strong competition within the financial system is the reason why banks have moved into new market segments, such as the household credit market.

According to the regulations of the Superintendency of Banks and Financial Institutions a loan that has not been paid within 90 days after its maturity is classified as a past due loan. This rule differs from the measure for loan loss reserves, that is useful in classifying the risk of the bank portfolio, which are banks' estimates of the default risk.

Table 3.5 shows non-performing loans for each type of contract. It is interesting to note that past due loans as a percentage of total credit, is relatively low (about 2%). The exception is the credit card contract, but if past dues are defined in terms of 30 days then this ratio decreases very rapidly. In general, it can be stated that past due loans are small percentages of total credit. However, the performance of bank loans is much better than the rest of the contracts. This situation could be attributed to the fact that banks offer several products, and therefore if the customer does not pay any part of the loan on time, banks will cancel all other contracts. Banks may also have better screening and monitoring technologies as well as loan recovery technology.

**Table 3.5**

**Non-performing loans as percentage of total credit**

<b>Type of Loans</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>
Past due loans (over 90 days)	0.8	1.1	0.9	1.0	1.0
Leasing contracts (over 90 days)		6.0	4.0	3.4	2.9
Credit cards (1 to 90 days)	NA	NA	10.2	10.9	9.6
Credit cards (30 to 90 days)	NA	NA	2.3	2.6	2.9
Credit cards (60 to 90 days)	NA	NA	0.6	0.8	0.8
Department Stores	1.1	1.5	1.5	1.6	2.0

Source: Superintendency of Banks and Financial Institutions, Superintendency of Securities and Insurance and Chilean National Chamber of Commerce.

### 3.4.2 Econometric analysis

The first question that we will explore is how the reforms of the seventies, the changes in the legal framework and in the information sharing system affect the development of the banking system. The idea is that the reforms of the seventies and the incorporation of the information sharing system should have positively affected the development of banking sector, while the 1986 banking law should have had an ambiguous effect on the development of the sector. To test these hypotheses we built an annual database of per capita banking loans (in real terms) from 1960 to 1997. A natural variable to control for is the per capita GDP (see section 3.1); the hypothesis here is that the banking system should be developing with the economy, on a long run perspective.

The first problem that we face in performing this analysis is that, in the case of Chile, many changes were going on almost at the same time. As shown in section 3.2, there were several reforms taking place in the seventies (financial liberalization, reserve requirements, etc.) and in the eighties (new pension fund system, changes in banking law, the beginning of information sharing, etc.). We attempt to sort out the effect of the most important institutional innovations.

The variables included in the regression analysis were:

Log (per capita GDP):	Log of per capita GDP expressed in pesos of 1986.
Log (per capita loans):	Log of per capita banking loans expressed in pesos of 1986.
Log (loans/GDP):	Log of banking loans expressed in pesos of 1986 to real GDP.
D7597:	Dummy variable that takes the value 1 for the period 1975-1997, i.e., for the post-reforms period.
D8697:	Dummy variable that takes the value 1 for the period 1986-1997, i.e., for the period of a new banking law.
D8997:	Dummy variable that takes the value 1 for the period 1989-1997, i.e., for the period of information sharing among banks.

Some other structural changes were tested using dummy variables, but they were not significant. For example, there was no evidence that per capita loans were affected by the pension fund reform (1981-1997) or by information sharing that was in operation prior to

1989, when the private contract between DICOM and each bank in the financial system started<sup>11</sup>.

Table 3.6 shows the results of the regression. First of all, both per capita loans and loans to GDP are strongly and positively correlated with per capita GDP. The reform of the seventies had a positive impact on the development of the banking system, while Law No. 18,576 enacted in 1986 had a negative impact on the growth of per capita loan and loan/GDP. There is certainly a structural change in 1986, but we could not ascertain whether it affected the intercept or the slope coefficient. Both were significant, but if you include a dummy for the intercept and the slope simultaneously become non-significant.

There is something interesting about information sharing. As described in section 3.3, since 1979 DICOM started gathering public information and providing it to the market. But the beginning of private contracts between DICOM and the banks took place only in 1989. We checked for structural changes in 1979 but they do not appear to be statistically significant. On the other hand, the structural change of 1989 affected both the intercept and the slope coefficient in different directions. Per capita loans become less sensitive to the growth rate of the economy, but at the same time there had a once-and-for-all increase in the function by 1989 that can interpret as the effect of the improvement in the information sharing system.

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<sup>11</sup> It should be borne in mind that some information sharing started in 1979, but it was public information that DICOM pooled. This information did not include the indebtedness with the financial system.

**Table 3.6**  
**Development of the banking sector**  
(Least square)

Variable	Log (per capita loan)	Log (per capita loan)	Log (loan/GDP)	Log (loan/GDP)
Constant	-6.650 (-3.615)	-6.657 (-3.616)	-5.301 (-2.837)	-5.309 (-2.838)
Log (per capita GDP)	1.372 (3.899)	1.373 (3.899)	0.888 (2.674)	0.889 (2.675)
Log (per capita loan)_1	0.745 (14.331)	0.744 (14.330)		
Log (loan/GDP)_1			0.786 (14.697)	0.786 (14.689)
D7597	0.307 (3.554)	0.307 (3.557)	0.271 (3.198)	0.271 (3.200)
D8697	-0.135 (-3.563)		-0.159 (-3.653)	
D8697*Log (per capita GDP)		-0.024 (-3.565)		-0.028 (-3.657)
D8997	4.484 (2.386)	4.355 (2.354)	3.248 (1.715)	3.097 (1.660)
D8997*Log (per capita GDP)	-0.800 (-2.429)	-0.778 (-2.398)	-0.583 (-1.754)	-0.557 (-1.700)
R-squared	0.987	0.987	0.980	0.980
S.E. of regression	0.124	0.124	0.130	0.130
Log likelihood	28.482	28.486	26.967	26.969
Durbin-Watson	2.201	2.200	2.178	2.177

t ratio in parenthesis. The estimation procedures was OLS correcting the variance covariance matrix by the Newey-West HAC procedure.

Considering the literature on growth and financial development, one can be suspicious of the results in terms that pre capita GDP is endogenous and jointly determined with any of the proxies for credit market development. Therefore we proceed to estimate using instrumental variables using one lag of per capita GDP. As it can be seen in Table 3.7 the results do not change very much and the same conclusions can be derived.

**Table 3.7**  
**Development of the banking sector**  
(Instrumental variables)

Variable	Log (per capita loan)	Log (per capita loan)	Log (loan/GDP)	Log (loan/GDP)
Constant	-6.692 (-2.458)	-6.701 (-2.460)	-8.427 (-2.549)	-8.439 (-2.550)
Log (per capita GDP)	1.380 (2.650)	1.382 (2.652)	1.427 (2.444)	1.429 (2.445)
Log (per capita loan)_1	0.744 (13.459)	0.743 (13.462)		
Log (loan/GDP)_1			0.721 (9.887)	0.721 (9.881)
D7597	0.308 (4.695)	0.308 (4.702)	0.334 (3.571)	0.334 (3.572)
D8697	-0.135 (-2.833)		-0.197 (-2.793)	
D8697*Log (per capita GDP)		-0.024 (-2.828)		-0.035 (-2.794)
D8997	4.523 (1.641)	4.396 (1.619)	6.227 (1.899)	6.042 (1.874)
D8997*Log (per capita GDP)	-0.807 (-1.667)	-0.784 (-1.645)	-1.109 (-1.921)	-1.076 (-1.897)
R-squared	0.987	0.987	0.978	0.978
S.E. of regression	0.124	0.124	0.135	0.135
Durbin-Watson	2.198	2.200	1.943	1.941

t ratio in parenthesis. The estimation procedures was TSLS correcting the variance covariance matrix by the Newey-West HAC procedure.

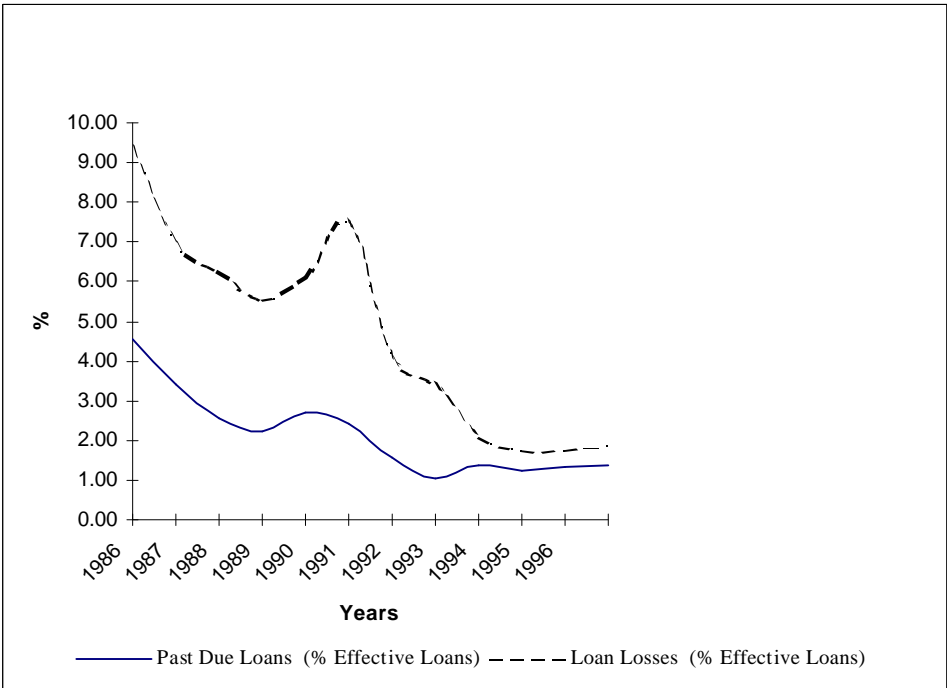
The following table shows the long-term elasticity of capital market development respect to per capita GDP. As it can be seen this elasticity decreases dramatically after 1989.

**Table 3.8**  
**Long-term elasticity of per capita loan and**  
**Loan/GDP ratio respect to per capita GDP**

Dependent Variable	1960-1985	1986-1988	1989-1997
log per capita loan	5.3774	5.2840	2.2335
log (loan/GDP)	5.1219	4.9964	1.1398

The second objective was to identify the determinants of aggregate overdue loans as a share of total loans. Unfortunately we do not have a long yearly series, but we were able to build a monthly series of overdue loans from January 1986 to December 1997 (see Figure 3.4). An alternative to a measure of unpaid debt is loan losses computed by the banks. However, we believe that the former measure is a better proxy to unpaid debt. In any case, both measures have decreased over time, as shown in Figure 3.4. Important regulatory improvements and the strong growth of the economy may explain this fact, after the financial crisis during the first half of the eighties.

**Figure 3.4**  
**Measures of unpaid debt**



Source: Superintendency of Banks and Financial Institutions

We regress the overdue loans to total loans ratio on macroeconomic variables and seasonal dummies. It is important to remember that banks have 90 days to consider an

unpaid loan as past due in their balance sheets. Therefore we had to include the macroeconomic variables that capture the cycle but with a lag of four months. The four candidates to explain short-term economic situation are the interest rate (we used loan rate of interest), IMACEC<sup>12</sup>, an index of economic activity constructed monthly by the Central Bank, inflation rate and the standard deviation of inflation rate.

Then we looked for structural changes that could be explained by the effect of information sharing. At the time there was some information sharing in the system and by August 1986 the authority enacted the new law. Therefore, major changes did not appear except for the private arrangements between DICOM and the banks to share private information on debtors. As we saw in the previous exercise, these agreements started in 1989, but we did not know their exact date and when it began to be effective. Therefore, we start verifying structural changes in January 1990, and then we went back month by month through 1989 searching for a structural change. This seems to have been in place in October 1989<sup>13</sup>.

In summary the variables used for the analysis were the following:

LPDUEPR:	Past dues to total loans ratio for the private banking system
Interest:	Loan interest rate
Yearly %ΔIMACEC:	Percentage change in economic activity measured by the IMACEC indicator
DINFO:	Dummy variable that takes the value 1 from October 1989 to December 1997.

Table 3.9 shows the regression results for this exercise. In the first column we have the regression of past due loans as a proportion of total loans for private banks on interest rate, 12 months variation of the IMACEC, rate of interest, lag values of the dependent variables and the seasonal dummies (coefficients not reported, but all of them were statistically significant). As can be seen, the interest rate positively affects past due loans, i.e., an increase in this independent variable will bring about a higher proportion of past dues over total loans. On the other hand, a drop in the economic activity will generate a higher share of past dues. However, this coefficient is not significantly different from zero.

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<sup>12</sup> IMACEC: Monthly Index of Economic Activity, available as from January 1986.

<sup>13</sup> The Chow test for this month has the lowest p-value, which is consistent with the inclusion of our dummy variable (DINFO).

The second column of Table 3.9 shows the results when introducing the dummy variable DINFO. First we observed that starting October 1989, there are changes in both the intercept and the slope coefficient. There is a reduction, *ceteris paribus*, of past dues loans after that date. But also the sensitivity of past dues with respect to the per capita loan decreases. The coefficient of the interest rate diminishes from 0.095 to 0.027, comparing before and after October 1989. On the other hand, for the same period, the impact of economic activity decreases (in absolute value) from 0.0072 down to 0.016. Neither average nor standard deviation of the inflation rate is statistically significant in any of the regressions.

**Table 3.9**  
**Past due loans, macroeconomic variables and information sharing**

Variables	LPDUEPR	LPDUEPR
Constant	0.0003 (0.0816)	0.0002 (0.0696)
Interest <sub>.4</sub>	0.0125 (2.2241)	0.0950 (3.8538)
Yearly % $\Delta$ IMACEC <sub>.4</sub>	-0.0025 (-0.8960)	-0.0072 (-2.1505)
DINFO		-0.0019 (-3.6947)
DINFO* Interest <sub>.4</sub>		-0.0685 (-2.7533)
DINFO* Yearly % $\Delta$ IMACEC <sub>.4</sub>		0.0056 (2.6067)
LPDUEPR <sub>.1</sub>	1.2172 (14.2244)	1.1229 (13.2340)
LPDUEPR <sub>.2</sub>	-0.2945 (-2.4338)	-0.2575 (-2.5314)
LPDUEPR <sub>.4</sub>	-0.1987 (-1.7588)	-0.2554 (-2.3140)
LPDUEPR <sub>.5</sub>	0.2481 (2.9615)	0.3259 (3.4503)
R-squared	0.9926	0.9939
S.E. of regression	0.0008	0.0007
Log likelihood	739.2267	751.8486
Durbin-Watson stat.	1.8781	1.9392
Number of observations	128	128

t ratio in parenthesis. The estimation procedures was OLS correcting the variance covariance matrix by the Newey-West HAC procedure.

We also computed long-run coefficients, which show that an increase in the interest rate of 100 base points will have the same impact of a drop of the economic activity in 3.7 per cent. It seems that past dues are more closely related to interest rate than to economic activity. Table 3.10 shows the long-term coefficients.

**Table 3.10**  
**Long-term coefficients**

Variables	01.86 to 09.89	09.89 to 12.97
Interest <sub>t-4</sub>	1.4808	0.4131
Yearly % $\Delta$ IMACEC <sub>t-4</sub>	-0.1119	-0.0253

There are other potential determinants of loan repayments <sup>14</sup> which are very difficult to quantify and therefore to incorporate in the regression. For example one may argue that the good performance of the Chilean credit market is due to a reduced access to credit by small firms and households. As shown in Section 3, this seems not to be the case in Chile, as the credit market has been growing at a very fast rate (under any measure that you may consider M2/GDP, Total Loans/GDP, etc.), particularly in the case of consumer loans.

Another potential determinant is the legal framework and this is related to the efficiency of the judicial system, the quality of the laws that protect creditor rights and the enforcement cost of them. The solution provided by the Chilean judicial system is inefficient. This is due to the high cost and low likelihood of obtaining an effective result. On the other hand the bankruptcy code in Chile accelerates bankruptcy proceedings as compared to developed countries, as it imposes time limits for asset liquidation which are lower than a year. Another important feature is that all the creditors have the right to vote, which prevents possible redistribution of wealth from unsecured creditors to secured creditors, as in the case of the UK and the US. It should be noted that the new German code (enacted in 1994 and to become effective in 1999) gives the same voting rights to all creditors (as in the case of Chile), but the time required for liquidation is still much longer.

Finally, we can find private solutions to the problem of creditor rights protection such as; prescreening techniques, modern collection technology and efficient private contracts. All of them appear to be important determinants of the low level of unpaid debt showed in Chile.

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<sup>14</sup> For a detailed discussion of these determinants please see Fuentes and Maquieira (1999)

## 4 Summary and Conclusions

This paper analyzes the determinants of two main features of the Chilean banking sector: the low level of arrears and the banking sector development. Although the legal Chilean framework is based on the French Civil Law, the economy outperforms the rest of the economies (classified in the same category) in terms of low level of non-performing credits and capital market development. In addition, there has been increasing competition over the nineties in the financial system, characterized by a banking disintermediation process. This reduced margins and it led banks to look for new market higher-risk niches (households and small business). However, this has not increased the number of arrears in the banking system.

Concerning the banking sector development we try to measure the impact of specific changes in regulations and other institutional characteristics over an annual time series (1960-1997). We find that the financial market liberalization during the seventies affected positively the banking sector development, while the new law enacted in the middle of eighties reduces the speed of development. In addition, we find that good macroeconomic performance and white information sharing are positive related to credit market development. However, white information sharing reduce the impact of the economy growth rate on credit market development.

Respect to the level of arrears we grouped the plausible explanations in terms of macroeconomic environment, legal framework and private solutions. Using monthly data for 1986-1997 we conclude that good macroeconomic performance and the introduction of white information sharing is negatively related with overdue loans. Moreover, the information sharing reduced the sensitiveness of unpaid loan respect to the business cycle.

There are other important factors that could explain the low level of arrears in the credit market, which are difficult to include in the regression analysis. Short time series, public data availability, some measurement problem and so on cause this problem. In an another paper we discussed in more detailed this determinants.<sup>15</sup>

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<sup>15</sup> Fuentes and Maquieira (1999).

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