

# FINANCIAL REFORM AND INFORMATION PROBLEMS IN CAPITAL MARKETS:

**An Empirical Analysis of the Chilean  
Experience, 1983-1992**

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## **Abstract**

This paper investigates whether the Chilean financial reforms of the 1980s have contributed to reducing market imperfections in Chilean capital markets in the late 1980 and early 1990s. To analyse this issue, patterns of investment and its finance for different types of firms is studied, based on balance sheet information of a panel of 70 firms. The general conclusion is that it remains difficult to find evidence for the fact that reforms did improve access of small and young firms to outside finance, indicating that market imperfections may still be prevalent. The results also show that those specific reforms, which aimed at reducing intra-conglomerate lending, seem to have been successful, since access of non-conglomerate firms has increased, indicating a reduction of existing market imperfections for these firms.

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## **1. Introduction**

Chile experienced a deep economic and financial crisis during the early 1980s. Real GDP fell by 16 per cent from 1981 to 1983 (Banco Central de Chile, 1990, p.58). Saving and investment plummeted, and real activity in several economic sectors reduced dramatically, especially in the manufacturing, construction and financial sectors. As a reaction to the crisis, the Chilean government introduced a series of reforms to regain the dynamic process of economic growth of the 1970s. With respect to the financial sector the government undertook several measures to try to enhance the process of financial intermediation. These measures aimed at improving resource mobilisation and the efficiency of investment. According to the Chilean policy makers, the improvement of both these aspects would contribute to higher economic growth.

An important element of the financial reform programme was the new regulation of the banking sector. The new regulation aimed at contributing to increased financial stability and to reduced market imperfections by encouraging monitoring and screening activities of market participants to reduce problems of information. The process of strengthening the banking system culminated in the presentation of the new banking law of 1986, which was directed towards improving the framework of prudential regulation. The new banking law was introduced as a reaction to the adverse experiences of weak regulation during the 1970s and early 1980s.

This paper aims at evaluating the contribution of the financial reform programme to reduce market imperfections in financial markets. It tries to analyse the impact of the reforms on investment and its finance of the Chilean business sector during 1983-1992. The approach taken is based on recent theoretical and empirical work, in which it is pointed out that information problems in capital markets have an important impact on how firms finance their investment plans. In particular, it has been pointed out that if these information problems do play a role, then internal sources should be positively related to fluctuations in investment outlays. Much of the empirical work on this issue concentrates on the importance of information problems in developed countries.

Only very few papers have been published in which the issue is analysed for developing countries. This paper tries to make a contribution to this literature.

The analysis follows techniques used in the existing empirical literature with respect to investigating the extent of information problems in capital markets. The investigation makes use of balance sheet data of a set of 70 Chilean firms for which information is available during 1982-1992. First, different groups of firms are distinguished for which there exist differences in the extent of these information problems. In the analysis in this paper firms are distinguished according to their size, age and relatedness to a business conglomerate. Second, investment behaviour of different groups of firms is compared. The econometric investigation focuses on the issue of whether internal sources of finance are more important in determining investment patterns of firms for which information problems in capital markets are perceived as being more pressing, which would adversely affect their access to loans.

The paper is organised as follows. Section 2 describes the main macroeconomic and financial reforms during the 1980s and early 1990s. Section 3 provides a theoretical background for the relationship between investment and its finance and discusses relevant empirical work. Section 4 describes the data used in the econometric analysis. Section 5 presents the results of the econometric investigation of the impact of the financial reform programme on investment and its finance of different groups of firms. Section 6 provides a summary and conclusion.

## **2. Macroeconomic and Financial Reforms**

### **2.1 The Macroeconomic Setting, 1974-1992**

The 1980s and early 1990s have been quite a hectic period for the Chilean economy. During the early 1980s the country experienced the most severe recession since the 1930s. The economy contracted by 15 per cent during 1982-1983, and the official unemployment rate rose to 20 per cent in 1982 (Corbo and Fischer, 1994, pp.32-33). Production in several sectors of the

economy fell dramatically. In manufacturing sector output shrank by 18.5 per cent from 1981 to 1983. In the construction and financial sector, output reduction during this period amounted to 34.5 per cent and 43.1 per cent respectively (Banco Central de Chile, 1990, p.58).

This severe contraction of the economy came after a period of relatively successful economic change. From 1974, after Allende had been overthrown by the military junta, the new Chilean government implemented a rigorous change of economic policy by carrying out a programme of economic stabilisation and structural adjustment. Various market reforms were introduced, including real and financial market liberalisations, labour market reforms, trade liberalisations, the liberalisation of the capital account and massive privatisation of public enterprises. This neo-liberal approach diverged importantly from what had been the system of economic organisation from the 1940s to the 1970s, when the state was the driving force behind economic development.

Initially, the economic stabilisation programme deepened the economic recession, basically because the government carried out restrictive monetary and fiscal policies. Yet, during 1976-1981 the economic policies seemed to be working. The annual average economic growth rate amounted to 8 per cent during 1977-1981, which was relatively high, even by international standards.<sup>1</sup> Economic success was not achieved on all fronts, however. Unemployment did not fall substantially from its 1975 level. Moreover, with respect to the external sector, Chile developed an increasing trade balance deficit from 1977, since the value of exports grew much slower than imports. The exchange rate policy - which until 1979 aimed at using a crawling peg system to break expectations of high inflation and thereafter was turned into a system of fixing the peso to the dollar - led to an increasingly overvalued real exchange rate. This, in combination with trade liberalisation, made imports both cheap and easy to access. The high level of imports fueled a consumption boom, financed to a large extent by foreign borrowing. This contributed to a rising current account deficit.

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<sup>1</sup> The annual average growth rate for Latin America during this period was only 4 per cent, whereas it reached 7 per cent for the East Asian countries (World Bank, 1991, pp.22-25).

The crisis of 1982-1983 was caused by the conjunction of domestic policies implemented during the 1970s and the adverse external developments of the early 1980s. On the one hand by external factors, such as falling terms of trade, world wide economic crisis, rising international interest rates and the sudden fall in external finance after the Mexican debt moratorium of August 1982 had an important adverse impact on the Chilean economy. On the other hand, domestic policies were also important. First, the adverse impact of the exchange rate policy on the external balance has already been described. Second, the policy of wage indexation gave Chilean producers a price disadvantage with respect to their external competitors, increasingly weakening their economic position. Third, the high indebtedness of both consumers and industrial sectors - which was a direct consequence of the financial liberalisation in combination with the regulation of the financial sector -, led to an increasingly weak financial position of both firms and banks, ending in a deep financial crisis. Finally, the situation of economic crisis was greatly enforced when in June 1982 the policy of fixing the peso to the dollar was finally given up and the government announced a considerable devaluation of the national currency. This policy added to the financial problems of many firms and consequently also banks, especially in those case where they had large debts, which were denominated in dollars.<sup>2</sup>

During the next two years, the economy only slowly recovered from the severity of the crisis. The Chilean government was muddling through without a clear picture of what should be done to overcome the economic recession. The crisis led to serious doubts about the neo-liberal approach to economic policy within the government in 1984. For a short period of time policies changed to activate the domestic economy, leading to a re-introduction of protectionist measures, a policy of industrial targeting, together with Keynesian-type government expenditure increases. From 1985, however, the government returned to a neo-liberal policy of stabilisation and structural transformation.

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<sup>2</sup> Useful descriptions of the economic liberalisation programme implemented in Chile during the 1970s and early 1980s, as well as analyses of its consequences and failures can be found in, among others, Vittorio Corbo (1985), Sebastian Edwards and Alejandra Cox Edwards (1991), Alejandro Foxley (1983), Cristian Moran (1989) and Joseph Ramos (1986).

The neo-liberal policies after 1985 were different from those carried out in the 1970s, however. The policies of the 1970s took the approach that macroeconomic problems would adjust on their own (Cox Edwards and Edwards, 1992, p.207). During the 1980s, the Chilean government actively used monetary and fiscal policy to stabilise and adjust the economic process. In particular, the government used policies to control the growth of domestic credit to target the real interest rate to avoid the experiences of the excessively high real interest rates during the 1970s. Additionally, it used an active exchange rate policy. Regular devaluations were made, which took into account the domestic inflation and domestic and external macroeconomic developments that were of influence on the (expected) real exchange rate (Edwards and Cox Edwards, 1991, pp.216-218). Moreover, the government redirected its expenditures from consumption towards investment. Finally, several reforms were implemented, which aimed at stimulating and diversifying exports, reducing the outstanding external debt and increasing domestic resource mobilisation. From 1986, economic growth resumed and remained fairly strong for the next seven years.

## **2.2 Financial Reforms**

The years 1982-1983 were especially critical for the financial sector. Due to the very weak position of firms - in many cases leading to their bankruptcy<sup>3</sup> - several banks met with considerable financial problems. Most observers now agree that the combination of weak prudential regulation and the dominance of business conglomerates in the Chilean economy has been an important factor behind the domestic financial instability during the early 1980s (Edwards and Cox-Edwards, 1991; Velasco, 1991; Hermes, 1995; Visser and Van Herpt, 1996).<sup>4</sup> The central bank had to intervene in order to prevent a complete financial breakdown. In early 1983 the central bank decided to intervene by

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<sup>3</sup> The number of bankruptcies increased from 131 in 1976 to 431 in 1981. Most firms went bankrupt in 1982, however, when their number rose to 810 (Mizala, 1985, pp.61-62).

<sup>4</sup> The details of the events related to this issue are beyond the scope of this paper. See De la Cuadra and Valdés (1992<sup>a</sup>) and Hermes (1995) for more indepth analyses of the facts that led to the financial instability in the early 1980.

taking over non-performing debts of banks with severe financial problems and by liquidating insolvent institutions. Together with earlier interventions in the financial system during 1981, the central bank intervened in thirteen banks and six financieras. Eight of these banks and all six financieras were liquidated. The others were technically taken over by the central bank. Among the latter were the two largest banks of the country. The loan portfolio of the intervened institutions represented 60 per cent of all loans issued by the financial system (Larraín, 1989, pp.1-2). Moreover, to reduce the crisis of confidence, the government issued an explicit deposit insurance on deposits held with insolvent intermediaries.

As a reaction to the problems in the domestic financial markets, the Chilean government decided to strengthen the regulatory system.<sup>5</sup> In 1986, the monetary authorities introduced a new banking law. This new law contained the most important financial reforms of the 1980s. This new banking law was preceded by several financial reforms during 1981-1982. The banking law, together with these new measures, were directed at preventing the financial sector from collapsing in the future. Moreover, they aimed at improving the process of domestic resource mobilisation and the efficiency of resource allocation. The most important elements these reforms contained are described briefly below.<sup>6</sup>

### **Strengthening the regulation of asset and liability management of banks**

- Restrictions on lending to individual borrowers of banks. The definition of an individual borrower includes firms in which the borrower has an important share of total equity.

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<sup>5</sup> The financial reforms described below only refer to new regulation to enforce the system of supervision. Note, however, that during the 1980s the Chilean government also introduced other major reforms with respect to the financial system. In particular, it privatised the pension fund system in 1981, which was an important stimulus to increased domestic savings and of trading in new securities markets. The issue of the privatisation of the pension funds and its effects on financial sector development is beyond the scope of this paper, however. See Diamond and Valdés (1994) for a review of the development of the pension fund system in the 1980s.

<sup>6</sup> For a more detailed description of the contents of the Chilean financial reforms, see Ramírez (1991), Ramírez and Rosende (1992), and De la Cuadra and Valdès (1992<sup>b</sup>).

- Restrictions on lending to related parties of the bank, *i.e.* its shareholders and employees.
- Loan classification system: banks have to report details of 85 per cent of their loan portfolio outstanding or of their 400 largest borrowers.
- Strengthening capital requirements.
- Regulations to reduce the risks of maturity mismatching.
- Restrictions on share of interbank loans to total liabilities.

#### **Disclosure of financial information to the public**

- Banks have to report details of their activities in a national newspaper four times a year. This should include information on their income statement and balance sheet, and specific information on issues like the extent of asset and liability mismatch and lending to related parties of the bank. Additionally, the report of the external auditing company should also be published.
- The *Superintendencia de Bancos e Instituciones Financieras* (SBIF) - the regulatory institution supervising the banking sector - publishes its own assessment of periodical evaluations of bank solvency.

#### **Explicit deposit insurance**

- Under the new banking law the deposit insurance scheme discriminates between money and other bank liabilities. Money liabilities are defined as liabilities termed for a maximum of less than 30 days or liabilities contracted for 30 days or more but expiring within the next ten days. All money liabilities are 100 per cent insured.
- For all other liabilities only small deposit holders are insured.

#### **New mechanisms for dealing with solvency problems of banks**

The approach taken by the Chilean regulatory authorities is to privatise bank losses. This approach requires that the public is convinced that the central bank will not intervene when bank failures occur, with the exception of holders of money liabilities and/or small deposit holders. This requires explicit rules indicating what will happen in the event of a bank failure. In case of bank



insolvency several adjustment mechanisms are defined:

- Recapitalisation proposal with creditors, submitted by the failing bank's board, which ensures that the liabilities of the insolvent bank are reshaped so that the bank becomes solvent again. This proposal may include:
    - \* total or partial capitalisation of bank liabilities;
    - \* extension of nonpreferential debt;
    - \* partial debt forgiveness;
    - \* other forms of reshaping debt payments between the bank and its creditors.
- This recapitalisation proposal may be rejected by the creditors of the bank after which a second round starts in which the bank management submits a new proposal. If this second proposal is also rejected by the bank's creditors, the central bank will put the insolvent bank under mandatory liquidation.
- Financial help from other banks by granting subordinate loans to failing banks.

The measures implemented before 1983 basically aimed at reducing the possibilities of intra-conglomerate lending. This kind of lending was held responsible, at least to a large extent, for the growing financial instability during the early 1980s. In fact, these measures prohibited banks from being the financial heart of these conglomerates, a position they had obtained in the course of the 1970s.

The new Chilean banking law of 1986, which contained the bulk of the above described reforms, explicitly aimed at improving financial intermediation by increasing the confidence of the public in the system as well as by improving the quality of bank management. In general terms, the newly developed regulatory system obliged banks to act risk-aversely, whereas at the same time the public was stimulated to closely monitor bank behaviour with only minor government involvement. The basic idea was that by improving financial market regulation as described above information-based market imperfections would be reduced by stimulating both deposit holders and banks to increase their monitoring and screening activities. Increasing public confidence by improving prudential regulation and by providing deposit holders clear incentives and possibilities to privately monitor and screen banking operations would contribute

to a safer and more efficient banking system, which would enhance resource mobilisation. This would increase the volume of resources available for investment. Moreover, better monitoring and screening by the management of the bank - to which management is obliged within the new banking law - would improve the quality of investment financed by banks. Increased production of information with respect to activities related to financial markets by both creditors of the banks as well as the banks themselves would contribute to reducing market segmentation and high-risk lending operations.

### **3. Investment and Financial Constraints**

In a world with perfect markets, investment of firms may be financed both from internal and external of finance. Internal finance consists of net profits plus depreciation (*i.e.* cash flow), whereas external finance may come from various sources of borrowing in financial markets. According to the neo-classical theory of corporate investment behaviour - developed by Franco Modigliani and Merton Miller (1958) - with financial markets being perfect firms will be indifferent with regard to financing investment with internal or external funds. Internal and external finance are perfect substitutes, which means that investment is not constrained by the availability of funds. Firms will invest until the marginal cost of borrowing - which is proxied by the risk-free market interest rate - is equal to the expected marginal rate of return on the investment project.

However, from existing theoretical literature it is well-known by now that financial markets are normally characterised by imperfections related to information problems, such as monitoring and screening problems and problems of asymmetric information (Jensen and Meckling, 1976; Stiglitz and Weiss, 1981; Myers, 1984; Myers and Majluf, 1984). Under these circumstances the Modigliani-Miller proposition no longer holds. It then follows that it does make a difference whether a firm finances its investment with external or internal funds, since, the cost of external finance will be above that of internal finance due to the additional costs of information. The borrower has to pay a premium

above the risk-free market interest rate to cover for these information costs. In some cases, borrowers are even excluded from external finance, in which case credit rationing applies, due to the fact that the information problem is too large and the related information costs are too high. The larger the information problems related to lending to particular (classes of) firms, the higher the interest rate premium, and the higher the possibility of full credit rationing. Stated somewhat differently, financial constraints may become important, especially for those borrowers having problems to communicate their private information to financial intermediaries and/or investors.

If financial constraints are important, this may influence investment behaviour of firms. Since some categories of firms have more problems in attaining external finance, based on the fact that they more difficulties in communicating their information to lenders, fluctuations in investment spending of these categories of firms will be more closely linked to changes in the availability of internal funds. They may even have to forego potentially good investment projects due to financial constraints. Based on the above theoretical framework, it is expected that levels of annual investment outlays are positively related to measures of internal sources, such as cash flow.

Within this framework, it is possible to investigate whether or not the financial reforms in Chile during the 1980s contributed to reducing existing market imperfections. The remainder of this paper investigates the impact of the above described financial reforms related to strengthening the regulation of the banking system on the financial decision making of firms during the 1980s and early 1990s. The hypothesis is that if the financial reforms have had the expected outcomes, then market imperfections in the financial sector should have reduced, at least from 1987 after that all major reforms had been implemented. This is based on the idea that before the reforms banks were less able to screen and monitor the projects with the highest expected rate of return, due to externalities related to screening and monitoring borrowers by these banks, and based on the high cost of gathering information. Consequently, they restricted their lending activities to particular groups of borrowers and rationed other groups, due to asymmetric information. After the reforms, monitoring and

screening is expected to have been improved and problems of asymmetric information to have been reduced, which may expose itself mainly through decreased segmentation of access to loans of different categories of firms. By considering changes in the relationship between investment and internal sources of firms in the 1983-1992 period, indirect evidence may be provided with respect to whether or not these expected effects did take place.

In recent years, a large body of empirical literature has investigated the issue of information problems in financial markets and their impact on investment decisions of firms in developed countries (see, among others, Fazzari, Hubbard and Petersen, 1988; Devereux and Schiantarelli, 1990; Hoshi, Kashyap and Scharfstein, 1991; Whited, 1992; Van Ees and Garretsen, 1994; and Chirinko and Schaller, 1995). These studies analyse the importance of measures of internal funds or liquidity as an explanatory variable of annual investment outlays. The empirical studies approach this issue by dividing firms into groups for which it might be expected that information problems are more severe as compared to other groups of firms. Next, they compare the impact of internal funds on investment between these different groups of firms to see whether there is evidence for the hypothesis that measures of internal funds are less important as determinants of investment of firms for which banks may hold more information. In general, these studies find empirical support for this hypothesis.

Analyses of differences in access to external finance to analyse financial market imperfections as described above have been scarcely applied to the cases of developing countries. One of the very few studies comes from Izak Atiyas (1992), who has used this methodology to analyse the impact of the financial reforms on credit constraints for small versus large firms in the case of Korea during the 1980s. His findings show that small firms are finance constrained during the early 1980s but these constraints are reduced in the late 1980s, as is suggested by the fact that the coefficient of a stock measure of liquidity drops in investment equations for these firms. For large firms the coefficient of the internal funds variable rises, which may be explained by the fact that after the liberalisations of the mid-1980s the Korean government significantly reduced its programmes for targeted credits. Before the liberalisation these targeted credits

were more directed towards large firms. After the liberalisation new targeted credit programmes were introduced, this time focusing on financing smaller firms.

Studies from John Harris, Fabio Schiantarelli and Miranda Siregar (1994), and Siregar (1995) investigate the issue of the impact of financial liberalisation on reducing information problems in the case of Indonesia in the 1980s. Both these studies do find support for the hypothesis that the Indonesian programme of financial liberalisation of 1983 has reduced the reliance of informationally disadvantaged firms on internal funds when they invest. In other words, they suggest that the degree of market segmentation has reduced after the reforms.

The present study extends the existing scarce empirical literature on developing countries by studying the issue of whether or not the financial reforms of the 1980s in Chile have changed the impact of financial market imperfections on investment and its finance.

#### **4. Data Description**

To analyse the hypothesis that in the presence of information problems in financial markets internal funds are more relevant in determining investment of some classes of firms as compared to other classes of firms, financial data have been used on a firm level. These data have been provided by the *Superintendencia de Valores y Seguros (SVS)*, a government agency to which limited companies have to report their activities on a quarterly base since 1981. For the present analysis annual data have been used. The data set consists of information on balance sheets, income statements and uses and sources of funds of firms from different sectors of the economy. These data are available for the 1980-1992 period.<sup>7</sup> For every year between 1981 and 1992 some 250 to 300 firms have reported information to the SVS.

The following criteria have been adopted to construct the data set which has

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<sup>7</sup> Before 1981 not only limited companies reported to the SVS.

been used in the empirical part of this paper. First, firms have been selected that presented full information for all relevant variables during the 1982-1992 period in order to acquire a balanced data set. Second, firms have been eliminated from the data set when they were operating within the financial, public administration or social sectors. In other words, the firms in the data set are engaged in the agricultural, mining, manufacturing, construction, or services sector. Using these two criteria did leave 81 firms in the data set. After eliminating those firms reporting that they were in a state of liquidation, or for which data appeared to be unacceptable or inconsistent (such as reporting zero sales, and unacceptable large changes in fixed and total assets), 70 firms remained, of which financial data have been used in the estimations presented below. It is acknowledged that the data set used in this study is not necessarily representative of the corporate sector in Chile. It consists of relatively larger firms, which may have better access to capital markets than the average Chilean firm. Any results from the present research project must therefore be appreciated as indicative only.

Firms have been divided into subsamples based on criteria which may be useful to identify firms that have different degrees of problems with communicating private information to financial intermediaries, *i.e.* banks. Stated differently, these criteria may distinguish those firms for which banks have difficulties to monitor and screen their behaviour. The criteria that have been used in this context are the *size* of firms, the *age* of firms, and whether or not a firm belongs to a business conglomerate, or *Grupo*.

First, with respect to the size criterion, it is clear that banks have less difficulty in screening and monitoring the behaviour of large firms, since the monitoring and screening costs related to lending to such firms are lower per unit of capital. This is due to the fixed cost nature of information and due to the fact that the volume of lending to these firms will generally be larger in absolute terms. Moreover, large firms are better able to provide collateral as compared to small firms.

Second, with respect to the age criterion, it can be stated that old firms have less difficulty in communicating private information, since banks will have had more time to obtain information on their creditworthiness. Moreover, old firms

have shown to be creditworthy and willing to pay back their obligations in the past (Chirinko and Schaller, 1995, p.529).

Finally, firms related to a Grupo have less difficulties in communicating information to banks. The Chilean Grupos are characterised by the fact that close relationships exist between firms and banks within these conglomerates (Hermes and Lensink, 1996). The existence of such close financial networks can be found in many developing countries and can be explained on the grounds of existing market failures, which appear to be prevalent in these countries (Stiglitz, 1989). Close relationships between banks and firms mitigate information problems. Banks are much better informed about the creditworthiness and the expected profitability of investment of Grupo related firms. This improves the access of these firms to bank loans.

Based on the above discussion of the criteria, it may become clear that small firms, young firms, and firms not belonging to Grupos have more problems to communicate information to banks. Banks have more difficulties to monitor and screen their activities. The result is that these firms face higher costs of external finance, and may even be rationed out of credit markets. Thus, they are more likely to be faced by financial constraints.

For each of the three above mentioned criteria two sub-samples of firms have been created: small versus large firms, young versus old firms and Grupo versus non-Grupo firms. The size sub-samples have been obtained by dividing the total sample of firms in two groups containing an equal number of firms, based on average total assets during 1983-1992. The age sub-samples have been obtained by classifying firms born less than 21 years ago as being young, whereas firms of 21 years or older have been classified as old.<sup>8</sup> This gives 50 old and 20 young firms. Finally, the division of firms into Grupo and non-Grupo firms is based on information provided by the SVS data. Among the information in the data set is also a reference to whether or not a firm belongs to a Grupo. If

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<sup>8</sup> One may question whether this really divides informationally disadvantaged younger firms from better known older firms. Yet, since only few firms are really young, *i.e.* for instance less than 10 years old, the cut-off point has been set at 20 years to obtain a sufficient number of firms within the sample of young firms.

this reference is applied to the set of 70 firms, 38 firms are classified as non-Grupo related firms, whereas 32 firms are classified as Grupo related firms.

Table 1 provides basic information on the characteristics of the sub-samples of firms. In general, the summary statistics presented in the table do show that different sub-samples of firms differ in a number of ways. First, large firms are much larger than small firms. Based on median values of total assets, large firms are seven times larger than small firms. Based on median values of fixed assets this is even more than eleven times. Note that Grupo related firms are also much larger than non-Grupo related firms, although the differences between both these sub-samples are less striking than for the sub-samples based on size. In terms of total assets, the median value of Grupo related firms is four and a half times that of non-Grupo related firms. For the stock of fixed assets this is more than six times. The difference in size between young and old firms is less pronounced. Although mean values of both total and fixed assets of old firms are roughly two times larger than that of young firms, median values do not differ substantially.

Second, differences with respect to investment activity are not very large between sub-samples. Mean values of investment to capital ratios for all sub-samples amount vary around a level of 0.12. Third, small firms as well as non-Grupo firms are less profitable than large and Grupo firms, respectively. For sub-samples based on age, it appears to be more difficult to determine which class of firms has been more profitable. Mean values of profit to total asset ratios are higher for young firms. Yet, mean values seem to be rather volatile over the 1983-1992 period (measured by its standard deviation). Therefore, median values may be a better representation of the center of both sub-samples. When looking at median values, it appears that old firms are more profitable. Fourth, with respect to sales to asset rates, small firms, old firms and non-Grupo firms have substantially higher mean and median values.

Finally, small firms, young firms and non-Grupo firms seem to have higher internal sources (divided by the capital stock) available. Yet, the annual amount of these internal sources appears to be rather volatile for all sub-samples (again measured by its standard deviation) in the table. Therefore, taking median values as a better representation of the center of sub-samples, the table shows that these



values for large, old and Grupo firms are above those for small, young and non-Grupo firms.

These summary statistics reveal interesting differences between different sub-samples of firms for a number of variables of interest for the issue discussed in this paper. Yet, econometric analysis is needed to really investigate whether the relationship between investment and the availability of internal sources differs for both groups of firms. By looking at the summary statistics in table 1, one can only compare the relevant variables for different sub-samples of firms unconditionally (*i.e.* not taking into account other specific features of these sub-samples).

Table 1: Summary Statistics of Different Sub-samples of Firms, 1983-92

	total assets	fixed assets	invest- ment	profit	sales	internal sources
SMALL						
mean	2,519	948	0.121	0.049	0.978	0.431
median	2,041	580	0.082	0.056	0.632	0.184
LARGE						
mean	38,004	19,856	0.117	0.083	0.567	0.267
median	15,377	6,652	0.089	0.084	0.509	0.207
YOUNG						
mean	13,116	6,804	0.124	0.079	0.527	0.567
median	5,548	1,768	0.083	0.126	0.519	0.174
OLD						
mean	23,830	12,220	0.117	0.062	0.862	0.258
median	5,977	2,241	0.087	0.143	0.586	0.204
NON-GRUPOS						
mean	5,702	2,579	0.117	0.051	0.989	0.393
median	2,876	731	0.077	0.058	0.747	0.188
GRUPOS						
mean	38,660	20,283	0.122	0.085	0.503	0.291
median	12,935	4,575	0.093	0.086	0.457	0.207

Note: total and fixed assets are in millions of 1985 pesos; investment and internal sources are divided by the capital stock; profit and sales are divided by total assets.

## 5. Econometric Investigation

### 5.1 The Strategy of Econometric Investigation

In order to investigate whether some classes of firms are confronted with stronger information problems in capital markets - which may reveal itself by smaller sensitivity of investment outlays to the availability of internal sources for large, old and Grupo firms as compared to small, young and non-Grupo firms - an investment function has to be specified in which proxies for internal sources are incorporated, next to other variables explaining investment behaviour. If the size, age or relatedness to a Grupo reduces information imperfections, this should expose itself by the fact that the coefficient for the internal sources variable in the investment equation is lower for large, old and Grupo firms than the coefficient for the small, young and non-Grupo firms.<sup>9</sup> Such an investigation is the first step in the process of analysing the central hypothesis of this paper, *i.e.* did the financial reforms in Chile in the 1980s contribute to reduce existing market imperfections based on information problems in capital markets?

The second step establishes the effect of the reforms on existing market imperfections. To investigate whether there is evidence for the hypothesis that financial reforms succeeded in reducing these imperfections, the same investment equation is estimated for sub-samples and sub-periods. In the estimations a pre-reform and post-reform period are distinguished. The dividing line for determining the pre- and post-reform periods has been set at the year 1987. The rationale for choosing 1987 is based on the following considerations. First, the major reforms were carried out during the 1981-1986 period. Second, these reforms need at least one year to materialise and to have the desired effects on the behaviour of participants in the financial markets. Both banks and firms need time to adjust their financial and real decisions to the new conditions created by the institutional reforms. The hypothesis specified above is said to be supported if the coefficient for the internal funds variable in the investment equations for

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<sup>9</sup> As was mentioned earlier, this method for investigating informational imperfections in financial markets is fairly standard in recent empirical work.

the small firms, young firms and non-Grupo firms - *i.e.* those confronted with more severe financial constraints, at least before the reforms - is higher for the pre-reform than for the post-reform period. This would suggest that the reforms have contributed to reduce information problems in capital markets, since those firms identified as being confronted with more severe financial constraints before the reforms would show reduced importance of internal sources to explain investment, *i.e.* financial constraints have been reduced.

The econometric analysis is carried out as follows. An investment equation is estimated for the 1983-1992 period. The dependent variable is gross investment, *i.e.* net investment plus depreciation in each year. The estimation procedure is based on pooled regressions of individual firm data, using the least squares technique.<sup>10</sup> All variables (dependent as well as independent) in the regressions presented below have been scaled by total capital stock one period lagged and have then been transformed into logs.<sup>11</sup> In order to be able to pool the information of individual firms, the *fixed effects technique* has been used. This technique assumes that the intercepts of individual firms differ, yet the slope coefficients are the same for all firms. To carry out fixed-effect estimations, the original data have been transformed. For each variable, the means of individual firm observations have been subtracted from the original observations. The least-squares method is then been applied to the transformed data (Hsiao, 1986, pp.29-41). In the estimation procedure, outliers have been skipped based on extreme values of the residuals of the individual equations.<sup>12</sup>

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<sup>10</sup> In some of the recent empirical work cited earlier the Generalised Method of Moments (GMM) has been applied to analyse balance sheet data from a large number of firms. Although this method may be preferred, since it uses the data more efficiently as compared to the fixed effects technique, GMM has not been applied here due to the fact that it is only useful when large data bases (*i.e.* data for more than 150-200 firms) are available.

<sup>11</sup> Note that this introduces a minor bias in the data, since this leaves out observations having zero or negative values.

<sup>12</sup> Only a few observations have been deleted from the data based on this procedure.

## 5.2 Specification of the Investment Equations

In the estimations an *accelerator-type investment model* has been used as the basic model for specification of the investment equations. This model is fairly standard in investment literature. It incorporates changes in total sales ( $\Delta \text{SAL}$ ) as the basic regressor which may explain investment behaviour. The idea is that investment decisions are based on observed patterns of past demand for final output. Therefore, a positive relationship is expected to be found between investment and the sales variable. Other regressors which have been added to the basic model are the debt to capital (or leverage) ratio (DEBT), investment one period lagged (GINV), cash flow (CF), and Tobin's Q (TOBQ). The debt to capital ratio has been included to account for the effects of the cost of debt on investment. Investment outlays will be negatively affected by this ratio, since the higher the leverage, the higher will be the costs of financing investment with debt. This is due to the fact that creditors will increase the marginal price of loans when a debtor already has a high level of debt to capital (Harris, Schiantarelli and Siregar, 1994, p.38). One should expect to find a negative relationship between investment and the debt indicator. Investment one period lagged is included to account for the stock adjustment process. It is hypothesised that the relationship between investment and investment one period lagged is positive.

Next, cash flow (net profit after taxes plus depreciation) has been added as a measure of internal sources. This is standard in the empirical literature related to the issue of this paper. Based on the discussion in section 3, one should expect to find a positive relationship between investment and cash flow. However, the coefficient of the cash flow variable should be lower for firms for which the information problem in capital markets is assumed to be smaller, *i.e.* large firms, old firms and Grupo firms.

Finally, Tobin's Q has been added, since standard criticism of analysing the relationship between investment and measures of internal sources has pointed out that these measures may also proxy for the profitability of investment. According to this criticism, one should expect there to be positive relationship between internal sources and investment, since firms having more liquidity are doing well

and thus have better possibilities to invest (Hoshi, Kashyap and Scharfstein, 1991, p.43). This may pose problems when one wants to interpret the cash flow coefficients in terms of representing capital market imperfections. Therefore, one can use Tobin's Q (TOBQ) - a frequently used proxy measure for expected profitability of the firm -, to account for the effect of the expected future profitability of investment on investment decisions.<sup>13</sup> There are several ways of measuring this variable. Tobin's Q is defined here as the market value of equity plus the book value of (short plus long-term) debt divided by the book value of total assets. The relationship between investment and Tobin's Q is expected to be positive.

The exact specification of investment behaviour can be found in table 2, equations [1]-[4]. All equations includes changes in total sales of the present period. All other variables are included with a lag of one period.<sup>14</sup> Cash flow is added one period lagged, based on the idea that in general a firm will finance investment in period t, using the cash flow which is generated one period earlier - *i.e.* which is available at the beginning of period t. In equations [2]-[4] two cash flow variables are included, representing cash flow for sub-samples based on size, age and relatedness to a Grupo. For example, in equation [2] one cash flow variable is obtained by multiplying one period lagged cash flow with a dummy variable, which is one when observations refer to small firms and zero when they refer to large firms (CFSML). The other variable is obtained by multiplying one period lagged cash flow with a dummy variable, which is one when observations refer to large firms and zero when they refer to small firms (CFLRG). The same procedure has been applied to create cash flow variables for sub-samples based on age (CFYNG and CFOLD, respectively) and relatedness to a Grupo (CFG and CFNG). All equations have been estimated including year

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<sup>13</sup> Several studies have followed this procedure. See, among others, Atiyas (1992); Fazzari, Hubbard and Petersen (1988); and Devereux and Schiantarelli (1990).

<sup>14</sup> The results for the cash flow variables presented in the tables below remained unchanged when using the debt to capital ratio and/or Tobin's Q of the current period, instead of lagged variables. These results were also not affected when equations were estimated incorporating only the sales variable or Tobin's Q, next to the debt to capital ratio, investment one period lagged and the cash flow variables.

dummies to capture the impact of macroeconomic changes during the 1983-1992 period.

### **5.3 Discussion of the Results**

The estimation results of the investment equations are presented in table 2. Equation [1] presents the outcomes for the total sample of firms. Equations [2] to [4] present the outcomes for the sub-samples of firms based on size, age and relatedness to a Grupo, respectively. For all equations the results are similar with respect to all regressors included except for cash flow. First, the results show that the accelerator model is always satisfied, since the sales variable appears with a strongly significant positive coefficient in all equations. Second, investment one period lagged also appears with the expected sign and is strongly significant. Third, the debt to capital ratio appears not to be statistically significantly related to investment in any of the equations.

Turning to cash flow, the variable which is of particular interest in the present analysis, the table shows that cash flow variables for all firms, as well as for different sub-samples of firms appear with the expected sign in the investment equations and are strongly significant.

The outcomes for the different sub-samples are as follows. For the sub-samples based on size, the outcomes reveal that the coefficient for cash flow of large firms is higher than that for small firms (0.145 against 0.12). Note, however, that the difference between the value of both coefficients appears not to be statistically significant. The cash flow coefficient of young firms is significantly higher than that of old firms (0.21 against 0.11), suggesting that young firms are confronted with more severe financial constraints due to information problems in capital markets. This difference in values of coefficients appears to be statistically significant. Finally, the coefficient of the non-Grupo firms is higher than that for Grupo firms (0.145 and 0.12, respectively). Yet, the difference between the levels of both coefficients appears not to be statistically significant.

The outcomes of the estimations for the entire 1983-1992 period are of less importance to the present study, since the financial reforms of the first half of

the 1980s are hypothesised to have had a significant impact on investment behaviour and its finance for different groups of firms. To test this hypothesis the investment equations in table 2 are re-estimated. Each of the equations [2] to [4] now includes four, instead of two cash flow variables. Again taking equation [2] as an example, there are two cash flow variables for the small firms and two for large firms. The cash flow variable for small firms is multiplied with a dummy variable, which is one when observations refer to the 1983-1987 period and zero when they refer to the 1988-1992 period (CFSML PRE). Moreover, the cash flow variable for small firms is multiplied with a dummy variable, which is one when observations refer to the 1988-1992 period and zero when they refer to the 1983-1987 period (CFSML POST). The same procedure has been followed to construct the two cash flow variables for large firms (CFLRG PRE and CFLRG POST, respectively), as well as for the other sub-samples (CFYNG PRE and POST, CFOLD PRE and POST, CFG PRE and POST, and CFNG PRE and POST, respectively).

The outcomes of the estimations reveal the following. For the full sample of firms, the cash flow coefficient drops from the pre-reform to the post-reform period, but this drop is only small, suggesting that on average the reform may not have changed investment and its finance very much. More information on this issue can be obtained when looking at sub-samples of firms, however.

First, for the sub-samples based on size the outcomes suggest that the cash flow coefficient for large firms is 0.14 and that it does not change after the implementation of the reforms. The coefficient for small firms does change, however, from 0.13 to 0.115. Differences between coefficients of both sub-samples, as well as sub-periods appear not to be statistically significant. This result suggests that when taking size as the criterion to divide firms into groups which differ with respect to the extent of information problems they are confronted with, no evidence is found for the hypothesis that the financial reforms in Chile did reduce information problems for the informationally disadvantaged small firms during the second half of the 1980s.

Second, for the sub-samples based on age the outcomes show that before the reforms cash flow was a significantly more important determinant of investment

for young firms (coefficient is 0.20) than for old firms (coefficient is 0.12). After the reforms, this outcome remains unchanged; the difference between the cash flow coefficients appears to become even somewhat larger (0.09 and 0.21, respectively). This suggests that, contrary to what is hypothesised, the reforms do not seem to have the expected impact on reducing market imperfections for the informationally disadvantaged young firms.

Finally, when looking at sub-samples based on the relatedness to a Grupo the estimation outcomes suggest the following. Before the reforms, internal sources of finance are a more important determinant of investment for non-Grupo firms as compared to Grupo firms (coefficients are 0.19 and 0.11, respectively). However, after the reforms there appears to be no significant difference between coefficients of cash flow (0.13 and 0.12, respectively), *i.e.* internal sources are equally important in determining investment of both Grupo and non-Grupo firms. This result suggests that, based on the criterion of whether or not firms have relationships to Grupos, informationally disadvantaged firms (*i.e.* firms without Grupo relations) were indeed confronted with more severe financial constraints based on existing information problems in capital markets, whereas after the reforms were implemented financial constraints did no longer differ. This may support the hypothesis that the financial reforms have been effective in reducing market imperfections in financial markets related to information problems.

The latter result may be interpreted as follows. As has been discussed elsewhere (Hermes and Lensink, 1996), one of the specific characteristics of the changes in regulation during the early 1980s was directed towards reducing the possibilities of intra-Grupo lending. This change of regulation may be part of the explanation for the results found and presented in table 3, equation [4]. The new regulation adversely affected the opportunities of banks being the financial heart of the Grupos. This may have also reduced the information advantages they had with respect to lending to Grupo firms as compared to non-Grupo firms before the restrictions on intra-Grupo lending were effectuated. Indeed, this regulatory change may have reduced the mitigating effect of conglomerate structures on the information problems in capital markets. Stated somewhat differently, it may



have helped to reduce the existing market segmentation in these markets based on such structures.

Table 2: Econometric Results of the Investment Equations

	[1]	[2]	[3]	[4]
CF (-1)	0.131 (4.65)			
CFLRG (-1)		0.144 (3.69)		
CFSML (-1)		0.121 (3.38)		
CFOLD (-1)			0.107 (3.28)	
CFYNG (-1)			0.206 (4.05)	
CFG (-1)				0.119 (3.23)
CFNG (-1)				0.144 (3.79)
TOBQ (-1)	0.059 (2.02)	0.057 (1.95)	0.061 (2.16)	0.058 (1.98)
DEBT (-1)	-0.043 (-1.52)	-0.043 (-1.52)	-0.045 (-1.16)	-0.043 (-1.52)
$\Delta$ SAL	0.212 (3.69)	0.213 (4.46)	0.219 (4.05)	0.214 (3.72)
GINV (-1)	0.306 (6.41)	0.307 (6.43)	0.300 (6.30)	0.303 (6.35)
R <sup>2</sup>	0.28	0.28	0.28	0.28
adj. R <sup>2</sup>	0.14	0.14	0.14	0.14
N	472	472	472	472

*Notes:*

The independent variable is gross investment. For explanation of the abbreviations used, see the main text. All equations have been estimated with year dummies. Only dummies for 1988 and 1992 appeared to be significant. The estimations shown in the table include only these two dummies. They have been omitted from the table for presentation purposes. Estimations including all year dummies do not differ substantially from those presented in the table.

t-statistics and R<sup>2</sup> have been corrected for the loss of degrees of freedom due to the inclusion of firm specific dummies. Adjusted t-values (between parentheses) and R<sup>2</sup> are presented in the table.

Estimations have been tested on the condition of normally distributed residuals, using the Jarque-Bera test statistic (JB). This test is chi-squared distributed with two degrees of freedom and should always be lower than 5.99 to be significant at the five per cent level. For all regressions presented in this table the test results show that the hypothesis of normally distributed residuals can be accepted at the five per cent level of significance. The White test is applied to test for problems of heteroscedasticity of residuals. In almost all cases the hypothesis of no problems of heteroscedasticity could be accepted at the one per cent level of significance. This indicates that there might still remain some minor problems with respect to heteroscedasticity.

Table 3: Econometric Results of the Investment Equations: Pre- and Post Reform

	[1]	[2]	[3]	[4]
<i>all firms:</i>				
CF (-1) PRE	0.136 (3.58)			
CF (-1) POST	0.126 (3.22)			
<i>large firms:</i>				
CFLRG (-1) PRE		0.143 (2.80)		
CFLRG (-1) POST		0.144 (2.60)		
<i>small firms:</i>				
CFSML (-1) PRE		0.130 (2.39)		
CFSML (-1) POST		0.115 (2.58)		
<i>old firms:</i>				
CFOLD (-1) PRE			0.120 (2.91)	
CFOLD (-1) POST			0.093 (2.20)	
<i>young firms:</i>				
CFYNG (-1) PRE			0.197 (2.39)	
CFYNG (-1) POST			0.211 (3.24)	
<i>Grupo firms:</i>				
CFG (-1) PRE				0.109 (2.33)
CFG (-1) POST				0.133 (2.45)
<i>non-Grupo firms:</i>				
CFNG (-1) PRE				0.186 (3.00)
CFNG (-1) POST				0.123 (2.69)
TOBQ (-1)	0.059 (2.01)	0.057 (1.94)	0.062 (2.12)	0.059 (2.07)
DEBT (-1)	-0.043 (-1.58)	-0.043 (-1.52)	-0.045 (-1.60)	-0.042 (-1.49)
$\Delta$ SAL	0.211 (3.67)	0.212 (3.90)	0.062 (3.83)	0.213 (3.70)
GINV (-1)	0.306 (6.41)	0.307 (6.41)	0.301 (6.31)	0.301 (6.57)
R <sup>2</sup>	0.28	0.28	0.28	0.26
adj. R <sup>2</sup>	0.14	0.13	0.14	0.12
N	472	472	472	472

Notes: see table 2.

## **6. Summary and Conclusions**

This paper has investigated whether the financial reforms, which have been implemented in Chile during the first half of the 1980s, have contributed to reducing market imperfections in capital markets in the late 1980s and early 1990s. The outcomes of the econometric analysis have shown that the supportive evidence for the hypothesis that financial reforms have contributed to reducing market imperfections in capital markets is not very strong. The outcomes of estimations based on two out of three sub-samples do not show the expected drop of the coefficient of cash flow for informationally disadvantaged firms after the reforms had been implemented. In the case where firms have been divided according to their relatedness to a Grupo, however, is there a drop of the cash flow coefficient of non-Grupo firms, and do the coefficients of Grupo and non-Grupo firms converge, indicating a reduction of information problems in capital markets related to the issue of financial networks between firms and banks. The importance of such networks in mitigating information problems appears to have been diminished after the implementation of the reforms. Or, in other words, the apparent market segmentation in capital markets based on the relatedness to a Grupo has decreased in the second half of the 1980s. This lends support to the idea that those changes in regulation, which were introduced exactly to reduce the dominant role of Grupos in financial markets, - and implemented mainly during 1981-1982 - appear to have been effective.

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