Just Good Friends?
Relationship Banking and Access to Finance in New Zealand Firms

Philip Stevens
Ministry of Economic Development, New Zealand
Philip.Stevens@med.govt.nz

Abstract

In this paper we use information form the *Business Finance Survey* (BFS), matched to the prototype *Longitudinal Business Database* (LBD) to examine the issue of access to finance for New Zealand firms. The BFS was sponsored by the Ministry of Economic Development (MED) to provide information on the capital structure of businesses, the sources of finance they use and their recent financing experiences. In particular, it contains information on recent applications for debt and equity finance, the value of business assets being used as collateral for financing, and the length of the firm's relationship with its main bank or financial institution. One drawback of the BFS is that it presents only a snapshot. By linking it to the LBD we can examine the influence of firms' previous performance on the probability of applying for, and their success in obtaining, external finance. Moreover, we can use items from firms' financial accounts to examine the effective cost of borrowing over a longer period and for a dramatically larger sample of firms.

JEL Classification: C33, C35, D21, D82, G21
Keywords: access to finance, relationship banking, panel data

Acknowledgements: I would like to thank Richard Fabling, Arthur Grimes, Julia Gretton, Bryan Chapple, Gillian Lawrence, Jason Le Vaillant-Coates for helpful comments, although the usual caveats apply.

Disclaimer

The opinions, findings, recommendations and conclusions expressed in this report are those of the author(s). Statistics NZ and the Ministry of Economic Development take no responsibility for any omissions or errors in the information contained here.

Access to the data used in this study was provided by Statistics NZ in accordance with security and confidentiality provisions of the Statistics Act 1975. Only people authorised by the Statistics Act 1975 are allowed to see data about a particular, business or organisation. The results in this paper have been confidentialised to protect individual businesses from identification.

The results are based in part on tax data supplied by Inland Revenue to Statistics NZ under the Tax Administration Act 1994. This tax data must be used only for statistical purposes, and no individual information is published or disclosed in any other form, or provided back to Inland Revenue for administrative or regulatory purposes. Any person who had access to the unit-record data has certified that they have been shown, have read and have understood section 81 of the Tax Administration Act 1994, which relates to privacy and confidentiality. Any discussion of data limitations or weaknesses is not related to the data's ability to support Inland Revenue's core operational requirements.

1 Introduction

New Zealand's low labour productivity relative to its OECD peers has often been blamed on its 'capital shallowness' (Hall and Scobie, 2005; Grimes, 2007; Mason and Osborne, 2007)[1]. New Zealand also has a relatively large proportion of small to medium-sized enterprises in comparison to its OECD peers (Mills and Timmins, 2004; MED, 2005). Economic theory suggests that smaller firms will often find it tougher to obtain funds for expansion. Relationship-banking theories argue that small and particularly young firms are likely to find external finance more difficult. In part because of this, life-cycle models of the firm suggest that firms enter a 'valley of death' relatively early in their life when cash flow and hence internal funds are also dangerously short (Robertson, 2006). Expansionary strategies such as innovation and exporting generally require relatively large amounts of investment in the anticipation of uncertain returns. If New Zealand's smaller size means that firms need to begin exporting earlier in their lifetime and its distance from other economies places it on the periphery of the global innovation system, this may exacerbate the problem.

Whilst anecdotal evidence suggests that many firms in New Zealand face a problem accessing finance, evidence from the *Business Finance Survey* in 2004 found that of the 34% of firms that requested debt finance, 90% were successful (of the 6% that applied for equity finance, 83% were successful) (MED, 2005). One might take this as *prima facie* evidence that there is not an access to finance problem. However, it may be the case that (a) this is just a function of the phase of the economic cycle at which the survey was conducted; (b) firms are simply not applying for external debt (or indeed equity) finance and/or (c) the price paid for such finance (in terms of interest rates and/or collateral required) is too high.

At the heart of the relationship between firms and their potential financiers are the issues of asymmetric information and moral hazard. There are two types of information asymmetry, relating to the three players: the borrowing firm, the lending bank and other potential lenders. The firm knows its own 'type', i.e. its financial prospects. The other players do not. Thus, banks and firms need to build up a relationship in order to build up trust – i.e. for the bank to learn the firm's type. Banks will place a heavier burden on firms with which they have a shorter relationship, in the form of higher interest rates or collateral requirements. An alternative view has been suggested, that firms use the informational monopoly they acquire with longer relationships to expropriate higher rents – the so called 'holdup problem'. Such

[1] For an excellent recent overview of the development of New Zealand financial system and its effects, see Cameron *et al.* (2007).

equilibrium outcomes have been found to be unstable, but may be more likely in small economies with less well populated capital markets.

In this paper, we use information form the *Business Finance Survey* (BFS), matched to the prototype *Longitudinal Business Database* (LBD) to examine the issue of access to finance for New Zealand firms. The BFS was sponsored by the Ministry of Economic Development (MED) to provide information on the capital structure of businesses, the sources of finance they use and their recent financing experiences. In particular, it contains information on recent applications for debt and equity finance, the value of business assets being used as collateral for financing, and the length of the firm's relationship with its main bank or financial institution. One drawback of the BFS is that it presents only a snapshot. By linking it to the LBD we can examine the influence of firms' previous performance on the probability of applying for, and their success in obtaining, external finance. Moreover, we can use items from firms' financial accounts to examine the effective cost of borrowing over a longer period and for a dramatically larger sample of firms.

In the next section, we provide some background on modern theories of financial intermediation. Section 3 describes the models we estimate and section 4 the data we use. We present our results in section 5. Section 6 concludes.

2 Background

To understand why small firms are likely to have problems accessing finance, it is useful to start with the question of why banks exist in the first place or, rather, why banks need to act as intermediaries between those with capital (its depositors) and those in need of it (its borrowers). These are the sort of questions that trouble economists. Intermediaries usually exist because of information asymmetries. Either one side of the market has no knowledge of where it can find potential partners (banks as matchmakers[2]) or there is crucial information about one side of the market (in this case the financial prospects of potential borrowers) which the other side would like to know before it provides a match (agrees to loan funds).

Whilst the first of these roles is undoubtedly important for banks, as well as other sectors of the financial market (clubs of angel investors for example), it is the second of these which is deemed most important and has been the subject of most analysis in financial economics. Authors such as Leland and Pyle (1977), Diamond (1984), Ramakrishnan and Thakor (1984), Fama (1985) and Boyd and Prescott (1986) have argued that 'it is a banks

[2] What Greenbaum and Thakor (1995) call banks' 'brokerage function'

ability to reduce information asymmetries between borrowers and savers that makes a bank unique relative to other financial institutions' (Ongena and Smith, 1998; p. 6). To put it another way, 'the *raison d'être* of banks may well be their role in mitigating informational asymmetries' (Boot, 2000; p.8)[3]. This modern view of financial intermediation stands in contrast to the earlier view that was based on transaction costs (Boot, 2000, p.9; Benston and Smith, 1976).

2.1 Asymmetric Information

When thinking about firm finance issues, it is instructive to think about *four* types of players: the firm in search of funds to invest, its competitors, the lender and other potential lenders. Suppose the firm has an idea for a new product. It does not want to alert its competitors to its new idea or it will lose the competitive edge it hopes to gain. Because of this, a public offering is not an enticing prospect (Campbell, 1979; Bhattacharya and Chiesa, 1995; Yosha, 1995). Instead of looking to the public capital markets, the firm instead approaches a bank. What are the incentives of the bank? The bank is in competition with other banks. Thus, the bank has an incentive to keep this information (and any other it has on the firm) private. The privacy of the bank-firm, lender-borrower relationship is in principle beneficial to both parties.

When we introduce multiple time periods and different types of information, the issue becomes more complex.

First consider other types of information. The first is the quality of the staff and other general determinants of firm performance (firm capability). These are typically the things that econometricians suppose are represented in firm fixed-effects[4]. As such, a lender will (like a panel data analyst) improve the quality of their estimates of these (their understanding of these) the longer period over which they observe them. Thus, we would expect the quality of information the lender has of the borrower to increase with the length of the relationship. It will also increase with its *intensity* and its *scope*.

Greater depth or intensity of the relationship increases the quality of the information a lender has of a borrower. Thus lenders (not only banks, but also angel investors and VCs) will often insist on having a representative on the board or in the management of the firm. This serves two purposes – which can be thought of as the transfer of information into and out of the

[3] This is part of what Greenbaum and Thakor (1995) call 'qualitative asset transformation' (what Claus and Grimes (2003) call 'transforming the risk characteristics of assets'. Note that banks provide many other services as an intermediary, such as intertemporal risk sharing (Diamond and Dybvig, 1983; what Claus and Grimes, 2003, call 'provision of liquidity). For more on this see the above authors or Boot (2000).
[4] C.f. Mundlak (1961) or Bloom and Van Reenen (2007)

borrowing firm. First, it increases the firm's capability by introducing experienced managers that can improve systems, processes, organisational and strategic decision-making. The other benefit is that the lender has 'someone on the ground' that can observe first hand the quality and prospects of the firm generally and its investment in particular. This is part of the monitoring role of banks that has been the focus of many economists (e.g. Diamond, 1984).

Another determinant of the quality – in terms of information transfer – of the borrower-lender relationship is the *scope* of this relationship. A bank may supply other services to the firm. For example, it may offer chequing or deposit services. A key point made by Kane and Malkiel (1965) is that an incumbent bank gains an informational advantage over competitors by privately observing the payment behaviour of its depositors. This will provide useful information on sales, cash flow, profitability etc. which the bank can use to inform it about the firms prospects (Petersen and Rajan, 1994; Rajan, 1998).

The bank is also likely to offer more than one loan to the firm. In part this is because expansion opportunities are lumpy, in part because firm growth is evolutionary and path dependent. This allows the terms of the continuing lender-borrower relationship to be renegotiated. Such rules versus discretion situations (in this case, the choice between fixed and renegotiated terms of lending) are open to problems of moral hazard. The upside is that terms (e.g. covenants) can be renegotiated if the arrival of new information makes current terms sub-optimal (Boot, 2000; p.14). The downside is that the possibility of renegotion may blunt the incentives of firms to strive to pay back the loan ((Bolton and Scharfstein, 1996).

2.2 Relationship banking

We can see therefore that the issue of relationship banking is essentially one of information asymmetry. Investment is an inherently risky business. This is in part because *all* business is risky; the outcome of firms' activities is uncertain. Activities may fail to achieve the return envisaged because they have been badly designed, but also because of influences beyond the firm's control. The firm is likely to have more information on these than the lender, although however that this is not certain. Particularly in the early stages of its life, a firm may not be the best reader of its particular tea leaves. Firms often start because of particular ideas about which the owners/managers may know a great deal. However, they are often lacking in experience in the more general aspects of running a firm, such as marketing. Thus, early in the firm's life, a vital component of lending services is the business services-like assistance that comes with finance. A prime example of this is the venture capital industry. Venture capitalists often focus on very specific sectors or sub-sectors about which they have a deep understanding.

They also tend to insist on membership of the boards and other direct involvement to ensure the best information is available and the best decisions are made by the firm.

The other reason for the riskiness of lending, and the one that is the main focus of relationship banking theories, is that even if the firm is aware of how likely an activity is to achieve its intended outcomes and the value of these to the firm, it is difficult for a potential investor in the firm to obtain this information. When firms fund activities via capital markets, they typically have to make information public. As we noted above, this is something they may not wish to do, because it provides potentially useful information to competitors[5]. The one-to-one relationship a firm has with its bank, on the other hand, means that banks can be provided with this information. Banks have a financial as well as legal incentive to retain this information. The information allows the bank to better assess the firm's prospects. The bank may use this informational monopoly to extract a rent from the firm (e.g. Sharpe, 1990), or it can share some or all of the benefits of this information with the firm by reducing the risk premium it imposes. The general opinion of the literature on relationship banking is that the benefits of a banking relationship are increasing for the firm (and bank) in its length (this is discussed in more detail in the following section).

2.3 The costs and benefits of relationship banking

What are the implications of incomplete information for banking relationships? Relationship banking has both costs and benefits. Boot (2000) identifies four benefits of relationship banking.

1. Implicit long-term contracting:
   Relationship lending leaves room for flexibility and discretion in contracts that permits the utilisation of subtle, non-contractable information that the firm might not wish to disclose to the financial market and potential competitors (Bhattacharya and Chiesa, 1995)[6].
2. Better control of potential conflicts of interest:
   Back loan contracts can include covenants to help control potential conflicts of interests and reduce agency costs.

[5] Although note that according to the analysis of Boot and Thakor (1997), incomplete information about future is best resolved in the financial market, *ceteris paribus*.
[6] although this discretion may create a moral hazard problem for the borrowing firm and leave the bank open to other problems (see discussion of the costs of relationship banking below).

3. Collateral based lending and monitoring:

   Collateral may mitigate moral hazard, although only if its value is monitored. This monitoring itself may increase information to the firm (see section 2.4 below).

4. Intertemporal transfers in loan pricing:

   Banks may be willing to fund loans that are not profitable in the short run, but be so in the longer term if they facilitate the initiation of a lasting relationship.

Boot describes two primary costs of relationship banking:

1. The soft-budget constraint problem relates to the fact that the lending bank has an incentive to bail out a borrower on the verge of defaulting, that a new lender does not. This ability of borrowing firms to renegotiate contracts *ex post* is the other side of the discretion issue and may create perverse incentives *ex ante*. The fact that bank loans are often senior to other debt[7], however, will tend to lessen this effect.

2. The hold-up problem alluded to above is where the bank uses the monopoly power it gains from its inside information on the borrowing firm to impose 'holdup' costs. The general opinion of these are that they are unlikely to be prevalent (see Ongena and Smith, 1998; Boot, 2000). There are mechanisms whereby the ability to exploit monopoly power is reduced, such as accurate public signals of the firm's ability to pay (Sharpe, 1990). Moreover, repeated borrowing from a bank may increase the firm's reputation for payment ability, allowing for easier access to public markets (Diamond, 1991). The effect of competition between two 'inside banks' (i.e. the benefits of establishing more than one banking relationship) on such monopoly power is ambiguous. For example, there is likely to be a winner's curse suffered by any new lender that offers a lower interest rate at an interim stage of financing (Rajan, 1992; von Thadden, 1998). Moreover, whilst such competition might reduce monopoly rents in the current period, it may also reduce intertemporal sharing or rent surplus (Peterson and Rajan, 1995). Thus, 'credit market competition reduces the availability of credit to firms that benefit most from relationship lending' (Ongena and Smith, 1998)[8].

2.4 Collateral

One advantage of bank loan contracts is that they can easily accommodate collateral requirements. The theoretical literature suggests that collateral can mitigate moral hazard and

[7] Diamond (1993); Berglöf and Von Thadden (1994).
[8] For more on the 'holdup problem', see Ongena and Smith (1998) or Boot (2000).

adverse selection problems in loan contracting (Chan and Thakor, 1987; Stiglitz and Weiss, 1981; Boot and Thakor, 1994). Certainly, evidence suggests that secured loans tend to be riskier than unsecured loans, even after taking account of the value of the collateral (Berger and Udell, 1990). However, the effectiveness of collateral depends upon the ease with which its value can be monitored (see Rajan and Winton, 1995). Thus, an additional benefit of the use of collateral (e.g. inventories and accounts receivable) is that it may reveal information about the business that is valuable to the bank (Boot, 2000).

2.5 Market capital

We have seen that there are a number of reasons why firms may prefer (or have to settle for) bank rather than public financing, particularly for small, young, 'informationally opaque' (Berger and Udell, 1998) firms. Who tends to use market capital? The model of Bougheas, Mizen and Yalcin (2006) predicts that larger firms are more likely to finance their projects with funds raised in the capital market. Firms are more likely to finance investments by raising funds in the capital market rather than with bank loans when (a) the level of existing debt is low, (b) the level of collateral is high, (c) the level of risk is low, (d) the level of future profitability is high, and (e) the level of economic activity is high.

3 Models

Because of the different data we have at our disposal, we estimate a number of models to investigate access to finance[9].

3.1 The length of banking relationship

We have seen that an important influence on the relationship between lending bank and borrowing firm is its length. Thus, the first relationship we investigate is the length of banking relationship between the firm and its main bank or financial institution.

The observed length of the banking relationship for firm i at time t is given by

$$(1) \qquad \begin{aligned} R_{it} = {} & \alpha_0 + \alpha_{11} Age_{it} + \alpha_{12} Age_{it}^2 \alpha_{21} A_{it-1} + \alpha_{22} A_{it-2} + \alpha_{31} S_{it-1} + \alpha_{32} S_{it-2} \\ & + \alpha_{41} \Pi_{it-1} + \alpha_{42} \Pi_{it-2} + \alpha_{51} C_{it-1} + \alpha_{52} C_{it-2} + \alpha_{61} Lev_{it-1} + \alpha_{62} Lev_{it-2} + \varepsilon_{1it} \end{aligned}$$

where R = length of banking relationship, Age = age of firm, A = (the log) assets, S = (the log of) sales, Π = profitability, C = cash flow, Lev = is leverage (debt divided by debt plus equity),

[9] Note that because the BFS is a stratified survey, we account for this structure by estimating all models using the BFS sample using the `svy:` commands in Stata to account for stratification and weighting.

ε is the error term. Assets, A, are a scale variable and are given by total assets from the IR10 accounts return (as does the rest of the financial data). Sales, S, are given by the sales of goods and services. Profitability, Π, is given by total taxable profits normalised by the value of total assets (T/A). Cash-flow, C, is calculated as net profits plus depreciation expenses, $(1-t)T+D$, where t is set at 33%. Leverage, *Lev*, is calculated as debt divided by debt plus equity (what is sometimes called the debt-to-value ratio), where equity is calculated as total proprietor or shareholder funds less drawings taken from the business by the proprietors and/or shareholders during the year and the closing balances of all proprietor and shareholder current accounts. For more details on the variables, see section 4 and the data appendix to this paper.

Current values of the financial variables are likely to be endogenous in (1) (and indeed our other models). Therefore, we use lagged values in our estimation, i.e. outcomes depend upon previous financial performance. We use two-lags of financial data to account for complex dynamics or their operation over time lags of over a year. However, there are two reasons why this is likely to reduce our sample size. First, our sample has many young firms (the minimum age of firms is six months). This may be exacerbated by the fact that our sample excludes very large firms (i.e. with more than 500 employees).

Unfortunately, the length of the firm's banking relationship was not collected as a continuous variable. In response to the question 'How many years has this business dealt with its main bank or financial institution?' (Q32), respondents to the *Business Finance Survey* are given four choices: 'less than 1 year', '1 to 3 years', '4 to 10 years' or 'more than 10 years'. Because of this we estimate (1) using an ordered probit.

One final issue to note is that our variable for relationship length – as indeed those used in other analyses of the length of banking relationships, e.g. Ongena and Smith (2001) – is not the completed length of banking relationship, i.e. there is right censoring. Ongena and Smith (2001) analyse a panel dataset of Norwegian firms and their banks. They find that censoring affects around three quarters of their observations. In their survival analysis, they apply a correction for right censoring and find that this almost doubles the estimated likelihood of a relationship surviving beyond the beginning of its fifth year. It also increases the chance of surviving past the beginning of the 16th year from 6.2% to 54%. Thus our measure of the length of the banking relationship is likely to underestimate the completed duration.

The length of banking relationship is a key explanatory variable in our estimation of other relationships, but is of course endogenous. Because of this we use the predicted values obtained from our ordered probit estimation on lagged financial variables (1).

3.2 The probability of applying for debt and equity

The next question is whether firms with longer banking relationships are more likely to request debt and/or equity. If the firm expects its applications to be more likely accepted the longer the relationship, one would expect a positive relationship between relationship length and the probability of applying for debt, *ceteris paribus*. Moreover, a long-lasting banking relationship may reveal something about the firm. It may act as a signal of firm quality/prospects to other potential investors (Diamond, 1991).

There are two ways to consider who applies for debt and/or equity. The first is to consider them as two separate, but correlated decisions. We do that in this section. The alternative is to consider the choice as one between debt and equity, (with joint funding somewhere in the middle), which we do in the following section.

In order to estimate the probability of applying for debt and equity we estimate (ignoring firm *i* subscripts):

$$\begin{aligned}(2)\qquad \Pr(Debt=1) = {} & \beta_0 + \beta_1 age_t + \beta_{21} ACol_{t-1} + \beta_{22} ACol_{t-2} + \beta_{31} \Pi_{t-1} + \beta_{32} \Pi_{t-2} \\ & + \beta_{41} CF_{t-1} + \beta_{42} CF_{t-2} + \beta_5 relation_t + \beta_{61} Lev_{it-1} + \beta_{62} Lev_{it-2} + \varepsilon_2 \end{aligned}, \quad \text{and}$$

$$\begin{aligned}(3)\qquad \Pr(Equity=1) = {} & \phi_0 + \phi_1 age_t + \phi_{21} ACol_{t-1} + \phi_{22} ACol_{t-2} + \phi_{31} \Pi_{t-1} + \phi_{32} \Pi_{t-2} \\ & + \phi_{41} CF_{t-1} + \phi_{42} CF_{t-2} + \phi_5 relation_t + \phi_{61} Lev_{it-1} + \phi_{62} Lev_{it-2} + \varepsilon_3 \end{aligned}$$

In order to account for any correlation, we estimate (2) and (3) as a seemingly unrelated system (Weesie, 1999). The sign of the coefficient on the length of relationship in (2) is ambiguous. If firms expect it to be easier to get funds from their bank the longer their relationship, we would expect β_5 to be positive. However, if they expect the bank to exploit their relationship or use the length of their banking relationship as a signal of their 'quality' on the public capital markets, we would expect it to be negative. Holding the length of the banking relationship constant, the expected sign on the coefficient β_1 is negative, since the older a firm is, the more likely it is to have build up a reputation which can be used on the public capital markets. However, it is likely that the two will be too highly correlated to distinguish their effects (see discussion below in sections 4 and 5). We would expect highly leveraged firms to be more likely to be reliant on bank finance (i.e. $\beta_6>1$, $\phi_6<1$). More profitable firms and those with higher cash flow will be able to rely on internal funds for expansion. However, either of these may be used as signals of firm-quality.

3.3 The choice between equity and debt

We combine three questions – whether they applied for debt, whether they applied for equity and if they applied for both, in which order they did so – to create a variable that we call the propensity for debt versus equity. In the BFS there are firms are asked the following questions: 'In the last 12 months, did the business request any new or additional debt finance?' 'In the last 12 months, did the business request any new or additional equity finance?' and for firms that requested both debt and equity finance in last 12 months a subsequent question, 'Which finance request was made first?' This final question has three response categories, debt first, equity first, or both at the same time. From this we can create a variable relating to 'the propensity to fund through debt/equity' or 'finance choice'. This categorical variable (*prop4debt*) is as follows:

1. Debt finance only
2. Both debt and equity, but debt first
3. Both debt and equity at the same time
4. Both debt and equity, but equity first
5. Equity only

We estimate the following ordered probit

$$prop4debt = \varphi_0 + \varphi_1 Age_t + \varphi_{21} ACol_{t-1} + \varphi_{22} ACol_{t-2} + \varphi_{31} \Pi_{t-1} + \varphi_{32} \Pi_{t-2} + \varphi_{41} CF_{t-1} + \varphi_{42} CF_{t-2} + \varphi_5 relation_t + \varphi_{61} Lev_{it-1} + \varphi_{62} Lev_{it-2} + \varepsilon_4 \quad (4)$$

3.4 The cost of borrowing – collateral requirement

There two ways in which banks may vary the cost of borrowing for firms. They may explicitly charge higher interest rates on debt or they may require firms to post higher levels of collateral. In the following section, we will consider relative interest costs. For now, we focus on collateral. The BFS collected information on the business and personal assets used as collateral for financing. We estimate a Heckman selection model of the determinants of requited collateral (Heckman, 1976):

$$Coll = \delta_0 + \delta_1 A_{t-1} + \delta_2 \Pi_{t-1} + \delta_3 Q_{t-1} + \delta_4 S_{t-1} + \delta_5 relation_t + \delta_6 Lev_{it-1} + \varepsilon_5 \quad (5)$$

$$\Pr(select = 1) = \gamma_0 + \gamma_1 A_{t-1} + \gamma_2 \Pi_{t-1} + \gamma_3 S_{t-1} + \gamma_4 relation_t + \gamma_5 Lev_{it-1} + \gamma_6 CF_{t-1} + \gamma_7 Emp_{t-1} + \gamma_8 debenture_t + \varepsilon_6 \quad (6)$$

where Corr(ε_5, ε_6)=ρ. We estimate the Heckman model for both business and personal assets as a pair of seemingly-unrelated regressions. We also do this for total assets. We estimate these models using the level of required assets in dollars and relative to total assets.

3.5 The cost of borrowing – interest costs

For this model, we depart from the Business Finance Survey and concentrate solely on information from the rest of the LBD, in particular the financial accounts (IRD form IR10). This allows us to considerably expand the focus of our analysis. We now have at our disposal all forms that submitted an IR10 form between 2006 and 2006.

$$i = \frac{I}{L} = \psi_0 + \psi_{11}A_{t-1} + \psi_{12}A_{t-2} + \psi_{21}\Pi_{t-1} + \psi_{22}\Pi_{t-2} + \psi_{31}CF_{t-1} + \psi_{32}CF_{t-2} + \psi_{41}S_{t-1} + \psi_{42}S_{t-2} + \psi_{51}Lev_{it-1} + \psi_{52}Lev_{it-2} + \sum_k \psi_{6k}t_k + \varepsilon_7 \quad (7)$$

where I = interest expenses, L = liabilities, and t is a set of k time dummies. We calculate L in two ways. First, we simply use the sum of accounts payable, bank account liabilities, other current liabilities and term liabilities in a given year. However, because the interest costs I are the sum of interest costs over the year and current liabilities refer to the year end only, this may not give us a very good measure of interest-baring liabilities. For example, there are firms that have no liabilities at year end, but incurred interest expenses over the year servicing liabilities that are now paid up. Because of this, we take an average of opening and closing (or rather this year's and last year's closing) liabilities, i.e. we calculate[10]

$$\overline{L_t} = \frac{L_t}{L_{t-1}}. \quad (8)$$

In what follows we refer to i as 'relative interest costs'. This is not of course the effective interest rate, since we no nothing of the term length structure of the liabilities. We do know the proportion that is made up of loans, mortgages that extend over more than a 12-month term from the balance date of the accounts, but no more than this.

We estimate (7) on the BFS sample, a panel of firms in the BFS and for the whole of the LBD (where we have data).

[10] I thank Richard Fabling for this suggestion

4 Data

The firm data we use for our analysis comes from the prototype Longitudinal Business Database (LBD). The LBD contains data for financial years 2000 to 2006 from a number of sources. The spine of the LBD is the Longitudinal Business Frame (LBF), to which are attached Goods and Services Tax (GST), financial returns (IR10) and aggregated Pay-As-You-Earn (PAYE) returns provided by the Inland Revenue Department (IRD). All data is annualised to firms' actual balance date, and then assigned to the closest year ending 31st March. The data are described in more detail in the data appendix and in Fabling *et al.* (2008).

The *Business Finance Survey* (BFS) was sponsored by the Ministry of Economic Development (MED) to provide information on the capital structure of businesses in New Zealand, the sources of finance they use and their recent financing experiences. The survey population was created from live enterprise units on Statistics New Zealand's Business Frame at the population selection date which:

- were economically significant enterprises (those with an annual GST turnover figure greater than $30,000)
- had between 1 and 500 employees
- had been operating for six months or more
- were not subsidiaries, more than 50 percent owned by another business
- were classified to Australian and New Zealand Standard Industrial Classification – NZ Version 1996 (ANZSIC96) codes listed as in scope as set out in the data appendix.
- were private enterprises as defined by New Zealand Institutional Sector 1996 Classification (NZISC96) 1111 or 1121.
- were classified to New Zealand Standard Classification of Business Types (BT96) codes 1-5, 13 or 20.

Age is taken from the Longitudinal Business Frame, with updates where we observe firms before their date of birth. Ideally we would like to have information on the age of the firm *prior* to the beginning of its current relationship (as in Ongea and Smith, 2006) to allow us to distinguish the true effect of a firm's age on outcomes from the effect of the length of banking relationship. For more on the other variables see the data appendix to this paper.

5 Results

5.1 Length of Banking Relationship

The results of our estimation of the ordered probit model of the length of banking relationship are presented in Table 1[11]. In the first three columns, we present results from using two lags of data. However, since this reduces our sample size by around a third, we also present results using only one lag of data.

Column (1) is our general specification. The length of banking relationship is increasing in age at a slightly decreasing rate[12]. This is true across all of the specifications. The assets of a firm have no explanatory power, but sales do. Larger firms, in terms of (log) sales, of a given age tend to have longer banking relationships than smaller firms. This sales effect appears to operate at two lags, as does the impact of profitability (although the coefficient on $Prof_{t-2}$ is only significant at the 10% level in (2) and (3)).

Column (2) repeats the analysis of (1), but drops the assets variables (note that merely dropping either one of the two lags of assets does not result in the remaining variable becoming significant). This exclusion of the *Assets* variables increases the significance of the $Prof_{t-2}$ variable (although it doesn't become significant at the 5% level). In column (3) we include an additional firm performance variable, (log) labour productivity (LP). This is to see if it is the determinants of firm performance (e.g. the quality of management) rather than the signalling or cash-flow benefits of high profitability that influence the length of banking relationship[13]. The labour productivity variables are not significant. It does reduce the significance of the coefficient on sales, whereas the impact on the profitability coefficient is to increase its size and significance. Because of this our preferred two-lag specification is (2) and we shall be using the predicted values of this specification in our later analysis.

[11] Note that we experimented with the inclusion of industry dummies, but these were insignificant.
[12] Note that a firm would need to be a hundred years old for the impact of age on relationship to be negative.
[13] Good managers may see the value of a lasting banking relationship (if indeed there is one) as well as make the firm perform well more generally.

Table 1 Ordered Probit of length of relationship

	(1) Two-lags	(2) Two-lags, no assets or leverage	(3) Two-lags, ln LP	(4) One-lag	(5) One-lag, no Assets or leverage	(6) One-lag, ln LP
Age	0.107***	0.104***	0.104***	0.119***	0.118***	0.120***
	(0.011)	(0.011)	(0.011)	(0.010)	(0.010)	(0.010)
Age^2	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
A_{t-1}	-0.033			-0.052		-0.059
	(0.094)			(0.038)		(0.040)
A_{t-2}	-0.072					
	(0.093)					
S_{t-1}	0.004	-0.044	-0.051	0.093**	0.056**	0.083*
	(0.084)	(0.075)	(0.101)	(0.039)	(0.029)	(0.043)
S_{t-2}	0.130**	0.103*	0.085			
	(0.064)	(0.062)	(0.091)			
Π_{t-1}	-0.027	-0.003	-0.014	0.050	0.066	0.046
	(0.055)	(0.049)	(0.048)	(0.049)	(0.048)	(0.051)
Π_{t-2}	0.130	0.155*	0.160*			
	(0.089)	(0.084)	(0.083)			
Lev_{t-1}	-0.004			-0.003		
	(0.004)			(0.003)		
Lev_{t-2}	0.003					
	(0.004)					
LP_{t-1}			0.075			0.048
			(0.112)			(0.052)
LP_{t-2}			0.005			
			(0.109)			
Cut 1	-0.821	-0.537	-0.746*	-0.595	0.027	-0.426
	0.486	0.480	0.369	0.353	0.715	0.506
Cut 2	0.292	0.573	0.706	0.858*	1.120	1.017*
	0.493	0.481	0.380	0.359	0.710	0.516
Cut 3	1.707***	1.980***	1.919***	2.067***	2.511***	2.233***
	0.507	0.494	0.392	0.372	0.718	0.526
Observations	1,725	1,730	1,685	2,505	2,510	2,480
F test	12.636	20.343	14.508	27.495	40.840	27.154
Prob >*F*	0.000	0.000	0.000	0.000	0.000	0.000

- *Standard errors in parentheses*
- * *significant at 10%;* ** *significant at 5%;* *** *significant at 1%*
- *Weighted and stratified*
- *Number of observations rounded to nearest five for confidentiality reasons*

Columns (4), (5) and (6) repeat the analysis of (1), (2) and (3), but use only the first lags of explanatory variables. As we have noted above, this increases our number of observations by one half. The results are essentially the same. Firms with higher sales and those that are more profitable tend to have longer banking relationships. As with the analysis using two lags, the coefficients on assets and labour productivity are insignificant, although the coefficient on

profitability is no-longer significant. Thus our preferred specification is (5) and we shall be using the predicted values of this specification in our later analysis.

Our result that firms with higher sales tend to have longer banking relationships contradicts those of Ongena and Smith (2001). One reason for this might be misspecification due to the right censoring in the data. However, Ongena and Smith's (2001) results without accounting for right censoring also show negative coefficient on ln sales. Our positive, but of variable significance, coefficient on profitability is similar to Ongena and Smith, but our lack of any statistically significant relationship between leverage and is at odds with their results. It is not clear how much institutional differences explain the difference in results. Ongena and Smith describe the Norwegian system as being one where 90% of commercial credit is supplied by banks. It is difficult to obtain an equivalent figure for New Zealand. However, according to the BFS, banks were a source of debt for 78% of businesses. Finance companies (including hire purchase or lending companies) were the next most common source and were used by 27% of businesses (*Business Finance in New Zealand 2004*).

5.2 Probability of requesting debt and/or equity

Are firms in long banking relationships more likely to apply for debt or equity finance? The results of our estimation of a seemingly unrelated system of equations for the probability of requesting debt and/or equity are presented in Table 2. (Note that because of the number of rows, the table spreads onto two pages.) In the top half of the table we present the results for the probability of requesting debt and in the bottom those for the probability of requesting equity.

The first three columns of Table 2 relate to the specifications including two-lags of explanatory variables, the second three columns one lag. In column (1) and (4), the coefficients on age are all insignificant as are those for the predicted value of length of banking relationship in the probability of requesting debt equation. Because of our inability to distinguish between impact of the age of the firm and the length of its relationship on the probability of requesting debt or activity, we drop the age variable. Once the age variable is removed, we find no relationship between relationship length and the likelihood of requesting debt, but statistically significant negative effect of relationship length on the propensity for equity. The financial intermediation theory outlined above suggests that firms would use long banking relationships as signals of reliability which they could exploit on the capital markets – thus we might expect a reduction in debt and an increase in equity. However, note also that more profitable firms are less likely to request both debt and equity. Theory lead one to expect profit to be a good signal

of reliability to both bank and capital market. Alternatively, it may be the case that more profitable firms find it easier to fund expansion internally; they are also less likely to need funds to tide them over during bad times. However, the coefficients on the cash flow terms are not very supportive of these. We can find no relationship between cash flow and the likelihood of requesting new equity, but we find a significant *positive* relationship with requesting new debt. We must bear in mind that there are at least there are two reasons, why we might not be picking up the impact of cash flow. One is the potential correlation between profitability and cash flow (although note that the first is a ratio). The second potential explanation is the fact that the taxable profit measure used to calculate cash flow may not be a true indication of available cash (Fabling, Grimes and Stevens, 2008).

Table 2 Requested Debt and/or equity, Seemingly unrelated regression

	(1) Two-lags	(2) Two-lags, no age	(3) Two-lags, no age, LP	(4) One-lag	(5) One lag, no age	(6) One-lag, no age, LP
Probability of requesting debt						
$AColl_{t-1}$	-0.476	-0.475	-0.583	-0.376	-0.377	-0.463*
	(0.590)	(0.590)	(0.591)	(0.244)	(0.244)	(0.246)
$AColl_{t-2}$	0.422	0.421	0.342			
	(0.635)	(0.635)	(0.630)			
Π_{t-1}	-0.220***	-0.220***	-0.226***	-0.126***	-0.123***	-0.138***
	(0.073)	(0.073)	(0.075)	(0.044)	(0.044)	(0.046)
Π_{t-2}	0.010	0.008	0.009			
	(0.040)	(0.036)	(0.037)			
Lev_{t-1}	-0.006	-0.006	-0.006	-0.004	-0.004	-0.006
	(0.004)	(0.004)	(0.005)	(0.003)	(0.003)	(0.004)
Lev_{t-2}	0.002	0.002	0.001			
	(0.004)	(0.004)	(0.004)			
CF_{t-1}	-0.015	-0.015	-0.060	0.208*	0.208*	0.094
	(0.109)	(0.110)	(0.093)	(0.117)	(0.117)	(0.077)
CF_{t-2}	0.467**	0.468**	0.415*			
	(0.225)	(0.228)	(0.217)			
Age	0.001			-0.003		
	(0.008)			(0.007)		
relation2	-0.076	-0.065	-0.033			
	(0.132)	(0.080)	(0.080)			
relation1				0.034	-0.001	-0.020
				(0.103)	(0.058)	(0.058)
LP_{t-1}			0.318***			0.167***
			(0.117)			(0.053)
LP_{t-2}			-0.174			
			(0.106)			
Constant	-0.248	-0.258	-1.720**	-0.097	-0.065	-1.747***
	(0.352)	(0.338)	(0.850)	(0.245)	(0.234)	(0.592)

	(1) Two-lags	(2) Two-lags, no age	(3) Two-lags, no age, LP	(4) One-lag	(5) One lag, no age	(6) One-lag, no age, LP
Probability of requesting equity						
$AColl_{t-1}$	-0.621	-0.624	-0.650	0.393	0.391	0.397
	(0.758)	(0.751)	(0.721)	(0.362)	(0.361)	(0.362)
$AColl_{t-2}$	1.322*	1.313*	1.297*			
	(0.773)	(0.766)	(0.736)			
Π_{t-1}	-0.239***	-0.239***	-0.248***	-0.167***	-0.155***	-0.160**
	(0.084)	(0.083)	(0.086)	(0.062)	(0.060)	(0.062)
Π_{t-2}	0.023	0.053*	0.063			
	(0.054)	(0.031)	(0.046)			
Lev_{t-1}	-0.003	-0.003	-0.004	-0.004	-0.004	-0.005
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Lev_{t-2}	0.001	0.001	0.001			
	(0.002)	(0.002)	(0.002)			
CF_{t-1}	-0.745	-0.725	-0.980	-0.299	-0.287	-0.332
	(0.740)	(0.733)	(0.815)	(0.257)	(0.251)	(0.273)
CF_{t-2}	0.301	0.328	0.592			
	(0.731)	(0.733)	(0.615)			
Age	-0.014			-0.014		
	(0.017)			(0.013)		
relation2	-0.128	-0.316**	-0.277**			
	(0.311)	(0.142)	(0.134)			
relation1				-0.150	-0.308***	-0.311***
				(0.195)	(0.095)	(0.097)
LP_{t-1}			0.260			0.025
			(0.210)			(0.086)
LP_{t-2}			-0.261			
			(0.163)			
Constant	-1.960***	-1.795***	-1.831	-1.630***	-1.500***	-1.759*
	(0.528)	(0.471)	(1.189)	(0.376)	(0.332)	(0.951)
Observations	1,995	1,995	1,945	2,965	2,965	2,930

- *Standard errors in parentheses*
- ** significant at 10%; ** significant at 5%; *** significant at 1%*
- *Weighted and stratified*
- *Number of observations rounded to nearest five for confidentiality reasons*

5.3 Propensity for Equity

The above results are supported by the estimate from our ordered probit model of the propensity for equity. Again, more profitable firms and those with longer banking relationships tend to prefer new debt to equity. In the models with two lags of explanatory variables, there appears to be a positive relationship between the second lag of available collateral and the propensity for equity (although this is only significant at the 10% level[14]).

[14] and the first lag is not significant in either of the sets of results (i.e. using two or one lag of data).

Table 3 Propensity for equity

	(1) 2 lags	(2) 2 lags, age	(3) 1 lag	(4) 1 lag, age
$AColl_{t-1}$	0.429	0.589	0.741*	0.646
	(0.737)	(0.757)	(0.418)	(0.409)
$AColl_{t-2}$	0.277	0.045		
	(0.710)	(0.715)		
Π_{t-1}	-0.317*	-0.303*	-0.248**	-0.271**
	(0.163)	(0.161)	(0.111)	(0.111)
Π_{t-2}	0.164	0.033		
	(0.147)	(0.118)		
Lev_{t-1}	0.000	0.000	0.000	-0.000
	(0.006)	(0.006)	(0.006)	(0.006)
Lev_{t-2}	-0.001	-0.003		
	(0.012)	(0.012)		
CF_{t-1}	-0.762	-0.827	-0.590*	-0.680**
	(0.639)	(0.626)	(0.325)	(0.322)
CF_{t-2}	-0.160	-0.093		
	(0.716)	(0.713)		
relation2	-0.399**			
	(0.166)			
relation1			-0.418***	
			(0.117)	
Age		-0.029**		-0.032***
		(0.013)		(0.010)
Observations	753	782	1,153	1,185
F-test	1.76	1.67	5.79	4.84
p	0.07	0.09	0.00	0.00

- *Standard errors in parentheses*
- ** significant at 10%; ** significant at 5%; *** significant at 1%*
- *Weighted and stratified*
- *Number of observations rounded to nearest five for confidentiality reasons*

5.4 Collateral requirements

We now turn to the cost of debt in terms of the collateral required by lenders. In Table 4 we present the estimates the Heckman selection model of the amount of business and personal assets required as a two equation system of seemingly unrelated regressions. Model (1) considers these measured in terms of their dollar value. Model (2) considers them as a proportion of assets.

Table 4 Collateral required

	(1) Level		(2) Collateral as proportion of assets	
	Business	Personal	Business	Personal
A_{t-1}	0.807***	0.135*	-0.000	-0.003***
	(0.100)	(0.080)	(0.000)	(0.001)
Π_{t-1}	-0.077	-0.125**	0.003	0.002***
	(0.238)	(0.064)	(0.002)	(0.001)
Lev_{t-1}	-0.001	0.000	-0.000	0.000
	(0.008)	(0.000)	(0.000)	(0.000)
S_{t-1}	-0.053	0.003	-0.000**	0.000
	(0.074)	(0.097)	(0.000)	(0.000)
relation1	0.156	0.160	-0.000	-0.000
	(0.118)	(0.162)	(0.000)	(0.000)
Constant	-4.647***	6.058***	0.007*	0.032***
	(1.299)	(0.951)	(0.004)	(0.008)
Selection Equation				
A_{t-1}	0.307***	0.021	0.320***	0.053
	(0.062)	(0.035)	(0.061)	(0.036)
Π_{t-1}	0.013	0.100***	0.070	0.159***
	(0.111)	(0.037)	(0.077)	(0.053)
Lev_{t-1}	-0.001	0.001	0.003**	-0.002
	(0.002)	(0.002)	(0.001)	(0.002)
S_{t-1}	-0.089*	0.052	-0.078	0.072*
	(0.051)	(0.043)	(0.051)	(0.043)
relation1	-0.080	-0.091	-0.025	-0.019
	(0.063)	(0.064)	(0.056)	(0.058)
CF_{t-1}	-0.173	-0.337**	-0.159*	-0.510***
	(0.144)	(0.151)	(0.093)	(0.180)
emp	0.001	0.001	-0.000	-0.005**
	(0.002)	(0.001)	(0.001)	(0.002)
debenture	8.531***	0.180**	2.009***	0.534***
	(0.799)	(0.073)	(0.091)	(0.123)
Constant	-3.414***	-1.459***	-3.861***	-2.200***
	(0.515)	(0.359)	(0.501)	(0.401)
athrho	0.060	-2.116***	0.005	-0.011
	(0.234)	(0.202)	(0.045)	(0.012)
lnsigma	0.231***	0.697***	-5.389***	-3.800***
	(0.051)	(0.136)	(0.256)	(0.470)
Observations	2,985		2,865	

- *Standard errors in parentheses*
- * *significant at 10%;* ** *significant at 5%;* *** *significant at 1%*
- *Weighted and stratified*
- *Number of observations rounded to nearest five for confidentiality reasons*

It is only in the case of the level of personal collateral required where the correlation between the error term in the selection equation and the regression equation is statistically significant. In this case the calculated value for ρ is 0.971 (=tanh(-2.116)). The more assets a

firm has, the more collateral it is required to post. However, the results from (2) suggest that the amount of proportion of personal assets required as collateral drops (there is no such relationship for business assets). More profitable firms have to post a lesser amount of personal assets (although, interestingly, a greater amount as a proportion of total assets). There is no significant relationship between profitability and business assets required as collateral. More highly leveraged firms are not required to post more collateral of either kind. Contrary to theory and the results of Berger and Udell (1995), we find no relationship between length of relationship and the amount of collateral required.

5.5 Determinants of interest costs

The results of our estimation of the determinants of interest costs for the BFS sample are set out in Table 5. Columns (1) and (3) present results when the cost is calculated over the current year's debt liabilities. Columns (2) and (4) presents results using the average of the current and previous year's debt liabilities. When we estimate the model using two lags of explanatory variables, both measures of the relative interest cost produce similar results. None of the explanatory variables have coefficients that are statistically significant. When we extend the sample by reducing the number of lags to one we find two significant correlates with the relative interest costs. The more assets a firm has, the higher the interest cost it pays. The higher sales the lower interest costs. These may be due to either the different structure of debt or the lower interest rates such firms pay. Sales may be acting as a barometer of potential success[15] – firms with high sales in the previous period may be seen as a lower risk to lenders. Quite why firms with more assets pay higher interest rates is uncertain. Berger and Udell (1995), for example find a negative, but insignificant relationship between assets and the premium of the interest rate charged over the prime rate for loans issued under lines of credit. Leverage is insignificant in all our models. This is consistent with the results of Berger and Udell (1995). Unlike Berger and Udell (1995), however, we also find no statistically significant negative relationship between length of relationship and the amount of collateral required.

[15] in an earlier version of the analysis, it was lagged profitability rather than sales that had a statistically significant negative coefficient

Table 5 The determinants of relative interest costs

	(1) Two-lags, one year's liabilities	(2) Two-lags, two-years' liabilities	(3) One-lag, one-year's liabilities	(4) One-lag, two-years' liabilities
Age	0.050	0.041	0.033	0.032
	(0.054)	(0.048)	(0.050)	(0.044)
A_{t-1}	0.210	0.111	0.380**	0.270**
	(0.358)	(0.332)	(0.180)	(0.130)
A_{t-2}	0.203	0.120		
	(0.321)	(0.338)		
Π_{t-1}	-0.280	-0.234	0.046	-0.107
	(0.205)	(0.145)	(0.179)	(0.118)
Π_{t-2}	0.644	-0.093		
	(0.800)	(0.305)		
S_{t-1}	-0.413	-0.340	-0.355**	-0.247*
	(0.300)	(0.327)	(0.165)	(0.149)
S_{t-2}	-0.003	0.096		
	(0.306)	(0.309)		
CF_{t-1}	0.003	-0.044	-0.184	0.203
	(0.423)	(0.369)	(0.280)	(0.310)
CF_{t-2}	-0.223	0.340		
	(1.005)	(0.918)		
Lev_{t-1}	-0.017	-0.015		
	(0.016)	(0.018)		
Lev_{t-2}	-0.005	-0.005		
	(0.006)	(0.007)		
relation2	-0.560	-0.390		
	(0.784)	(0.702)		
relation1			-0.191	-0.049
			(0.629)	(0.560)
Constant	4.994**	4.804**	4.018**	3.701**
	(2.197)	(2.118)	(1.928)	(1.578)
Observations	1,710	1,725	2,480	2,500
R^2	0.018	0.015	0.011	0.011

- *Standard errors in parentheses*
- ** significant at 10%; ** significant at 5%; *** significant at 1%*
- *Weighted and stratified*
- *Number of observations rounded to nearest five for confidentiality reasons*

The results of our fixed-effect panel estimation of the determinants of interest costs are set out in Table 6. Note the number of firms we can match to financial data goes up (in particular because we now have lagged data for many of the younger firms). Firms with higher assets tend to have higher interest costs relative to current debt, although this result disappears when we consider the average of two years debt. The only statistically significant result that is consistent across specifications we have is the positive coefficient on cash flow (which is significant at the 10% level when we use one years liabilities and 5% level when we use two).

Table 6 The determinants of relative interest costs, FE panel estimates

	(1) Two-lags, one year's liabilities	(2) Two-lags, two years' liabilities	(3) One-lag, one year's liabilities	(4) One-lag, two years' liabilities
A_{t-1}	0.674***	-0.036	0.501***	-0.070
	(0.125)	(0.105)	(0.082)	(0.073)
A_{t-2}	0.012	0.002		
	(0.115)	(0.098)		
Π_{t-1}	-0.025	-0.005	-0.053	-0.027
	(0.048)	(0.042)	(0.032)	(0.030)
Π_{t-2}	0.011	0.020		
	(0.050)	(0.043)		
S_{t-1}	0.120	0.136	0.097	0.125**
	(0.132)	(0.109)	(0.066)	(0.058)
S_{t-2}	-0.087	-0.098		
	(0.087)	(0.074)		
CF_{t-1}	0.161*	0.176**	0.108*	0.134**
	(0.087)	(0.075)	(0.057)	(0.052)
CF_{t-2}	0.003	0.004		
	(0.079)	(0.068)		
Lev_{t-1}	-0.001	-0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Lev_{t-2}	-0.000	-0.000		
	(0.001)	(0.001)		
Constant	151.5	-46.1	237.3***	180.4**
	(131.924)	(113.145)	(77.342)	(70.254)
Observations	8585	8730	12730	12920
Number of firms	3,115	3,150	3,795	3,815
R^2	0.010	0.004	0.010	0.003
F test	4.069	1.413	8.614	2.954

- *Standard errors in parentheses*
- * *significant at 10%;* ** *significant at 5%;* *** *significant at 1%*
- *Number of observations and number of firms (n) rounded to nearest five for confidentiality reasons*
- *All equations include time trend and time dummies*

The positive correlation between assets and relative interest costs is confirmed when we expand the sample to include all firms. It becomes highly significant for all specifications and for the second lag in columns (1) and (2).

We also find a statistically significant positive effect of profitability, although the impact is very small. Firms with higher sales also tend to have *higher* interest costs, contrary to our cross-section results with the BFS sample (Table 5). As with the results for the panel of data for BFS firms, we find evidence of a positive relationship between cash flow and relative interest costs.

Table 7 The determinants of relative interest costs, FE panel estimates

	(1) Two-lags, one year's liabilities	(2) Two-lags, two years' liabilities	(3) One-lag, one year's liabilities	(4) One-lag, two years' liabilities
A_{t-1}	0.629***	0.089***	0.604***	0.140***
	(0.012)	(0.010)	(0.008)	(0.007)
A_{t-2}	0.142***	0.085***		
	(0.012)	(0.010)		
Π_{t-1}	0.000***	-0.000	0.000***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Π_{t-2}	0.000***	0.000***		
	(0.000)	(0.000)		
S_{t-1}	0.059***	0.059***	0.099***	0.074***
	(0.010)	(0.008)	(0.006)	(0.005)
S_{t-2}	0.023**	0.015*		
	(0.009)	(0.008)		
CF_{t-1}	0.104**	0.167***	0.027	0.082***
	(0.049)	(0.042)	(0.031)	(0.027)
CF_{t-2}	-0.046	0.024		
	(0.050)	(0.044)		
Lev_{t-1}	0.000	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Lev_{t-2}	0.000	0.000		
	(0.000)	(0.000)		
Constant	145.296***	175.709***	285.777***	303.442***
	(16.074)	(13.778)	(9.632)	(8.379)
Observations	643670	670710	1014700	1058570
Number of firms	244825	251635	350275	359785
R-squared	0.010	0.001	0.012	0.003
F test	292.447	43.926	778.017	224.484

- *Standard errors in parentheses*
- * *significant at 10%;* ** *significant at 5%;* *** *significant at 1%*
- *Number of observations and number of firms (n) rounded to nearest five for confidentiality reasons*
- *All equations include time trend and time dummies*

6 Conclusions

Access to finance by firms is important for economic development. The impact of the existence of an access to finance problem on the economy is likely to have both a growth effect and a cyclical effect. Economic growth is likely to be reduced as firms with sound expansion plans will not be able to invest (Greenwald and Stiglitz, 1993; Nickell and Nicolitsas, 1999). Economic shocks that weaken firms' balance sheets and/or weakens the ability of banks to lend (like the current 'sub prime'-induced credit crisis) may also hit finance constrained firms particularly hard (Bernanke and Gertler, 1989; Fisher, 1999; cited in Fabling and Grimes, 2004).

We have considered access to finance, with a focus on bank finance, for a sample of firms between 1-500 employees across a number of dimensions. We have found that the length of firms banking relationship increases with age and that more successful firms in terms of sales and (to a lesser extent) profitability tend to have longer banking relationships. Our results contradict some previous work for Norway by Ongena and Smith (2001).

When we consider what types of firm have recently applied for new debt and equity, we find that firms with longer banking relationships are less likely to request new equity, but more likely to request new debt. We find that more profitable firms are less likely to request both debt and equity. These results are robust to alternative specifications of the choices to request the two broad types of finance.

We find that the more assets a firm has, the more collateral it is required to post. Larger firms (in terms of assets) are required to post a smaller amount of personal assets, relative to the total assets of the firm. More profitable firms have to post a lesser amount of personal assets as collateral. More highly leveraged firms are no more likely to be required to post more collateral of either business or personal assets. Note that contrary to relation-banking theory, we find no relationship between length of relationship and the amount of collateral required.

Finally we have considered the determinants of interest costs on three different sets of data. The one consistent result across our models is the positive relationship between firm assets and interest costs, and the insignificance of firms' leverage. In both of our panel estimates (on firms in the BFS and in the wider economy), we find a positive relationship between cash flow and interest costs. In our BFS cross section, we find a negative relationship between sales and interest costs. When we expand our analysis to use all years for which we have data on these firms, we find no effect and when we expand our sample to encompass the wider economy, we find a *positive* relationship.

7 Bibliography

George, J. Benston and Clifford, W. Smith, (1976), 'A Transactions Cost Approach to the Theory of Financial Intermediation', *Journal of Finance*, 31.2, pp. 215-231.

Berglöf, E., and Von Thadden, E.L., (1994), 'Short-term versus long-term interests: Capital structure with multiple investors', *Quarterly Journal of Economics*, 109, pp. 1055-1084.

Berger, A.N. and Udell, G.F., (1990), 'Collateral, loan quality, and bank risk', *Journal of Monetary Economics*, 25, pp. 21-42.

Berger, A.N. and Udell, G.F., (1995), 'Relationship Banking and Lines of Credit in Small Firm Finance', *Journal of Business*, 68, pp. 351-381.

Berger, A.N. and Udell, G.F., (1998), 'The Economics of Small Business Finance: The Roles of Private Equitey and Debt Markets in the Financial Growth Cycle', *Journal of Banking and Finance*, 22, pp. 873-987.

Bernanke, B., and Gertler, M., (1989), 'Agency costs, net Worth, and Business Fluctuations', *American Economic Review*, 79, pp. 14-31.

Bhattacharya, S., and Thakor, A.V., (1993), 'Contemporary Banking Theory', *Journal of Financial Intermediation*, 3, pp. 2-50.

Bhattacharya, S., and Chiesa, G., (1995), 'Proprietary Information, Financial Intermediation, and Research Incentives', *Journal of Financial Intermediation*, 4, pp. 328-357.

Nick Bloom and John Van Reenen, (2007), 'Measuring and Explaining Management Practices Across Firms and Countries', *Quarterly Journal of Economics*, , 1224, pp. 1351-1408

Bolton, P., and Scharfstein, D.S., (1996), 'Optimal debt structure and the number of creditors', *Journal of Political Economy*, 104, p. 1-25.

Arnoud W.A., Boot, (2000), 'Relationship Banking: What Do We Know?' *Journal of Financial Intermediation*, 9, pp. 7-25.

Boot, A.W.A. and Thakor, A.V., (1994), 'Moral Hazard and Secured Lending in an Infinitely Repeated Credit Market Game', *International Economic Review*, 35, pp. 899-920.

Boot, A.W.A. and Thakor, A.V., (1997), 'Financial system architecture', *Review of Financial Studies*, 10, pp. 693-733.

Spiros Bougheas, Paul Mizen and Cihan Yalcin (2006), 'Access to external finance: Theory and evidence on the impact of monetary policy and firm-specific characteristics', *Journal of Banking and Finance*, 30, pp. 199-227.

Boyd, J.H. and Prescott, E.C., (1986), 'Financial Intermediary Coalitions', *Journal of Economic Theory*, 38, pp 211-232.

Linda Cameron, Bryan Chapple, Nick Davis, Artemisia Kousis and Geoff Lewis, (2007), 'New Zealand Financial Markets, Saving and Investment', New Zealand Treasury, Policy Perspectives paper 07/01, Wellington.

Campbell, T.S., (1979), 'Optimal Investment Financing Decisions and the Value of Confidentiality', *Journal of Financial and Quantitative Analysis*, 14, pp. 232-257.

Chan, Y., and Thakor, A.V., (1987), 'Collateral and competitive equilibria with moral hazard and private information', *Journal of Finance*, 42, pp. 345-363.

Iris Claus and Arthur Grimes, (2003), 'Asymmetric Information, Financial Intermediation and the Monetary Transmission Mechanism: A Critical Review', Treasury Working Paper Series 03/19, New Zealand Treasury.

Diamond, D., (1984), 'Financial Intermediation and Delegated Monitoring', *Review of Economic Studies*, 51, pp. 393-414.

Diamond, D., (1991), 'Monitoring and Reputation" the Choice between Bank Loans and Privately Placed Debt', *Journal of Political Economy*, 99, 689-721.

Diamond, D., (1993),'Seniority and maturity of debt contracts', *Journal of Financial Economics*, 33, pp. 341-368.

Douglas W. Diamond and Phiip H. Dybvig, (1983), 'Bank Runs Deposit Insurance and Liquidity', *Journal of Political Economy*, 91, pp. 401-19.

Ricahrd Fabling and Arthur Grimes (2004), 'Brother, Can You Spare a Dime? Finance Constraints & Firm Success', Ministry of Economic Development.

Richard Fabling, Arthur Grimes and Philip Stevens, (2008), 'A Comparison of Qualitative and Quantitative Firm Performance Measures', Ministry of Economic Development Occasional Paper 08/04, Wellington.

Fama, E.F., (1985), 'What's Different about Banks?' *Journal of Monetary Economics*, 15, pp. 5-29.

Fischer, J., (1999), 'Credit Market Imperfections and the Heterogeneous Response of Firms to Monetary Shocks', *Journal of Money, Credit and Banking*, 31, pp. 187-211.

Stuart, I. Greenbaum, and Anjan V. Thakor, (1995), *Contemporary Financial Intermediation*, Forth Worth, Texas: The Dryden Press.

Greenwald, B., and Stiglitz, J., (1993), 'Financial Market Imperfections and Business Cycles', *Quarterly Journal of Economics*, 108, pp. 77-114.

Arthur Grimes, (2007), 'Capital Intensity and Welfare: National and International Determinants', Ministry of Economic Development Occasional Paper 07/03, Wellington.

Julia Hall and Grant Scobie, (2005), 'Capital Shallowness: A Problem for New Zealand', Treasury Working Paper Series 05/05, New Zealand Treasury.

Heckman, J., (1976, 'The common structure of statistical models of truncation, sample selection, and limited dependent variables and a simple estimateor for suchmodels, *Annals of Economic and Social Measurement*, 5, pp. 475-492.

Kane, E.J., and Malkiel, B.G., (1965), 'Bank Portfolio Allocation, Deposit Variability, and the Availability Doctrine', *Quarterly Journal of Economics*, 79, pp. 257-261.

Leland, H.E., and Pyle, D.H., (1977), 'Informational Asymmetries, Financial Structure, and Financial Intermediation', *Journal of Finance*, 32, pp. 371-387.

Geoff Mason and Matthew Osborne, (2007), 'Productivity, Capital-Intensity and Labour Quality at Sector Level in New Zealand and the UK', Treasury Working Paper Series, 07/01, New Zealand Treasury.

MED, (2005), 'SMEs in New Zealand: Structure and Dynamics: 2005', Ministry of Economic Development, Wellington.

Duncan Mills and Jason Timmins, (2004), 'Firm Dynamics in New Zealand: A Comparative Analysis with OECD Countries', New Zealand Treasury Working Paper 04/11, Wellington.

Mundlak, Y. (1961), 'Empirical Production Function Free of Management Bias', *Journal of Farm Economics*, 43(1), pp. 44-56

Stephen Nickell and Daphne Nicolitsas, (1999), 'How does financial pressure affect firms?', *European Economic Review*, 43.8, pp. 1435-1456.

Steven Ongea and David C. Smith, (1998), 'Relationship Banking: A Survey', reprinted in P. Harker and S.A. Zenios (eds.) *The Performance of Financial Institutions*, CUP.

Steven Ongea and David C. Smith, (2006), 'Access to external finance: Theory and evidence on the impact of monetary policy and firm-specific characteristics', *Journal of Banking and Finance*, 30, pp. 199-227.

Peterson, M.A., and Rajan, R.G., (1994), 'The Benefits of Lending Relationships: Evidence from Small Business Data', *Journal of Finance*, 49, pp. 3-37.

Peterson, M.A., and Rajan, R.G., (1995), 'The Effect of Credit Market Competition on Lending Relationships', *Quarterly Journal of Economics*, 110, pp. 406-443.

Rajan, R.G., (1992), 'Insiders and Outsiders: the Choice between Informed and Arm's-length Debt', *Journal of Finance*, 47, pp. 1367-1400.

Rajan, R.G., and Winton, A., (1995), 'Covenants and collateral as incentives to monitor', *Journal of Finance*, 50, pp. 1113-1146.

Rajan, R.G., (1998), 'The Past and future of Commercial Banking Viewed through and Incomplete Contract Lens', *Journal of Money, Credit and Banking*, 30, pp. 524-550.

Ramakrishnan, R.T.S., and Thakor, A.V., (1984), 'Information Reliability and a Theory of Financial Intermediation', *Review of Economic Studies*, 51, pp. 415-432.

Robertson, B. (2006), *Mind the gap: small firm financing in New Zealand*. Ministry of Economic Development, Wellington.

Sharpe, S.A., (1990), 'Asymmetric Information, Bank Lending and Implicit Contracts: a Stylized Model of Customer Relationships', *Journal of Finance*, 45, pp. 1069-1087.

Stiglitz, J.E., and Weiss, A., (1981), 'Credit rationing in markets with imperfect information', *American Economic Review*, 71, pp. 393-410.

von Thadden, E.L., (1998), 'Asymmetric Information, Bank Lending, and Implicit Contracts: the Winner's Curse', mimeo, University of Lausanne (DEEP).

Weesie, J., (1999), Seemingly unrelated estimation and the cluster-adjusted sandwich estimator, *Stata Technical Bulletin*, 13, pp. 19.23.

Yosha, O., (1995), 'Information Disclosure Costs and the Choice of Financing Source', *Journal of Financial Intermediation*, 4, pp. 3-20.

8 Appendix 1: Data Appendix

8.1 Business Finance Survey

The *Business Finance Survey* (BFS) was sponsored by the Ministry of Research Economic Development (MED) to provide information on the capital structure of businesses in New Zealand, the sources of finance they use and their recent financing experiences. The

survey population was created from live enterprise units on Statistics New Zealand's Business Frame at the population selection date which:

- were economically significant enterprises (those with an annual GST turnover figure greater than $30,000)
- had between 1 and 500 employees
- had been operating for six months or more
- were not subsidiaries, more than 50 percent owned by another business
- were classified to Australian and New Zealand Standard Industrial Classification – NZ Version 1996 (ANZSIC96) codes listed as in scope as set out in the table below.
- were private enterprises as defined by New Zealand Institutional Sector 1996 Classification (NZISC96) 1111 (private corporate producer enterprises) or 1121 (private non-corporate producer enterprises).
- were classified to New Zealand Standard Classification of Business Types (BT96) codes:
    1 individual proprietorship,
    2 Partnership,
    3 Registered Limited Liability Company (non CO-op),
    4 Co-operative Companies,
    5 Joint Ventures and Consortia,
    13 Trusts/Estates
    20 Other Business Types.

Industries in scope:

A02	Services to Agriculture, Hunting and Trapping
A03	Forestry and Logging
A04	Commercial Fishing
C	Manufacturing
E	Construction
F & G	Wholesale Trade & Retail Trade
H	Accommodation, Cafes and Restaurants
I61 & I66	Road Transport & Services to Transport
J	Communication Services
L77 (excl. L773 & L771210)	Property Services (excl. Commercial Property & Non-financial Asset Investors)
L78 (excl. L784)	Business Services (excl. Legal and Accounting Services)
N	Education
O (excl. O862)	Health and Community Services (excl. Medical and Dental Services)
P91	Motion Picture, Radio and Television Services
P93 (excl. 9311, P9312 & P9321)	Sports and recreation Services (excl. Horse and Dog racing, Sports Grounds and Facilities & Lotteries)
Q95	Personal Services

The sample design was stratified according to ANZSIC industry, age groups and employee size groups. This information was obtained using enterprise ANZSIC industry, business age and employee information from Statistics New Zealand's Business Frame.

The first level of stratification was into ANZSIC industry groupings. Within each of the ANZSIC groups, there is a further stratification by age and employee size group. For more on the Business Finance Survey, see http://www2.stats.govt.nz/domino/external/pasfull/pasfull.nsf/173371ce38d7627b4c25680900046f25/4c2567ef00247c6acc256ff20018f810?OpenDocument .

8.1.1 Variables

Length of Banking Relationship

This comes from question 32, 'How many years has this business dealt with its main bank or financial institution?' There are four response choices: 'less than 1 year', '1 to 3 years', '4 to 10 years' or 'more than 10 years'.

Debt financing

This came from question 3, 'In the past 12 months did the business request new or additional debt finance?'

Equity financing

This came from question 11, 'In the past 12 months did the business request new or additional equity finance?'

Debt and Equity Financing

This came from question 18 'In the last 12 months, did the business request both debt and equity finance?' and question 19 'Which finance request was made first?' This final question has three response categories, debt first, equity first, or both at the same time.

8.2 IR10 Accounts information

The IR10 data used in this paper come from the IRD form Accounts information IR10 form. More information on what should appear in the IR10 form can be found in the IRD guide IR10G.

Sales

The sales data recorded in the IR10 form relate to Box 2 'Gross income from sales and/or services' and are GST exclusive.

Assets

Our measure of assets is 'Total assets' (`i10_totassts`). It is made up of 'current assets' (`i10_totlcass`), 'fixed assets' (`i10_totlfass`) and 'other assets' (`i10_othassts`). Current assets are made up of 'accounts receivable (debtors)', 'bank accounts', and 'other current assets'. Fixed assets are made up of 'vehicles', 'plant and machinery', 'furniture and fittings', 'land and buildings', and 'other fixed assets'. Other assets are made up of 'intangibles', 'preference shares', 'shares and debentures', 'term deposits' and 'other assets'.

Liabilities

Liabilities come from Box 51, total liabilities, and include 'accounts payable (creditors)' (`i10_accspay`), 'Bank accounts (liability), (`i10_bkacslia`), 'Other current liabilities' (`i10_othclia`), 'Total current liabilities' (`i10_totclia`), and 'Term liabilities' (`i10_termlia`).

Equity

This is calculated as 'total proprietor or shareholder funds' (`i10_proshfds`) and subtract 'Drawings' (`i10_drawings`) and 'Current account closing balance' (`i10_cclosbal`). According to the IR10G guide from IRD, total proprietor or shareholder funds 'is the sum of Box 53 and any other proprietor or shareholder equity.' Under 'items listed in this box' the guide lists: 'Income equalisation reserves', 'Proprietorship funds or equity' and 'Shareholders' funds or equity'.

Leverage

Leverage is calculated as debt divided by dept plus equity.

Interest expenses

Interest expenses come from Box 17 of the IR10. These expenses include: 'Exchange losses', 'Interest paid', 'Shareholders' interest', and 'Use-of-money interest (expenses)'. This can also include 'any interest paid to Inland Revenue'

Profit

The profits data recorded in the IR10 form relate to Box 29 'Total current year taxable profit'. Note that this includes changes in stocks.

Profitability

Profitability is calculated as net total taxable profits divided by total assets

Cash flow

Cash flow is calculated as net total taxable profits plus depreciation expenses. Note that we only have gross total taxable profits. Therefore, we multiply this by 0.67.