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Corporate Credit and Monetary Policy: The Impact of Firm-Specific Characteristics on Financial Structure

By

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Abstract

This paper examines the impact of monetary policy on UK firms' access to bank and market finance when allowance is made for differences in firm-specific characteristics. A theoretical model determines the cut-off values for project profitability that would allow firms to access bank or market finance. This model predicts that specific characteristics in terms of size, age, risk and debt can make a firm more vulnerable to tightening credit when interest rates increase. Empirically, the paper shows, using a panel of 16,000 UK firm records over 10 years, that firms distributed according to their type (asset size, rating etc) do have differing access to bank lending and market finance. Small, young and risky firms are more significantly affected by tight monetary conditions than large, old and secure firms. The evidence is consistent with a credit channel, and demonstrates that there are distribution implications from tightening monetary policy.

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1. Introduction

The monetary transmission mechanism has traditionally referred to money, on the *liabilities* side of the banking sector's balance sheet, rather than to credit; yet a considerable body of literature has built up to explore the 'credit channel', operating through the *asset* side of banks' balance sheets. The credit channel has been used to augment standard transmission lines by Bernanke and Blinder (1988), Romer and Romer (1990), Friedman and Kuttner (1993), Bernanke and Gertler (1995) to mention just a few. The influence of this channel is felt through the balance sheet (Gertler and Gilchrist, 1994), the effects of bank lending on those firms that are particularly bank dependent (Kashyap, Stein and Wilcox, 1993) and through the stimulation of endogenous cycles or accelerator effects (Fuerst, 1995; Kiyotaki and Moore, 1997, Bernanke *et al.*, 1999). Financial conditions restrict firms' access to internal and external funds, and therefore affect real variables such as employment, production, sales, investment and inventory accumulation decisions (Fazzari *et al*., 1988, Guariglia and Schiantarelli, 1998, Nickell and Nicolitsis, 1999, and Guariglia, 1999). However, this does not mean that the effect is likely to be uniform. In fact, the question of just how influential the credit channel might be, and which firms are most affected by it, is an important question for monetary policy makers.

To answer the question is not a simple matter. A key empirical issue for researchers has been the identification of the credit channel as a separate influence from other channels – such as the interest rate channel, for example. Early attempts to measure the influence of policy tightening on the level of bank lending did not distinguish between demand-side influences, operating through the liabilities side of banks balance sheets (via the interest rate channel), and supply shifts, and therefore could not establish beyond doubt that there was a separate credit channel. But a seminal contribution by Kashyap *et al.* (1993) isolated the influence of monetary policy contractions on bank lending by measuring the *relative* changes of bank lending to non-bank sources of funds. They did so by constructing a 'mix' variable defined as the ratio of bank lending to total external finance (bank lending plus commercial paper). With such a relative measure based on the mix the effect of the interest rate channel on all types of finance could be distinguished from a credit channel on bank lending alone. When Kashyap *et al.* (1993) showed that the mix between bank lending and market-based finance declined with a monetary contraction in the US they provided strong support for the credit channel in general and the bank lending channel in particular.

Subsequent work by Oliner and Rudebusch (1996) offered a critique of Kashyap *et al.* (1993). While they were convinced by the use of a mix variable to capture the relative adjustment in the financial portfolio, they were unsure whether Kashyap *et al.* (1993) had used the correct mix. They argued that the original mix variable did not take into account a sufficiently wide range of alternative sources of finance and did not account for differential effects on small as opposed to large firms. Small firms are almost entirely bank dependent and therefore their mix is likely to be invariant to the monetary policy stance. With a wider measure of alternative funds and a distinction between small and large firms Oliner and Rudebusch (1996) showed that there was less evidence for a credit channel than had been originally supposed. Nevertheless, they found that the broad credit channel, which implies that all sources of funds contract simultaneously as monetary policy tightens, leaving the mix unaffected, does exist. They concluded that disaggregation fails to substantiate that the mix changes as policy tightens, as they could find no evidence to support a bank lending channel, either in aggregate or for small or large firms separately.

Kashyap *et al.* (1996) responded by arguing that the re-interpretation of Oliner and Rudebusch (1996) was misleading. The implication that the mix does not respond to monetary policy when the data is disaggregated, they argued, is entirely expected for small firms (because they are bank dependent at all times) and an artefact of the different measure of the mix for large firms. When Kashyap *et al.* (1996) recalculated the effects for small and large firms using their own definition of the mix their original results were upheld.

The interchange between Kashyap *et al.* (1993, 1996) on the one hand and Oliner and Rudebusch (1996) on the other is far from a minor dispute. It touches on an important issue for the credit channel – the influence of firm-specific characteristics on the response to monetary contractions. If factors such as the size of the firm – to take the characteristic chosen by Oliner and Rudebusch (1996) – can have an influential effect on the composition of finance, then other characteristics may also alter the responsiveness to monetary policy. In other words, why consider only size? In their conclusion Kashyap *et al.* (1996) note that there is 'more to be learned from careful analysis of a variety of micro data, at the level of both individual banks and individual firms' p. 313, and we agree. Now that micro data is accessible on other aspects of firm characteristics, such as their balance sheet, real assets, perceived riskiness and indebtedness, in panels spanning a decade with periods of both tight and benign monetary policy, we can consider

their effects. The influence of the above factors on access to bank versus market-based finance is the point that the present paper addresses[2].

Our paper extends the theoretical model of Hoshi, Kashyap and Scharfstein (1993) by introducing a variable opportunity cost of funds in order to examine the effects of monetary policy on corporate financing. The minimum conditions that a firm must satisfy in order to access finance from an intermediary or from the market are then defined in terms of the scale of the financial payoff to investment in relation to its asset size. If a firm exceeds some minimum cut-off value it will obtain bank finance, and if it exceeds a higher cut-off value it will obtain market finance. Clearly the proximity of profitability to the cut-off values will depend on monetary conditions as well as firm-specific characteristics. The predictions from our model are evaluated for a panel of 16,000 manufacturing firms in the UK, which shows that the more financially vulnerable firms – smaller, younger, more risky and more indebted firms – are more severely affected by monetary tightening as their profitability declines and the cut-off values they face become more exacting.

The paper is organised as follows. Section 2 provides a theoretical model to explore the influence of firm-specific characteristics on the behaviour of the mix as monetary policy contracts. Section 3 explains the predictions of the model. The data sources and methodology are discussed in Section, and then Section 5 presents the empirical evidence. Section 6 concludes.

2. The Theoretical Model

We develop a theoretical model using the framework suggested by Diamond (1991) in which the interaction between a firm's reputation capital (a good track record) and the choice between intermediary and market finance is analysed in the context of delegating monitoring[3]. This framework has been used by Hoshi *et al.* (1993) to analyse the role of ownership structure for raising external funds in Japan, and although our application is different, we adapt their approach for our purpose.

We assume that firms own a certain amount of total assets (A_T), which consist of tangible collateral assets (A_C), intangible assets, and existing debt (D_E), which is less than collateral

[2] Kishan and Opiela (2000) use a similar methodology with bank balance sheet data.
[3] Other significant papers by Besanko and Kanatas (1993), Holmsrom and Tirole (1997), Repullo and Suarez (2000) and Bolton and Freixas (2000) have analysed the choice between market and intermediary finance as affected by the net worth value of firms.

assets and thus it is riskless. Potential investment projects generate financial payoffs of π to shareholders as well as private benefit, β, to the managers, hence the manager's expected utility consists of a fraction, α, of the financial payoffs of the project, and the private benefit, $\alpha\pi + \beta$. If the manager is the owner of the firm $(\alpha = 1)$, he jointly maximises the financial payoff and the private benefit but if his equity share is zero $(\alpha = 0)$, he only maximises the private benefit. There are two types of projects ($i = 1, 2$) and each project has a payoff X with probability p_i and zero with probability $(1 - p_i)$. Project 2 (the good project) has a higher expected financial payoff than Project 1(the bad project) hence $p_2X > p_1X$; the manager's private benefit is zero in Project 2 and it is a positive number, B, in Project 1. Both projects require an initial investment (project size), F and the private benefit is proportional to the firm size $(B = bA_T)$, where $b > 0$[4]. The manager chooses the type of project that maximises his/her expected utility. All parties are risk neutral. Finally, we impose the condition $(p_2 - p_1)X > B$, which implies that Project 2 is the socially efficient project:

2.1 Market Finance without Monitoring

The manager raises funds from the market without being monitored. Suppose the firm borrows F, and promises to repay D, where the existing debt is assumed to be senior to the new debt[5]. If the firm cannot meet its commitments, the lender can liquidate the tangible collateral, A_C. The manager's payoff from Project 1 is $\alpha[p_1(X - D + A_T - D_E) + (1 - p_1)(A_T - A_C)] + bA_T$ and the corresponding payoff from Project 2 is $\alpha[p_2(X - D + A_T - D_E) + (1 - p_2)(A_T - A_C)]$.

The manager will choose the socially efficient project provided that

(1) $$\alpha(p_2 - p_1)(X - D + A_C - D_E) \geq bA_T$$

If debtholders believe the managers will choose Project 2, their zero profit condition implies:

(2) $$p_2D + (1 - p_2)(A_C - D_E) = F(1 + r)$$

We introduce a positive market interest rate, r, as the opportunity cost of funds. This is important since the main point of this paper is the interaction between monetary policy stance (measured by interest rates) and firm-specific characteristics in determining the access to

[4] We follow Hoshi *et al.* (1993) by assuming that the private benefit is proportional to the size of project and the size of project is proportional to the size of firm.

external finance[6]. Substituting (2) into (1) we find that the manager will have a proper incentive to choose the good project if and only if the following condition is satisfied:

$$(3) \qquad \frac{\alpha(p_2 - p_1)}{A_T}\left(X - \frac{F(1+r) + D_E - A_C}{p_2}\right) \geq b$$

Depending on the parameters, if (3) is satisfied the firm chooses the good project, borrows from the financial market and makes an efficient investment decision. If the incentive constraint (3) is not satisfied, the firm chooses the bad project and the new debtholders require a higher repayment, D_1. The lender's zero profit condition is $p_1 D_1 + (1 - p_1)(A_C - D_E) = F(1+r)$.

At this value of D_1 the manager would choose the inefficient project (the bad project) and his payoff would be $\alpha[p_1 X + A_T - D_E - F(1+r)] + bA_T$. In a world without intermediary finance, if the incentive constraint (3) holds, the manager chooses the good project, and if it does not hold he/she chooses the bad project. In both cases, the manager borrows from the financial market.

2.2 Intermediary Finance

In this section we introduce a new group of investors (banks) endowed with a monitoring technology that enables them to observe the manager's project choice at a cost of *m* per project. Since the monitoring technology is costly for individual investors, the investors deposit their money in monitoring intermediary institutions, mainly banks[7]. Now if incentive constraint (3) is not satisfied, the manager might still choose the good project by borrowing from banks. Then, the repayment of the loan, *L,* to the intermediary institution must satisfy $p_2 L + (1 - p_2)(A_C - D_E) = (F + m)(1+r)$.[8] In this case, the manager's payoff is $\alpha[p_2 X + A_T - D_E - (F+m)(1+r)]$ and the manager prefers intermediary finance if the following expression holds:

$$(4) \qquad \frac{\alpha(p_2 - p_1)}{A_T}\left[X - \frac{m(1+r)}{p_2 - p_1}\right] \geq b$$

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[5] This assumption implies that the existing debt rather than the new debt is paid first in the case of default.
[6] Hoshi *et al.* (1993) assumed that the opportunity cost of finance is zero ($r=0$), but this does not allow us to investigate the influence of monetary policy, which operates through changes in interest rates.
[7] Both Diamond (1984) and Chant (1992) have shown that banks have greater incentives to monitor than individual investors.
[8] In this case, the repayment to a monitoring institution includes both the loan return and the monitoring cost.

The firm issues public debt (borrows directly from the market) if either (3) holds or (4) does not hold, otherwise the firm borrows from intermediary institutions. The conditions for market finance can be rewritten as:

$$(5) \qquad \frac{p_2 X}{A_T} \geq \frac{p_2 b}{\alpha(p_2 - p_1)} + \frac{F(1+r)}{A_T} - \frac{A_C}{A_T} + \frac{D_E}{A_T}$$

$$(6) \qquad \frac{p_2 X}{A_T} \leq \frac{m(1+r)p_2}{(p_2 - p_1)A_T} + \frac{p_2 b}{\alpha(p_2 - p_1)}$$

If in addition the monitoring cost is relatively low, i.e. it satisfies the condition $F(1+r) - A_C + D_E > \frac{m(1+r)p_2}{(p_2 - p_1)}$, then bank (intermediary) finance becomes feasible provided that

$$(7) \qquad \frac{m(1+r)p_2}{(p_2 - p_1)A_T} + \frac{p_2 b}{\alpha(p_2 - p_1)} \leq \frac{p_2 X}{A_T} \leq \frac{p_2 b}{\alpha(p_2 - p_1)} + \frac{F(1+r)}{A_T} - \frac{A_C}{A_T} + \frac{D_E}{A_T}$$

Notice that p_2X/A_T is a measure of profitability. A_C/A_T and D_E/A_T are the ratio of collateral assets to total assets and the firm's gearing ratio, respectively. If we denote the lower critical point of the interval as Q_1 and the upper critical point as Q_2, those firms with profitability measures below Q_1 use public debt to finance their investments in bad projects, while those firms with corresponding values above Q_2 use the same source to finance their investments in good projects. Firms with profitability measures between Q_1 and Q_2 use bank debt to finance their investments in good projects.

The value of the critical points may depend upon the financial structure of firms and the financial environment where lending and borrowing activities take place. Where the firm's financial structure is strong (i.e. characterised by high value of total assets and low gearing ratios, high probabilities of success of good projects, high manager's shares of equity, low private benefits, monitoring cost and market interest rates, etc), the critical values would be low. In these cases the moral hazard problem is not serious and therefore the choice of socially efficient projects is likely. It is obvious that large and well-capitalized firms, whose critical points are relatively low, are more likely to choose the good projects that could be financed by either market or intermediary finance. On the contrary, small and poorly capitalized firms are expected to have high critical points that make the moral hazard problem more serious. The

relative magnitude of demand for intermediate and market finance also depends on the distribution of firms according to their profitability.

3. Model Predictions

Our main goal in this paper is to determine the implications of changes in monetary policy on the financing options of firms, with a special interest in knowing how these effects vary with firm characteristics, such as size, collateral, debt and risk. In the first part of this section we examine the impact of firm characteristics on financial structure and in the second part we explore the change in the response to monetary policy conditions as these characteristics are taken into account. The former signs the partial derivatives of our model in section 2 and the latter signs the cross-partials.

3.1 Firm Characteristics

Firm Size

We measure firm size by the value of total assets, A_T. From (7) we find that the lower (upper) critical values decrease (increase) in response to the value of total assets:

$$\frac{\partial Q_1}{\partial A_T} = -\frac{m(1+r)p_2}{(p_2 - p_1)A_T^2} < 0 \text{ and } \frac{\partial Q_2}{\partial A_T} = \frac{A_C - D_E}{A_T^2} > 0 \ .$$

Given that profitability, p_2X/A_T, is *ceteris paribus* decreasing with firm size our model predicts that the range of bank finance is also *ceteris paribus* increasing with firm size. The intuition behind this prediction is that size is not sufficient to reduce rates of return without a corresponding increase in profits.

Riskiness

A relative change in the project success probabilities may be interpreted as variability in the risk distribution. Let us then denote the risk factor term $(p_2 - p_1)$ by $\rho > 0$. A relatively high value of ρ implies that the project, and thus the firm that carries it out, involves a lower risk.

$$\frac{\partial Q_1}{\partial \rho} = -\frac{bp_2}{\alpha \rho^2} - \frac{m(1+r)p_2}{\alpha A_T \rho^2} < 0 \ , \ \frac{\partial Q_2}{\partial \rho} = -\frac{bp_2}{\alpha \rho^2} < 0 \text{ and } \left|\frac{\partial Q_2}{\partial \rho}\right| < \left|\frac{\partial Q_1}{\partial \rho}\right|$$

The above imply that *ceteris paribus* a lower level of risk increases the number of firms that have access to low-cost market finance. In our model, with a uniform distribution, there is an increase in the interval of intermediary finance.[9]

Collateral Assets and Debt

An increase in collateral assets relative to total assets causes the upper critical point to decline since A_C enters the expression for Q_2 with a negative sign. This implies that access to market finance increases with collateral. There is no corresponding effect on the lower critical value since collateral assets do not appear in Q_1. Hence intermediary finance will decline independently of the shape of the distribution as a result of a rise in collateral assets. In addition, the magnitude of the change in the upper critical point would be larger for small firms than for large firms. This follows from the fact that a given increase in collateral assets would have a larger effect on small firms, which have lower total assets, than for large firms. As a result small firms are likely to be more sensitive to a change in collateral assets of a given size. Debt is an important determinant of the strength of the balance sheet of firms for much the same reasons[10]. The variable D_E enters Q_1 with a positive sign: indebted firms are more likely to finance their projects through intermediary finance, if at all. Thus the impact of debt on the equilibrium condition is just the opposite of collateral assets: an increase in existing debt causes the upper critical point to *increase*. As in the case of collateral assets, the existing debt does not affect the lower critical point, and the magnitude of these effects is decreasing in firm size.

Profitability

It is clear from (7) that p_2X/A_T is has a central role in the model. The numerator is equal to expected revenues while the denominator is equal to total assets thus the ratio is a measure of the expected rate of return or profitability.[11] Our model predicts that firms fall into three groups according to their profitability, and controlling for other firm characteristics, this affects their access to financing options. High-profit firms finance their projects by borrowing directly from

[9] This point is dependent on the relative movement of critical points, and therefore the assumptions about the distribution of firms are central.
[10] The term $(A_C - D_E)/A_T$ can be thought of as a measure of net worth.
[11] Hoshi *et al.* (1993) refer to this term as Tobin's Q because they use the Tobin's Q measure in the empirical implementation of their model.

the capital market at a low interest rate. Firms with moderate profits do not have access to low interest financing in the capital market and borrow from banks. Finally, low-profit firms that cannot raise funds from banks must find alternative forms of finance, if available. This logic implies that there is a link between sources of finance and rate or return or profitability. An empirical test that confirms the link between profitability, as a proxy for p_2X/A_T, and forms of finance would offer some initial support of the theoretical framework[12].

3.2 Monetary Policy Implications

We have introduced a market interest rate in the model as a measure of the opportunity cost of finance in order to examine the implications of monetary policy for the transmission mechanism. The traditional balance sheet channel indicates that higher interest rates result in higher servicing costs, lower retained profits and therefore weaker balance sheets of firms (see Gertler and Gilchrist, 1994; and Bernanke and Gertler, 1995, Bernanke, Gertler and Gilchrist, 1996). We therefore assume that the net worth ratio, $(A_C - D_E)/A_T$, denoted ω, is a decreasing function of the interest rate, $\partial\omega(r)/\partial r < 0$.

The interest rate implies affects the upper and the lower critical points as follows:

$$\frac{\partial Q_1}{\partial r} = \frac{mp_2}{(p_2 - p_1)A_T} > 0 \text{ and } \frac{\partial Q_2}{\partial r} = \frac{F}{A_T} - \frac{\partial \omega}{\partial r} > 0 .$$

This means that as interest rates decrease, firms that experience an increase in the ratio of market to intermediary finance should have higher rates of return compared to those firms that experience a decrease.[13] In addition, the above expressions suggest that since net worth affects only the upper limit, then the more sensitive net worth is to interest rate changes, i.e. the higher $\left|\frac{\partial\omega}{\partial r}\right|$, the greater the effect of a change in interest rates will be on the upper limit.

[12] Empirical evidence among UK firms suggests that there is heterogeneity in the investment returns of firms when the distinction is drawn between financially constrained and unconstrained firms (see Basu and Guariglia, 2002).

[13] A change in the interest rates affects both upper and lower critical points therefore without knowing the exact distribution we cannot make any claims about the changes in total market and total intermediary finance. Nevertheless, we know that firms around the lower critical point (Q_1) are firms who have a low expected return from good project and firms around the upper critical point (Q_2) are firms who have a high-expected return from good project. Therefore, after a decrease in the interest rates, firms around Q_1 should substitute intermediary finance for high-cost market finance and firms around Q_2 should substitute low-cost market finance for intermediary finance.

Second order effects can be evaluated by differentiating the derivatives $\frac{\partial Q_1}{\partial r}$ and $\frac{\partial Q_2}{\partial r}$, with respect to risk, $\rho = p_2 - p_1$, and asset size, A_T.

Monetary Policy and Risk

Access to intermediary finance when monetary policy is tight is very much related to the risk factor. The sensitivity of the lower critical value to a change in interest rates falls with ρ, (higher ρ implies lower risk):

$$\frac{\partial Q_1^2}{\partial r \partial \rho} = -\frac{mp_2}{\rho^2 A_T} < 0$$

In other words, the extent of intermediary finance declines more for riskier firms as a result of a tighter monetary policy. As the risk factor increases, i.e. ρ declines, firms are also more likely to adopt socially inefficient projects.

Monetary Policy and Asset size

Assuming that the project size is proportional to asset size we find that at the lower critical value

$$\frac{\partial Q_1^2}{\partial r \partial A_T} = -\frac{mp_2}{\rho A_T^2} < 0 \quad .$$

As firm size increases, the impact of rising interest rates on the composition of firm finance will be less significant. Smaller firms are more sensitive to the tightening of monetary policy and are more likely to switch from intermediary finance to other sources lower down the pecking order.

The assumption that we tie project size to asset size is not critical. When we relax this assumption we observe a shift in the upper critical point:

$$\frac{\partial Q_2^2}{\partial r \partial A_T} = -\frac{F}{A_T^2} < 0$$

Again the impact of monetary policy is negative in the firm size. Large firms will be immunized to a greater degree from changes in interest rates since large firms with high collateral assets are more likely to access market finance. Small firms on the other hand are more bank dependent and therefore more interest sensitive.

4. Data and Methodology

4.1. Data sources and definitions

The FAME database covers all UK registered companies giving up to 11 years of detailed information (modified accounts) for about 500,000 large, small and medium sized British companies[14]. Large firms provide balance sheets, profit-loss accounts and some important ratios based on firms' accounting thresholds (section 248 of Companies Act 1985). Small and medium enterprises (SMEs), have some advantages relative to large companies because they need not prepare detailed accounts. For medium-sized companies there is no requirement to disclose turnover details, while for small-sized companies only an abridged balance sheet is required.

We construct a sample from the FAME Database that allows us some flexibility in analysing the monetary transmission mechanism and corporate sector finance. The sample is extracted from the FAME Database based on the following criteria[15]:

- Firms whose primary activity is classified as manufacturing industry according to 1992 SIC UK Code in England, Scotland, Wales and Northern Ireland [16].
- Firms established prior to 1989 and still reporting for the years 1999 and 2000[17].

We now turn to our measure of the financial mix. Kashyap *et al.* (1993) defined the mix as ratio of short-term bank loans to sum of short-term bank loans and commercial paper, while Oliner and Rudebush (1996) used the ratio of short-term debt to the sum of short-term debt and all

[14] There is no single definition of a small firm (because of the wide diversity of businesses) but the best description of the key characteristics of a small firm remains that used by the Bolton Committee in its 1971 Report on Small Firms. This stated that a small firm is an independent business, managed by its owner or part-owners and having a small market share. The Bolton Report also adopted a number of different statistical definitions. It recognised that the size is relevant to sector i.e. a firm of a given size could be small in relation to one sector where the market is large and there are many competitors; whereas a firm of similar proportions could be considered large in another sector with fewer competitors and/or generally smaller firms within it. Similarly, it recognised that it may be more appropriate to define size by the number of employees in some sectors but more appropriate to use turnover in others. Currently, companies should satisfy two out the three criteria to be classified as small or medium sized company. These criteria are based on turnover, balance sheet (total assets) and number of employees.

[15] The sample result is based figures downloaded in October and November 2001. The sample size based on these criteria is likely to change with downloading time because of monthly revision of firm accounts.

[16] The software included 940 firms (5.7 percent of total sample) whose secondary activity is classified in the manufacturing sector rather than primary activity.

[17] In fact, only 3 percent of the firms in the manufacturing industry stopped reporting during the period of 1990-1999. This may stem from either failure of company or getting into the exemption threshold, which allows some missing observations in company's accounts held on the FAME Database. These are prevalent in the first couple of years of the sample period, and this means that the sample is not a balanced panel, since firms whose turnover is under the threshold are not observed (the threshold on turnover is £90,000).

forms of short term non-bank finance, not merely commercial paper. We derive three different measures of the financial mix that correspond to these measures – short-term debt to current liabilities; total debt to total liabilities; and short-term debt to total debt. Short-term debt is made up of the sum of bank overdrafts, short term-group and director loans, hire purchase, leasing and other short-term loans. Current liabilities are made of short-term debt, trade credit and total other current liabilities that include some forms of finance resembling commercial paper or bonds. Finally, the item of total liabilities is made of current liabilities, long term debt and other long-term liabilities.

We also use a number of measures of the properties of the firms, namely size; perceived riskiness (QuiScore); age; solvency; gearing; real asset size. The database contains quite rich information about firms. Size is based on the definitions adopted by the UK government's Department of Trade and Industry, which defines small, medium and large companies on the basis that they satisfy two out of three criteria based on turnover, balance sheet and employees. The logarithm of real total assets is used to cover both the impact of size and activity level of firms on the form of finance, and is calculated by deflating nominal total assets by the relevant sectoral producer price index.

Our measure of risk is the QuiScore measure produced by Qui Credit Assessment Ltd, which assesses the likelihood of company failure in the twelve months following the date of calculation. The QuiScore is given as a number in the range 0 to 100, and for ease of interpretation, that range may be considered as comprising five distinct bands.[18] Clearly firms in bands one and two are quite secure, while firms in band four are four times as likely to fail as the firms in band three, and are therefore quite risky. Firms in band five are almost certain to fail unless action is taken immediately. The number of firms that have a reported QuiScores during the recession is low. Only 9,000 firms reported this figure in 1990, but the number increased to 14,000 in 1992, and an average 16,000 firms reported a QuiScore per year in the period 1993-

[18] The QuiScore is based on statistical analysis of a random selection of companies. To ensure that the model is not distorted, three categories are screened out from the initial selection: major public companies, companies that have insignificant amounts of unsecured trade credit and liquidated companies that have a surplus of assets over liabilities. There are five bands. The *Secure Band* (81-100) implies companies in this sector tend to be large and successful public companies. Failure is very unusual. The *Stable Band* (61-80) implies company failure is a rare occurrence and will only come about if there are major company or marketplace changes. The *Normal Band* (41-60). The sector contains many companies that do not fail, but some that do. The *Unstable Band* (21-40). Companies in this band are on average four times more likely to fail that those in the *Normal Band*. The *High Risk Band* (0-20). Companies are unlikely to be able to continue trading unless significant remedial action is undertaken.

1999. Firms whose QuiScore figures are at most 40, were labelled risky firms while those have QuiScore over 60 were labelled secure firms.

There are four other measures of firm-specific characteristics that we employ. We have the information about the year of incorporation for all firms. We introduce the age as an explanatory variable and classify firms by their age to measure the importance of track record for the change in the composition of firm external finance. Firms that were incorporated before 1975 are called 'old' while those incorporated between 1975-1989 are called 'young' firms. We use the solvency ratio (the ratio of shareholders` equity to total asset) and the gearing ratio (the ratio of total loans to shareholder funds) as the indicators reflecting financial position of firms. Solvency and gearing ratios (a measure of indebtedness) reflect information about financial healthiness of firms and thus affect the form and cost of finance. We classified firms as 'highly-indebted' or 'low-indebted' if their gearing figures are in the highest or lowest quartile of the distribution, respectively. Low capital return and high capital return indicate the lowest and highest 25% expected returns (by value), and are measures of expected profitability. The latter are more likely to be financially constrained than the former.

In Kashyap *et al.* (1993) monetary policy stance was measured with reference to Romer dates (Romer and Romer 1990), the Federal Funds rate and the spread of the Federal Funds rate over Treasury bonds. There are no equivalents to Romer dates in the UK, but we can use the official interest rate to measure monetary policy tightness. We opt for the cumulative change in each year in the official interest rate set by the Bank of England because this allows for the smoothing of interest rates in recent years where rate changes have been made in a series of successive changes in the same direction. We also measure the interest burden – the ratio of interest payments to total debt – which provides a comparison with our first measure. This has the advantage of reflecting both the tightness of monetary policy and the extent to which it has an impact on firms' balance sheets. This is a more useful indicator of accelerator effects, which rely on mechanisms relating to the strength of the balance sheet to propagate cycles following monetary shocks.

4.2 Methodology employed

To capture the effects of external events, we divided the sample into two different time periods corresponding to tight and benign monetary policy. The first period of tight policy relates to the

period when monetary policy in the UK was dedicated towards maintaining the exchange rate within its target zone in the Exchange Rate Mechanism during 1990-1992. This required high rates of interest to match those in Germany after reunification and to offset the perceived weakness of sterling, which was at the bottom of its permitted range in the target zone for much of the period. The early 1990s also coincided with a recession and therefore represented a harsh episode for existing and new corporate borrowers. The second period 1993-1999 following the recession witnessed a period of sustained economic growth, falling unemployment and inflation, with interest rates at low levels. The corporate sector experienced an improvement in net worth and borrowing conditions were less constrained.

We compare small, medium and large firms, young and old firms, risky and secure firms, low-indebted and high-indebted firms to determine how these characteristics influenced the mix when monetary policy was tight compared to when it was benign. By categorising firms according to size, age, risk rating, solvency (the ratio of shareholders' equity to total asset), the gearing of the firm (the ratio of total debt to total equity), indebtedness and profitability we can establish the importance of different types of firm heterogeneity on recourse to external funds.

We estimate the relationship between the financial choices of firms and their specific characteristics using a standard panel model.[19] This can be written in the following form:

$$y_{it} = \alpha_i + X_{it}\beta + \varepsilon_{it}$$

where $i = 1,2,\ldots, N$ refers to a cross section unit (firms in this study), $t = 1,2,\ldots..,T$ refers to time period. y_{it} and X_{it} dependent variable and the vector of non-stochastic explanatory variables for firm i and year t, respectively. ε_{it} is the error term, α_i is firm-specific effects. Individual effects arising from the characteristics identified above can be treated as fixed effects or random effects. The fixed effects approach takes α_i as a firm-specific time invariant constant term in the regression, while random effects approach specifies that α_i is a firm-specific disturbance. The nature of the data and the specification of the model are important for the selection of estimation approach in panel data. Since our sample is drawn from a large population, the random effects

[19] Our theoretical model predicts the signs for a static framework, therefore we do not estimate a dynamic panel GMM-estimator such as that proposed by Arellano and Bond (1991). While our model is robust to firm-specific heterogeneity since we account for these factors explicitly in our model, we may still encounter endogenity bias. Estimates based on an IV estimator – which are robust to the endogeniety bias – suggested that the results are almost identical to those reported here. Therefore we conclude that the extent of the endogenity bias is very small.

model is the most suitable approach for estimation, because it is more likely that firm-specific constant terms are distributed randomly across cross-sectional units and there is no correlation between firm-specific constant terms and explanatory variables. When we compared a random effects model against a fixed effects alternative, we rejected the hypothesis of no systematic difference between coefficients obtained from the random effects and fixed effects models by using Hausman test, but the results obtained from random effects model are reported here.

We write the random effects model as follows:

$$y_{it} = X_{it}\beta + \varepsilon_{it}, \qquad \varepsilon_{it} = \alpha_i + e_{it}$$

where ε_{it}, the disturbance term, is made up of α_i representing an individual disturbance which is fixed over time and assumed to be uncorrected with explanatory variables and e_{it}, an idiosyncratic disturbance. The estimation process involved unbalanced panel data techniques to test our hypothesis.

5. Results

We report our findings in Tables 1 and 2, using the cumulative change in the interest rate, and for the purposes of comparison the responses to the apparent rate of interest are reported in Table 3[20]. In Tables 1 and 2 we partition the results into estimations for the tight period of monetary policy (1990-92) and the benign period (1993-99). The rows separate out the responses of firms according to type based on: size – small versus large firms; credit rating – risky and secure firms; age – young and old firms; high and low indebted firms and lastly firms with a high and a low capital return. The column heads indicate the response of the mix for firms in these categories to different variables of interest such as monetary policy stance, size (real asset measure), risk score, age, solvency, collateral asset size, and gearing.

Tables 1 and 2 each have three panels, labelled *a-c*, for the three different measures of the financial mix – short-term debt to current liabilities; total debt to total liabilities; and short-term debt to total debt. The Tables give three types of information. First, they indicate the

[20] We report only the response to monetary policy since it is only the interest rate variable that differs; in all other respects the sign and significance of the responses to firm-specific variables was identical after changing the measure of monetary stance, although the magnitudes did differ slightly. The results for the full set of tables are

different responses to variables such as monetary policy tightening by firms according to their type based on size, credit score, age, and indebtedness. This information is given by reading down the columns of each Table. Second, these responses can be compared for the three different measures of the mix by looking at the same columns in the separate panels of each Table. Last of all, they compare the impact for each variable on firms of a given type under different monetary policy conditions by comparing equivalent columns in Table 1 (tighter monetary policy) with those in Table 2 (looser monetary policy).

Response to monetary policy stance

Consider the first column in Table 1a. The coefficients on the measure of monetary stance, based on the cumulative base rate in the regression, are negative and significant across all firm types classified by size, credit ratings and age. This means that the mix falls for firms of all types, but the absolute values of these coefficients are larger for small, risky and young firms than for large or secure firms, therefore there is a greater response in the mix variable for smaller, more risky and younger firms when monetary policy tightens. This is in line with the predictions of our model, and suggests that the credit channel is more pronounced for financially fragile firms in tightening monetary conditions. Comparing the results in the first column for in Tables 1b and 1c shows that similar results are obtained when we use other measures of the mix such as the ratio of short-term debt to total debt, and the ratio of total debt to total liabilities.

These findings are also supported if we use the interest burden, i.e. the ratio of interest payment to total debt, as a measure of monetary tightness instead of the cumulative change in the base rate. The results reported in Table 3 indicate the response of each mix measure for the two periods allowing for the impact effect of interest rate changes on cash flow, where risky and indebted firms will have a much greater response to interest rate changes than other firms. In the case of indebted firms, the response is over 100 times larger than the whole sample response for Mix 1 and approximately 170 times, and 260 times higher for Mix 2 and 3. By contrast, low indebted firms, and those that are old or large, show very little difference from the response of the full sample.

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available from the authors on request, but we do not report them here in the interests of keeping the paper to a managable length.

When we compare these results with Table 2, when monetary policy is benign, we find that the coefficients on the monetary stance variable for the period of 1993-1999 are positive and significant and show no significant differences across firm-specific characteristics. The same can be said of the apparent interest rate measure although in this case the coefficients remain negative, but they are smaller in absolute value than in the period when there was a tight monetary stance. This implies that firm-specific characteristics bite when monetary policy tightens, but they do not matter so much when it loosens.

The credit channel literature has hypothesised that firm size, risk, age and indebtedness will have an impact on the transmission of monetary policy such that small, risky, young and indebted firms with relatively limited collateral assets and weak balance sheet positions are will be more likely to experience the negative effects of a tight monetary policy because they are unlikely to obtain substitutes in the forms of external funds. Our results confirm this view. Two main implications may be highlighted from our evidence that have a bearing on these hypotheses. First, all firms – whether they are large, small, risky, secure, young or old – are less likely to have access to short-term loans during recessionary periods, as indicated by the responses of the whole sample reported in the first row of Tables 1 and 2. This result confirms that a bank-lending channel operates on all types of firms not just small firms, as suggested by Kashyap *et al.* (1993). It also confirms the theoretical predictions made by Bernanke and Blinder (1988) and Kashyap *et al.* (1993) that tight monetary policy constrains loan supply. Thus there is substantial evidence for a bank-lending channel, and it is not independent of firm-specific characteristics, especially during tightening periods. Second, there is substantial heterogeneity in the impact of monetary policy stance on firm finance across firm categories and policy periods – small, young and risky firms are affected more severely than larger, older and more secure firms. When interest rates are high and monetary policy is tight, financially weak firms tended to reduce the short-term debt component of external finance, shifting toward non-debt liabilities. This suggests that these firms were confronted with some constraints in raising intermediate finance, and diversification in the coefficients of firm categories during the recession may be considered important evidence for the broad credit channel, confirming the findings in Oliner and Rudebusch (1996).

Response to firm-specific characteristics

Comparing the subsequent columns in each of the panels in Tables 1(a-c) and 2(a-c) allows us to investigate the specific influence of factors such as asset size, risk, age, solvency, collateral assets and gearing. Taking asset size first, according to the theoretical model we expect to find that firms with greater assets have greater access to intermediary financing. We find support for this prediction because we observe predominantly positive signs, implying a greater share of intermediary finance is sought and obtained in response to increasing real assets. But there is also some evidence in the Tables that greater asset size also leads to a reduction in short-term debt. This shift towards finance with a longer term to maturity is consistent with stronger balance sheets; therefore we are not surprised to find that small and risky firms shift away from short-term debt as asset size increases. This effect is seen more systematically in Table 2c, where firms of all types shift out of short term debt as monetary policy loosens, and conditions relating to financial health improve.

The QuiScore may be interpreted as the perception of the financial health and risk of firms. Estimation results imply that this risk assessment is an important explanatory variable for the different version of the mix across firm categories and policy regimes. The coefficient estimates are consistently negative and significant in all cases, while the coefficients are larger for the tight money period than for the benign period. That is, the firms with higher credit ratings have the opportunity to access alternative finance other than bank debt and this fact is more important during tight monetary policy, when the supply of loans is more likely to be constrained. The coefficients on the QuiScore do not vary a great deal with respect to size or age in a tight money period but two factors that do matter are the perceived riskiness of firms and the level of indebtedness. During the tight monetary period risky and highly indebted firms experience a more substantial decline in the mix variables based on their individual risk scores than low risk and low debt firms. In the benign period, riskiness matters less, but indebtedness continues to have an adverse effect on the mix. Secure firms shift towards long-term debt as monetary policy tightens and their reliance on short-term debt declines by more than less secure firms.

The influence of the year of incorporation on the mix appears to be a significant explanatory variable for the less established firms. Small, young and risky firms are more likely

to be sensitive to this measure than older, larger and more secure firms. There is no systematic difference in the response during tight versus benign periods of monetary policy, rather, age provides confirmation of the importance of a track record for certain types of firms. For large, secure and old firms the mix is reduced by the age, which suggests that these firms have alternative sources of funds perhaps because they can overcome the dispersed investor problem identified by Diamand (1984, 1991) and Chant (1992), with their long-established corporate histories. Small and financially weak firms are less likely to be subject to financial constraints if they are older, implying that access to bank loans in tight periods is possible if they have a track record. This is indirect evidence for a relationship-banking thesis (Rajan, 1992, Berlin and Mester, 1999 and Boot, 2000).

The influence of firm solvency (the ratio of equity to total asset) on the mix measures follows much the same pattern as the risk score, and clearly risk assessments and solvency are closely related. In almost all the regressions, the coefficient on firm solvency is significantly positive, as expected[21]. Coefficients are relatively higher in the tight money period implying that firm solvency is a more important factor for explaining the change in the composition of firm finance when interest rates are high than in a recovery period when they are low. This result provides support for the financial accelerator theory proposed by Kiyotaki and Moore (1997), since this aspect of the credit channel operates on the balance sheet through cash flow.

The measure of collateral assets is liable to be very important for access to external finance. Our theoretical model implies that the response of the mix to greater collateral assets will be negative for firms in the upper tail of the distribution, since they have greater access to market finance when they have more collateral. We may assume that secure, large, old and high profitable firms are in upper tail of distribution, but the model does not imply anything for other types of firms. Our Tables indicate that larger, older and more secure firms do reduce their intermediary finance when collateral assets increase, while other types of firms increase their intermediary finance. Short term debt as a proportion of total debt declines across the board as collateral increases, indicating that there is a shift in the composition of total debt towards longer maturity finance as collateral assets increase.

[21] The exception is the regression of total debt to total liabilities ratio where improved solvency can reduce the total debt as a proportion of total liabilities for straightforward accounting reasons.

Gearing also appears to be a significant factor. Our model predicted that a rise in firm debt relative to assets would lead to an increase in the demand for intermediary finance, and this is what we find in the panel data evidence. On theoretical grounds, firms with high debt are more likely to have a close relation with banks and thus to raise bank finance relative to weak firms in terms of collateral and track records. Empirically, the positive and significant coefficients for gearing in all regressions would confirm this hypothesis.

Finally, comparing the responses of the top 25% with the bottom 25% of firms according to their expected returns, we find that there was little evidence of significant differences in the response to the measures of the financial mix in tight or benign periods with the exception of the ratio of short-term debt to total debt. Here the response indicates that the firms expected to be most profitable, and therefore least likely to be financially constrained, were more inclined to reduce their exposure to short-term debt as interest rates increased. Only fianncially healthy firms are predicteed to be able to access to longer term market finance, therefore this finding is supportive of our model.

6. Conclusions

This paper has re-examined the evidence for credit channels on the composition of corporate finance during tight and loose periods of monetary policy. The paper has developed a new theoretical framework in which to analyse the effects of monetary policy and firm-specific characteristics based on Diamand (1991) and Hoshi *et al.* (1993). This model makes predictions about the response in financial structure to firm-specific characteristics. Using firm level data for 16,000 firms over a decade allows us to test the predictions based on size, credit rating, age and indebtedness to determine whether monetary policy tightening influences the mix between types of short-term and long-term finance.

The results show that smaller, more risky or highly indebted and younger firms are more noticeably affected by monetary tightening than larger, secure, less-indebted or older firms. This confirms the findings of major US studies relating to the credit channel, and suggests that these features are also present in UK data. Specifically, there is a broad credit channel effect (Oliner and Rudebusch, 1996), a bank-lending channel (Kashyap *et al.* 1993 and Gertler and Gilchrist, 1994), accelerator effects (Kiyotaki and Moore, 1997, and Bernanke *et al.,* 1999), evidence

consistent with relationship banking when age proxies for the development of such bank-firm relationships (Rajan, 1992, Berlin and Mester, 1999 and Boot, 2000), and an influence from debt gearing (Hoshi *et al.*, 1993).

The effect of the tightening of monetary policy is felt more severely by small and medium sized firms and by those that have adverse financial characteristics such as poor solvency, a short track record, high gearing and low real assets compared to the large, financially healthy, long-established companies with good credit ratings. Larger companies are least affected in the composition of their financial structure by a changing monetary climate. We conclude that Oliner and Rudebusch (1996) were right to point out the importance of distinguishing between firm types, but in the UK, the effects of making this distinction do not undermine the findings of Kashyap *et al.* (1993) as they did in the US. Our investigation has uncovered new dimensions to the influence of firm-specific characteristics, besides size, on the impact of monetary policy through the credit channel.

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Appendix:
Definition of Terms Used in the Tables

CINTR	Cumulative Change in the Base Rate
RASSET	Log of Total Real Assets
SCORE	Rating Scores (in previous version was QuiScore)
AGE	Age of Firm
SOLV	Ratio of Shareholder Equity to Total Assets (Percent)
CRATE	Ratio of Tangible Assets to Total Assets i.e. collateral (percent)
GEAR	Ratio of Debt to Shareholder Equity (Percent)
CONS	Intercept

Table 1a: Estimation Results Using Cumulative Change in Interest Rates as a Monetary Stance Variable for the Period 1990-92

Dependent variable: Short-Term Debt/Current Liabilities (MIX1)

	OBS.	CINTR	RASSET	SCORE	AGE	SOLV	CRATE	GEAR	CONS	R^2
Whole Sample	**31,309**	**-0.097**	**3.295**	**-0.734**	**0.010**	**0.328**	**0.802**	**0.006**	**34.964**	**0.242**
		-18.73	29.66	-73.71	1.26	29.06	1.00	25.97	33.29	
Small	**6,929**	**-0.282**	**2.903**	**-0.686**	**0.034**	**0.343**	**7.349**	**0.007**	**46.164**	**0.217**
		-21.11	6.52	-32.12	1.79	14.70	4.79	15.09	14.48	
Large	**11,924**	**-0.007**	**4.350**	**-0.750**	**0.007**	**0.322**	**-2.560**	**0.004**	**18.042**	**0.276**
		-0.91	27.48	-48.32	0.62	18.08	-1.96	12.17	10.58	
Risky	**6,860**	**-0.128**	**4.122**	**-0.806**	**0.063**	**0.500**	**1.353**	**0.006**	**29.477**	**0.216**
		-9.40	18.30	-23.92	3.76	17.46	0.83	17.98	12.62	
Secure	**13,265**	**-0.072**	**2.459**	**-0.555**	**-0.024**	**0.138**	**-1.045**	**0.006**	**39.384**	**0.088**
		-9.42	16.83	-28.82	-2.43	8.66	-0.95	7.87	21.03	
Young	**11,482**	**-0.114**	**3.577**	**-0.721**	**0.245**	**0.381**	**4.047**	**0.007**	**27.376**	**0.235**
		-11.68	19.41	-43.27	3.44	19.95	3.19	20.20	14.21	
Old Firms	**19,827**	**-0.087**	**3.081**	**-0.739**	**-0.023**	**0.284**	**-1.600**	**0.005**	**41.142**	**0.256**
		-13.78	22.03	-59.51	-2.20	20.09	-1.56	16.90	29.72	
Highly Indebted	**7,984**	**-0.076**	**1.473**	**-0.777**	**0.063**	**1.367**	**-12.232**	**0.006**	**44.597**	**0.307**
		-7.09	7.96	-46.07	4.50	39.80	-9.02	23.05	24.79	
Low Indebted	**7,717**	**-0.017**	**0.493**	**-0.155**	**-0.026**	**0.438**	**-13.676**	**1.296**	**-15.557**	**0.377**
		-3.50	4.72	-15.41	-4.44	40.22	-18.58	60.85	-16.16	
High Cap. Return	**10,274**	**-0.110**	**4.600**	**-0.475**	**0.039**	**0.156**	**-4.657**	**0.007**	**15.137**	**0.214**
		-11.10	23.63	-22.64	2.83	7.22	-3.54	21.74	8.66	
Low Cap. Return	**7,397**	**-0.097**	**2.257**	**-0.745**	**-0.011**	**0.250**	**0.569**	**0.004**	**49.717**	**0.200**
		-7.13	10.76	-33.73	-0.84	11.38	0.38	10.35	23.12	

Note: z-values are given below the coefficients

Table 1b: Estimation Results Using Cumulative Change in Interest Rates as a Monetary Stance Variable for the Period 1990-92

Dependent variable: Total Debt/Total Liabilities (MIX2)

	OBS.	CINTR	RASSET	SCORE	AGE	SOLV	CRATE	GEAR	CONS	R^2
Whole Sample	**29,674**	**-0.142**	**3.061**	**-0.346**	**-0.010**	**-0.091**	**18.684**	**0.005**	**38.457**	**0.225**
		-26.66	26.84	-34.16	-1.20	-7.87	22.69	23.61	35.64	
Small	**6,738**	**-0.266**	**4.706**	**-0.332**	**0.001**	**-0.012**	**27.074**	**0.006**	**29.689**	**0.212**
		-19.03	10.11	-14.88	0.05	-0.50	16.96	14.40	8.91	
Large	**10,813**	**-0.080**	**3.148**	**-0.277**	**-0.007**	**-0.217**	**13.306**	**0.003**	**34.479**	**0.219**
		-10.23	18.61	-17.20	-0.63	-11.57	9.66	9.24	18.81	
Risky	**6,717**	**-0.158**	**4.032**	**-0.609**	**0.022**	**0.323**	**12.910**	**0.005**	**33.259**	**0.222**
		-12.09	19.49	-19.22	1.45	12.18	8.61	18.72	15.28	
Secure	**12,111**	**-0.122**	**1.825**	**-0.114**	**-0.033**	**-0.388**	**18.640**	**0.008**	**48.036**	**0.187**
		-14.63	11.25	-5.42	-3.07	-21.95	15.30	9.51	23.12	
Young	**10,889**	**-0.153**	**3.456**	**-0.293**	**-0.039**	**-0.056**	**25.209**	**0.006**	**29.896**	**0.205**
		-15.11	18.02	-17.04	-0.53	-2.80	19.09	18.25	14.90	
Old Firms	**18,785**	**-0.136**	**2.739**	**-0.375**	**-0.004**	**-0.117**	**13.952**	**0.004**	**45.349**	**0.246**
		-21.31	19.26	-29.93	-0.40	-8.15	13.32	15.50	32.20	
Highly Indebted	**7,922**	**-0.130**	**1.567**	**-0.207**	**0.029**	**0.886**	**3.177**	**0.005**	**41.296**	**0.164**
		-12.72	9.63	-13.36	2.38	28.20	2.63	24.05	25.64	
Low Indebted	**6,474**	**0.004**	**-0.142**	**-0.137**	**-0.026**	**0.493**	**-8.641**	**1.477**	**-16.558**	**0.464**
		0.76	-1.27	-12.56	-4.05	41.82	-10.94	63.72	-15.86	
High Cap. Return	**11,618**	**-0.160**	**3.404**	**-0.090**	**0.001**	**-0.226**	**19.091**	**0.007**	**23.622**	**0.175**
		-16.58	18.31	-5.00	0.10	-12.06	15.38	16.21	13.85	
Low Cap. Return	**7,266**	**-0.167**	**2.499**	**-0.262**	**-0.049**	**-0.165**	**13.684**	**0.004**	**51.864**	**0.181**
		-12.71	12.31	-12.23	-3.75	-7.68	9.39	10.33	24.96	

Note: z-values are given below the coefficients

Table 1c: Estimation Results Using Cumulative Change in Interest Rates as a Monetary Stance Variable for the Period 1990-92

Dependent variable: Short-Term Debt/Total Debt (MIX3)

	OBS.	CINTR	RASSET	SCORE	AGE	SOLV	CRATE	GEAR	CONS	R^2
Whole Sample	**28,496**	**-0.052**	**1.573**	**-0.941**	**0.069**	**1.011**	**-49.026**	**0.004**	**83.173**	**0.172**
		-5.53	9.12	-56.72	5.73	53.98	-38.21	10.84	49.73	
Small	**6,145**	**-0.480**	**-3.982**	**-1.021**	**0.154**	**1.046**	**-47.474**	**0.006**	**151.511**	**0.217**
		-19.65	-5.69	-28.98	5.10	27.22	-19.50	7.94	30.02	
Large	**10,799**	**0.105**	**2.663**	**-1.006**	**0.056**	**1.128**	**-41.436**	**0.003**	**56.021**	**0.174**
		7.99	9.91	-37.81	3.07	36.66	-18.68	5.05	19.05	
Risky	**6,603**	**-0.064**	**0.800**	**-0.658**	**0.143**	**0.613**	**-42.214**	**0.002**	**88.638**	**0.113**
		-3.17	2.77	-13.93	6.73	15.85	-19.92	5.65	28.12	
Secure	**11,341**	**-0.048**	**1.943**	**-0.898**	**0.018**	**1.098**	**-50.640**	**0.003**	**73.793**	**0.189**
		-2.91	7.23	-23.39	0.99	35.41	-24.36	1.84	20.27	
Young	**10,470**	**-0.098**	**1.718**	**-0.944**	**0.816**	**0.954**	**-52.121**	**0.004**	**80.384**	**0.186**
		-5.70	6.06	-34.38	7.45	30.45	-25.93	6.79	26.57	
Old Firms	**18,026**	**-0.022**	**1.714**	**-0.939**	**-0.030**	**1.018**	**-47.011**	**0.004**	**83.833**	**0.162**
		-1.95	7.84	-45.01	-1.83	43.06	-28.35	8.30	37.88	
Highly Indebted	**1,871**	**0.071**	**-0.962**	**-1.015**	**0.108**	**1.045**	**-48.224**	**0.002**	**101.523**	**0.295**
		4.86	-3.73	-43.61	5.56	21.94	-25.58	4.88	40.60	
Low Indebted	**5,607**	**-0.323**	**5.266**	**0.040**	**-0.020**	**0.757**	**-44.736**	**1.410**	**-0.034**	**0.169**
		-12.16	10.90	0.81	-0.72	14.30	-12.63	13.18	-0.01	
High Cap. Return	**8,502**	**-0.214**	**6.733**	**-0.741**	**0.119**	**0.719**	**-52.879**	**0.005**	**57.889**	**0.164**
		-10.25	19.69	-18.65	4.87	17.25	-21.82	8.70	18.29	
Low Cap. Return	**7,201**	**0.020**	**-0.716**	**-1.110**	**0.095**	**1.017**	**-43.362**	**0.002**	**97.097**	**0.240**
		1.03	-2.62	-36.43	5.36	33.90	-21.87	4.21	33.75	

Note: z-values are given below the coefficients

Table 2a: Estimation Results Using Cumulative Change in Interest Rates as a Monetary Stance Variable for the Period 1993-99

Dependent variable: Short-Term Debt/Current Liabilities (MIX1)

	OBS.	CINTR	RASSET	SCORE	AGE	SOLV	CRATE	GEAR	CONS	R^2
Whole Sample	**94,523**	**0.061**	**3.341**	**-0.585**	**0.039**	**0.170**	**0.757**	**0.004**	**25.057**	**0.185**
		13.34	38.04	-104.97	5.81	26.65	1.47	28.85	32.28	
Small	**17,657**	**0.040**	**5.098**	**-0.458**	**0.075**	**0.076**	**9.746**	**0.003**	**10.681**	**0.125**
		3.67	16.44	-36.57	4.43	5.39	8.65	12.31	4.89	
Large	**37,131**	**0.036**	**4.818**	**-0.672**	**0.029**	**0.242**	**-7.754**	**0.003**	**12.800**	**0.258**
		5.26	39.64	-79.94	3.24	25.13	-9.8	18.62	10.65	
Risky	**16,920**	**0.055**	**3.911**	**-0.534**	**0.061**	**0.244**	**5.486**	**0.003**	**17.587**	**0.183**
		4.87	23.49	-26.86	4.65	14.49	4.83	18.37	11.14	
Secure	**43,649**	**0.045**	**2.248**	**-0.473**	**0.007**	**0.062**	**-2.713**	**0.006**	**34.923**	**0.065**
		6.92	19.72	-44.18	0.94	6.76	-3.87	11.55	29.58	
Young	**41,331**	**0.030**	**3.687**	**-0.550**	**0.624**	**0.171**	**4.404**	**0.004**	**12.965**	**0.170**
		4.05	27.48	-64.72	18.34	17.39	5.68	23.56	11.27	
Old Firms	**53,192**	**0.053**	**2.760**	**-0.610**	**0.037**	**0.148**	**-2.172**	**0.003**	**33.631**	**0.203**
		8.85	23.7	-82.81	3.96	17.58	-3.16	17.05	30.96	
Highly Indebted	**23,167**	**0.051**	**1.761**	**-0.702**	**0.068**	**1.075**	**-9.439**	**0.004**	**38.540**	**0.243**
		5.81	13.17	-70.96	6.31	56.23	-10.64	28.77	31.87	
Low Indebted	**23,596**	**0.011**	**0.251**	**-0.170**	**-0.016**	**0.519**	**-16.525**	**1.471**	**-18.884**	**0.391**
		2.44	2.99	-27.22	-3.09	73.59	-30.36	109.31	-25.51	
High Cap. Return	**32,568**	**0.046**	**4.138**	**-0.370**	**0.064**	**0.011**	**-4.279**	**0.005**	**10.045**	**0.193**
		5.71	31.32	-33.37	6.26	0.97	-5.15	26.25	8.98	
Low Cap. Return	**17,911**	**0.070**	**2.305**	**-0.555**	**-0.012**	**0.154**	**1.201**	**0.002**	**37.288**	**0.138**
		5.8	15.07	-41.92	-1.16	11.43	1.17	9.84	25.64	

Note: z-values are given below the coefficients

Table 2b: Estimation Results Using Cumulative Change in Interest Rates as a Monetary Stance Variable for the Period 1993-99

Dependent variable: Total Debt/Total Liabilities (MIX2)

	OBS.	CINTR	RASSET	SCORE	AGE	SOLV	CRATE	GEAR	CONS	R^2
Whole Sample	**88,745**	**0.039**	**3.477**	**-0.241**	**0.042**	**-0.217**	**16.849**	**0.003**	**23.670**	**0.194**
		8.36	39.09	-43.2	6.18	-33.54	32.1	26.63	30.04	
Small	**17,130**	**0.031**	**6.227**	**-0.185**	**0.067**	**-0.219**	**27.132**	**0.004**	**1.347**	**0.160**
		2.74	19.64	-14.53	3.83	-15.22	23.62	13.77	0.6	
Large	**32,590**	**0.010**	**4.196**	**-0.258**	**0.046**	**-0.234**	**3.675**	**0.003**	**20.526**	**0.191**
		1.42	31.73	-30.36	4.93	-23.34	4.38	14.33	15.5	
Risky	**16,515**	**0.039**	**3.965**	**-0.366**	**0.036**	**0.110**	**16.842**	**0.003**	**18.084**	**0.195**
		3.66	25.89	-19.68	3.02	7.06	16.01	21.25	12.36	
Secure	**39,518**	**0.029**	**2.287**	**-0.107**	**0.023**	**-0.406**	**13.413**	**0.010**	**37.170**	**0.173**
		4.11	18.86	-9.48	2.72	-41.28	17.81	17.72	29.47	
Young	**38,820**	**0.010**	**3.886**	**-0.235**	**0.408**	**-0.168**	**21.927**	**0.004**	**13.341**	**0.171**
		1.35	28.45	-27.2	11.78	-16.63	27.57	21.94	11.3	
Old Firms	**49,925**	**0.038**	**2.899**	**-0.245**	**0.062**	**-0.266**	**12.776**	**0.003**	**31.150**	**0.221**
		6.31	24.7	-33.57	6.63	-31.49	18.38	15.76	28.42	
Highly Indebted	**22,989**	**0.038**	**2.899**	**-0.245**	**0.062**	**-0.266**	**12.776**	**0.003**	**31.150**	**0.148**
		6.31	24.7	-33.57	6.63	-31.49	18.38	15.76	28.42	
Low Indebted	**19,282**	**0.005**	**-0.045**	**-0.132**	**-0.022**	**0.577**	**-13.737**	**1.737**	**-22.976**	**0.467**
		1.11	-0.5	-20.16	-3.89	76.88	-23.33	121.36	-28.5	
High Cap. Return	**28,383**	**0.028**	**3.151**	**-0.156**	**0.053**	**-0.219**	**10.554**	**0.005**	**17.293**	**0.165**
		3.15	23.33	-13.38	5.12	-17.85	11.97	22.41	14.97	
Low Cap. Return	**17,655**	**0.035**	**2.873**	**-0.105**	**-0.017**	**-0.242**	**14.028**	**0.002**	**31.661**	**0.155**
		3.06	19.71	-8.4	-1.65	-18.92	14.32	10.8	22.88	

Note: z-values are given below the coefficients

Table 2c: Estimation Results Using Cumulative Change in Interest Rates as a Monetary Stance Variable for the Period 1993-99

Dependent variable: Short-Term Debt/Total Debt (MIX3)

	OBS.	CINTR	RASSET	SCORE	AGE	SOLV	CRATE	GEAR	CONS	R^2
Whole Sample	**85,311**	**0.056**	**-0.778**	**-0.801**	**0.035**	**0.890**	**-47.575**	**0.002**	**99.253**	**0.211**
		8.38	-6.66	-100.57	3.98	97.31	-65.6	10.27	94.76	
Small	**15,938**	**0.018**	**-2.923**	**-0.636**	**0.097**	**0.732**	**-49.947**	**0.001**	**111.477**	**0.205**
		1.15	-7.32	-37.16	4.67	38.46	-34.04	2.81	39.45	
Large	**32,519**	**0.072**	**0.286**	**-0.898**	**0.013**	**0.993**	**-40.486**	**0.002**	**87.010**	**0.192**
		6.57	1.48	-69.19	0.92	65.22	-32.25	8.17	44.73	
Risky	**16,207**	**0.052**	**-0.536**	**-0.507**	**0.076**	**0.419**	**-40.845**	**0.000**	**97.456**	**0.011**
		3.52	-2.9	-20.59	5.39	20.73	-31.19	0.96	53.53	
Secure	**37,128**	**0.044**	**-0.859**	**-0.783**	**0.003**	**1.027**	**-47.885**	**-0.001**	**92.019**	**0.254**
		4.08	-5.16	-46.36	0.3	70.76	-44.22	-1.34	51.35	
Young	**37,321**	**0.035**	**-0.536**	**-0.756**	**0.680**	**0.809**	**-49.589**	**0.002**	**90.018**	**0.201**
		3.22	-3	-61.85	14.31	56.95	-45.51	7.74	56.82	
Old Firms	**47,990**	**0.047**	**-1.013**	**-0.830**	**-0.033**	**0.926**	**-46.069**	**0.002**	**104.967**	**0.222**
		5.33	-6.54	-79.13	-2.73	77.02	-47.56	6.39	71.84	
Highly Indebted	**22,846**	**0.053**	**-1.595**	**-0.960**	**0.067**	**0.879**	**-47.829**	**0.001**	**115.260**	**0.318**
		4.71	-9.17	-75.39	4.77	35.58	-41.58	3.1	73.14	
Low Indebted	**16,723**	**0.040**	**0.645**	**-0.106**	**0.017**	**0.395**	**-29.424**	**-0.043**	**62.956**	**0.043**
		2.38	2.48	-5.14	1.06	16.73	-16.09	-0.92	25.74	
High Cap. Return	**25,891**	**0.074**	**2.267**	**-0.610**	**0.106**	**0.623**	**-49.569**	**0.003**	**77.519**	**0.137**
		5.22	11.74	-34.02	7.19	32.91	-37.52	10.24	46.11	
Low Cap. Return	**17,501**	**0.059**	**-1.782**	**-0.973**	**0.027**	**0.877**	**-41.444**	**0.001**	**109.023**	**0.280**
		3.96	-10.39	-60.43	2.34	54.31	-34.74	2.45	65.98	

Note: z-values are given below the coefficients

Table 3: Comparable ResponsesWhen Using Apparent Interest Rates

Responses of the Mix Measures						
Dependent variable:	***MIX1***	***MIX2***	***MIX3***	***MIX1***	***MIX2***	***MIX3***
Sample Period	***1990-92***	***1990-92***	***1990-92***	***1993-99***	***1993-99***	***1993-99***
Whole Sample	**-0.016**	**-0.019**	**0.006**	**-0.002**	**-0.003**	**0.002**
	-4.74	-5.52	1.09	-4.06	-5.66	2.47
Small	**-0.106**	**-0.114**	**-0.055**	**-0.002**	**-0.003**	**0.001**
	-4.06	-4.4	-1.28	-4.02	-4.48	1.28
Large	**-0.010**	**-0.012**	**0.008**	**-0.045**	**-0.049**	**-0.046**
	-3.42	-3.89	1.64	-7.33	-8.33	-5.1
Risky	**-0.343**	**-0.363**	**-0.158**	**-1.151**	**-1.385**	**0.282**
	-7.62	-8.58	-2.55	-8.48	-10.72	1.58
Secure	**-0.021**	**-0.027**	**0.019**	**-0.005**	**-0.006**	**0.009**
	-2.35	-2.95	1.11	-1.62	-2.11	1.84
Young	**-0.079**	**-0.093**	**0.017**	**-0.002**	**-0.003**	**0.002**
	-3.44	-4.16	0.44	-3.79	-5.3	2.39
Old Firms	**-0.015**	**-0.017**	**0.006**	**-0.046**	**-0.060**	**0.037**
	-4.3	-4.97	1.04	-4.2	-5.58	2.33
Highly Indebted	**-1.681**	**-3.273**	**1.603**	**-0.001**	**-0.002**	**0.002**
	-6.11	-12.63	4.22	-3.16	-5.14	2.92
Low Indebted	**-0.002**	**-0.002**	**0.008**	**-0.001**	**-0.001**	**0.001**
	-0.9	-1.22	0.98	-0.51	-0.5	0.44
High Cap. Return	**-0.261**	**-0.377**	**0.121**	**-0.005**	**-0.006**	**0.002**
	-4.24	-6.32	1.1	-1.68	-2.04	0.48
Low Cap. Return	**-0.011**	**-0.015**	**0.011**	**-0.803**	**-1.125**	**0.249**
	-2.51	-3.59	1.82	-8.34	-12.5	2.05

Note: z-values are given below the coefficients