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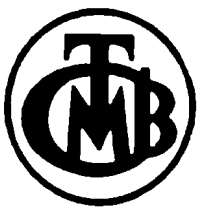

The Impact of Firm-Specific Characteristics on the Response to Monetary Policy Actions

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Abstract

This paper examines the impact of monetary policy on 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 distributional implications from tightening monetary policy.

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1. Introduction

A considerable body of literature has built up to explore the credit channel of monetary transmission including papers 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 health is used as an indicator to determine firms' access to internal and external funds, so that when monetary policy tightens real variables such as employment, production, sales, investment and inventory accumulation decisions are influenced by higher interest rates and by contracting credit supply (Fazzari *et al*., 1988, Guariglia and Schiantarelli, 1998, Nickell and Nicolitsis, 1999, and Guariglia, 1999). The point here is that access to credit is determined by firm-specific characteristics and therefore the effects of monetary policy contractions are unlikely 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 issue for monetary policy makers. Our paper tackles this subject.

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) and Oliner and Rudebusch (1996) 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 periods of both tight and benign monetary policy, we can consider their effects. The influence of the above factors on firms' access to bank versus market-based finance when monetary policy is altered is the point that the present paper addresses[1].

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

[1] Kishan and Opiela (2000) use a similar methodology with bank balance sheet data to offer support for the lending channel.

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 but also, crucially from the point of view of the credit channel, on firm-specific characteristics, which are the basis that credit providers use to identify creditworthy applicants. The predictions from our model are evaluated for a panel of 16,000 manufacturing firms in the UK. Our results show 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. Thus we offer empirical support for the theoretical model, and can quantify the effects of particular characteristics on the responsiveness to monetary policy..

The paper is organized as follows. Section 2 provides a theoretical model to explore the influence of firm-specific characteristics on the mix as monetary policy contracts or expands. Section 3 explains the predictions of the model. The data sources and methodology are discussed in Section 4, and then Section 5 presents the empirical evidence. Section 6 concludes.

2. The Theoretical Model

We extend a theoretical model based on 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[2]. Initially used by Hoshi *et al.* (1993) to analyse ownership structure and external finance in Japan, our application is different as we explicitly introduce the interest rate to derive the implications of monetary policy decisions.

Our main interest in this paper is to understand how firm characteristics influence the effects of monetary policy on the ability of firms to raise funds from either capital markets or from banks. As Hoshi *et al.* (1993) demonstrated we can derive a taxonomy of firms according to their source of finance that depends on their individual characteristics, such as age, size, total assets, short- and long-term liabilities, credit ratings, and solvency and gearing ratios. Our main contribution is to analyse the effects of changes in monetary policy on the above taxonomy. More specifically, there

[2] Other significant papers by Besanko and Kanatas (1993), Holmstrom 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.

are two kinds of predictions that we derive and subsequently test. First, we would like to know the direct effects of monetary policy changes on financial choice. This is straightforward, but monetary policy also has some indirect effects. It is well documented in the literature, that financial choices of firms also depend on their individual characteristics due to the screening process of financial intermediaries offering credit, for example. Therefore, our second objective is to understand whether these indirect effects are also influenced by monetary policy. Of course, we would also like to make sure that the standard first order effects of individual characteristics on financial choice are corroborated by our new data. The remainder of this section and the next carefully document the model and its predictions to ensure that our contribution is clearly stated.

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 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 maximizes the financial payoff and the private benefit but if his equity share is zero $(\alpha = 0)$, he only maximizes 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 $b > 0$[3]. The manager chooses the type of project that maximizes 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[4]. If the firm cannot meet its commitments, the lender can liquidate the tangible collateral, A_C. The

[3] We follow Hoshi *et al.* (1993) by assuming that the private benefit is proportional to the size of project and the size of the project proportional to the size of the firm. For consistency, we also assume that the payoff when the project is successful is also proportional to the size of the project.

[4] This assumption implies that existing debt rather than new debt is paid off first in the case of default.

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

Here we have introduced 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 access to external finance[5]. 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) $$\frac{\alpha(p_2 - p_1)}{A_T}\left(X - \frac{F(1+r) + D_E - A_C}{p_2}\right) \geq b$$

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

[5] 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. This is especially appropriate in our case because we use UK data where the official interest rate is used by the Bank of England to conduct monetary policy with respect to its inflation target. The change in this instrument is a direct measure of the monetary policy stance.

in monitoring intermediary institutions, mainly banks[6]. Now if the 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 $p_2L + (1 - p_2)(A_C - D_E) = (F + m)(1+r)$.[7] In this case, the manager's payoff is $\alpha[p_2X + A_T - D_E - (F+m)(1+r)]$ and the manager prefers intermediary finance if the following expression holds:

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

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:

$$(5) \qquad \frac{p_2X}{A_T} \geq \frac{p_2b}{\alpha(p_2 - p_1)} + \frac{F(1+r)}{A_T} - \frac{A_C}{A_T} + \frac{D_E}{A_T}$$

$$(6) \qquad \frac{p_2X}{A_T} \leq \frac{m(1+r)p_2}{(p_2 - p_1)A_T} + \frac{p_2b}{\alpha(p_2 - p_1)}$$

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

$$(7) \qquad \frac{m(1+r)p_2}{(p_2 - p_1)A_T} + \frac{p_2b}{\alpha(p_2 - p_1)} \leq \frac{p_2X}{A_T} \equiv p_2x \leq \frac{p_2b}{\alpha(p_2 - p_1)} + \frac{F(1+r)}{A_T} - \frac{A_C}{A_T} + \frac{D_E}{A_T}$$

where the identity is implied by our restriction that X is proportional to the size of the project. Notice that p_2X 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.

[6] Both Diamond (1984) and Chant (1992) have shown that banks have greater incentives to monitor than individual investors.

[7] In this case, the repayment to a monitoring institution includes both the loan return and the monitoring cost.

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. characterized 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.

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. Here we sign the partial derivatives of our model and, where possible, 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:

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

where the above derivation takes into account that F and X are assumed to be proportional to A_T. Our model predicts that the range of bank finance is *ceteris paribus* increasing with firm size.

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 and the number of firms that can access bank finance.

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 for much the same reasons[8]. 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 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.[9] Our model predicts that firms fall into three groups according to their profitability, and controlling for other firm characteristics, this affects their financial options. High-profit firms finance their projects by borrowing directly from 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[10].

[8] The term $(A_C - D_E)/A_T$ can be thought of as a measure of net worth.

[9] 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.

[10] 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).

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 firm balance sheets (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 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.[11] In addition, the above expressions suggest that, since net worth affects only the upper limit, the more sensitive the former is to interest rate changes, i.e. the higher is $\left|\frac{\partial\omega}{\partial r}\right|$, the greater the effect of a change in interest rates will be on the upper limit.

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):

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

[11] 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.

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.

4. Data

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 UK companies. 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 on the following criteria[12]:

- Firms whose primary activity is classified as manufacturing industry according to 1992 SIC UK Code in England, Scotland, Wales and Northern Ireland [13].
- Firms established prior to 1989 and still reporting for the years 1999 and 2000[14].

[12] 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.

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

We now turn to our measure of the financial mix. Kashyap *et al.* (1993) defined the mix as the 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 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 variety of firm characteristics, namely size; perceived riskiness (QuiScore); age; solvency; gearing; real asset size. The database contains quite rich information about firms on these characteristics. 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.[15] 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. Firms whose QuiScore figures are at most 40, were labeled risky firms while those have QuiScore over 60 were labeled secure firms.

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[14] 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).

[15] 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, i.e. *secure band* (81-100), *stable band* (61-80), *normal band* (41-60), u*nstable band* (21-40) and *high risk band* (0-20). .

There are four other measures of firm-specific characteristics that we employ. We have 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 indicators of financial healthiness of firms. 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), respectively, 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 could make use of the level of interest rate to measure monetary policy or the cumulated change in each year. The former starts from some historically determined level and reports the effects of rate changes on the level, while the latter simply calculates the successive changes (either positive or negative) from the beginning of each year. The marginal effect in each case is the same[16].

4.2 Empirical Methodology

Our sample offers a natural experiment to evaluate the influence of firm-specific characteristics on the response of the corporate financial mix to monetary policy. The first period of our sample, 1990-1992, 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. The period coincided with a recession, tightening monetary policy and a harsh environment for existing and new corporate borrowers. This was because high rates of interest in Germany after reunification and the perceived weakness of sterling as a currency contributed to keep UK interest rates high during this period in order to meet the external policy objective. The second period following the recession,

[16] A shortcoming of either the level or the cumulative change is that they are firm-invariant i.e. there is a single base rate level (or change) for all firms having different characteristics for a given year As a result the variable can appear significant because it is capturing an event that is specific to a given year or an event that affects all firms as a group. To overcome this problem in this study we make use of time dummies and firm specific fixed effects in a panel data framework to condition for year and firm-specific fixed effects.

1993-1999, witnessed a period of sustained economic growth, falling unemployment and inflation, and interest rates at historically low levels. The corporate sector experienced an improvement in net worth and borrowing conditions were less constrained. Thus we have two successive episodes where the climate for corporate borrowing would have been very different: the climate is likely to affect the financial 'mix' between market-based and bank-based finance.

The composition of external finance (the mix) is regressed on the variables derived from the model explained above. In this context the model employed is:

$$MIX = f(MPS,\ MPR_p,\ FCD_j,\ MPS*FCD_j,\ MPS*MPR_p,\ FCD_j*MPR_p,\ MPS*FCD_j*MPR_p,\ RASSET,\ SCORE,\ AGE,\ SOLV,\ COL,\ GEAR,\ GDP,\ YEARD)$$

We measure the mix as the ratio of total short-term debt to total current liabilities, *MIX1,* the ratio of total debt to total liabilities, *MIX2*, and the ratio of short-term debt to total debt, *MIX3.*[17] The explanatory variables are defined as follows:

MPS denotes the monetary policy stance i.e. the cumulative changes to the official (base) interest rate (*BRATE*). Two-time period dummies are assigned to reflect the tight monetary policy period of 1990-1992 (*TP*) and the loose monetary policy period of 1993-1999 (*LP*), respectively.

$$MPR_p = 1 \ \ if \ \ p = TP, LP$$

$$= 0 \quad otherwise$$

We then define dummies for firm-specific characteristics. *FCD* consists of ten different binary variables ($j = 1 \ldots.10$) reflecting ten different firm characteristics i.e. small, large, risky, secure, young, old, highly indebted, low indebted, high profitable and low profitable, respectively.

$$FCD_j = 1 \quad j = 1 \ldots.10$$

$$= 0 \ \ otherwise$$

Having introduced these period and firm group dummies we can interact them with the monetary stance variable. These additions allow us to test for differences in the reaction of the mix to monetary policy changes across groups and sub-periods. The interaction of monetary stance variable with firm characteristics group is denoted, *MPS*FCD*, the corresponding one for sub-

[17]We provide summaries of the results for *MIX2* and *MIX3*, but full results are available from the authors upon request. These results are supportive of the model.

periods is denoted, *MPS*MPR*, and the one that includes both firms characteristics and sub-periods, *MPS*FCD*MPR*[18].

The remaining variables are control variables. *RASSET*[19] is the logarithm of nominal value total assets for each firm deflated by two digits SIC producer price indices. *SCORE* is the credit rating as explained above by the QuiScore. *AGE* shows the age of firms. *SOLV* and *GEAR* are the solvency ratio and the gearing ratio. *COL* is the ratio of tangible assets to total asset that proxies the collateral level of the firms and thus the extent of moral hazard. *GDP* is the growth rate of gross domestic product that is invariant across firms to control for the business cycle and *YEARD* are time (year) dummies to control for unobserved time effects. We report basic statistics for the variables used in the regressions across sub-periods in Table 1a and across firm characteristics in Table 1b.

We estimate the relationship between the financial choices of firms and their specific characteristics using a standard panel model that enables us to control for firm specific unobservable effects and to account for firm heterogeneity. The format is:

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

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} denote the dependent variable and the vector of non-stochastic explanatory variables for firm i and year t, respectively. ε_{it} is the error term, and α_i captures firm-specific effects. 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 the Hausman test. Therefore, we report the fixed effects estimates because these are more efficient than random effects[20].

5. Results

We begin by evaluating the response of the financial mix to the firm-specific characteristics and other control variables in our panel estimates. As this is relatively straightforward and confirms our

[18] Kashyap, Lamont and Stein (1994) employ a similar methodology.

[19] Since there is a significant number of missing observations in intangible assets, we calculate total assets excluding intangible assets.

[20] Estimates based on an IV estimator – which are robust to the endogeneity bias – suggested that the results are almost identical to those reported here. Therefore we conclude that the extent of the endogeneity bias is very small. However, we also estimated a dynamic panel GMM-estimator such as that proposed by Arellano and Bond (1991). The hypothesis of no serial autocorrelation of residuals was not rejected for the second order Arellano-Bond test, while the Sargan test of over-identifying restrictions, through which the null hypothesis of the validity of the GMM instruments can be tested, was rejected for different versions of the model. Therefore we did not report the results. While our model is robust to firm-specific heterogeneity, since we account for these factors explicitly in our model, we may still encounter endogeneity bias when we introduce dynamic aspects.

priors, we move on briskly to the more policy-relevant issue of how the impact of monetary policy varies with the financial characteristics of the firm.

5.1 Response to control variables

Comparing the columns in each of the panels of Table 2 allows us to evaluate the response of firms with specific characteristics in comparison to the response of the whole panel, which is reported in the first column. We investigate the specific influence of factors such as asset size, risk, age, solvency, collateral assets, gearing, *GDP* growth rate and time dummies on the mix.

Taking the logarithm of real assets size first, it provides an indicator of the extent of firm activity, and this is found to be an important determinant of the mix. We expect to find that the firms with greater assets have greater access to intermediary finance. Clearly beyond some point they would be eligible for market finance at more favorable interest rates, but our theoretical model predicts that the net effect of an increase in asset size will result in a greater proportion of firms that cross the lower than the upper thresholds. Hence we expect the mix to increase with size, and this is what we find. We uniformly observe positive signs, implying that a greater share of intermediary finance is taken up in response to an increase in real assets.

The model also predicts that as risk falls so the firms accessing both intermediary and market finance increase. Our measure of the risk is the QuiScore rating (*SCORE*), and the higher the value the less risky the firm; we expect both bank-based and market based finance to increase with an increase in the SCORE, but the response of the mix is ambiguous. Our results indicate that the mix falls with an increase in the SCORE, which suggests that as firms become safer overall in terms of their credit rating, more of them exit intermediary finance than take it up.

Age appears to be a significant explanatory variable for some measures of the mix and its coefficients are positive in all regressions[21]. Age provides a confirmation of the importance of a track record for certain types of firms and this is a direct test of the relationship-banking proposition suggested by Sharpe (1990), Rajan (1992) and Boot (2000). Small and financially weak firms, that nonetheless have a track record are less likely to be financially constrained because they have a better chance to receive bank finance.

Firm solvency appears to be another important determinant of the mix as is gearing. In almost all the regressions the coefficients of the firm solvency are significantly positive, as expected. This result provides support for the financial accelerator theory proposed by Kiyotaki and

[21] Implication on *AGE* is not observed directly from theoretical model given above but AGE is a variable reflecting the track record discussed by Diamond (1991) that is a version of our model.

Moore (1997) where financially weak firms are more likely subject to constraints. The positive and significant coefficients for gearing in almost all regressions is consistent with the prediction of Hoshi *et al.* (1993) that intermediary finance rises with gearing.[22]

The measure of collateral assets (tangible assets in total), *COL*, is less important in practice than expected. Greater collateral should enhance access to both intermediary and market finance, and depending on the relative inflows and outflows should alter the mix; but the variable does not appear to be significant in most of the regressions. There are several possible reasons for this. The net outflows (to market finance) and inflows (of firms previously unable to obtain any finance) could leave the mix, which is a ratio, almost unchanged. Thus the variable may appear insignificant even though it is in fact important. Alternatively, the effects of tangible assets in aggregate may have little additional explanatory power over the effect of total real assets, which we have already identified as a significant influence on the mix.

Comparing the responses of the top 25% with the bottom 25% of firms according to their capital 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 were inclined to shift out of short term debt as interest rates increased, which is consistent with our prediction that more profitable firms will have greater access to longer term market finance.

Finally, we use *GDP* growth rate to control for cyclical effects in aggregate level. An increase in the *GDP* growth rate encourages firms to shift toward to non-debt liabilities. There are significant time effects from dummies for 1992 (positive, suggesting a shift towards greater debt and less market finance) and 1995, 1996 and 1999 (all negative). The inclusion of this variable in all panel estimates controls for demand-side influences.

5.2 *Monetary Policy, Firm Characteristics and the Financial Mix*

We report the detailed findings of fixed effects estimates for *MIX1* in Table 2, and the corresponding results for *MIX2* and *MIX3* (unreported, available on request) are similar, but summaries of the responses to monetary policy are reported later, in Table 3. There are three panels of estimations in Table 2 labeled *a-c*, which partition the results into estimations for the whole period (1990-1999), the tight period (1990-92) and the benign period (1993-99). The rows separate

[22] We have classified firms according to gearing in order to measure the impact of monetary policy on the composition of external finance across low and highly indebted firms. It is estimated that the mix of firms in the high-debt group is more sensitive to change in monetary policy stance than that of the low-debt firms. It may be the case that high

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. We reported the estimation results with interaction terms that allow us to test the reactions of the financial mix to changes in the monetary policy regime i.e. whole sample, tight and loose periods (three panels). Estimation results without using any interaction term that includes firm characteristics are reported in column 2 in each Table. We separate out the responses of firms according to size – small, large firms in columns 3-4, credit rating – risky and secure firms in columns 5-6, age – young and old firms in columns 7-8, gearing – highly and low indebted firms in columns 9-10. We do not report the results for profitability since the findings for this group of firms do not contain any new information.

The coefficients of the measure of monetary policy stance (row 1) are negative and significant. This result confirms the proposition that changing monetary policy stance reduces the liability composition of non-financial firms. But the variable is invariant for firms of different types and to avoid drawing the (incorrect) conclusion that our monetary policy variable is important because it acts as a proxy for some other time-specific effect, we introduce interactive dummies.

First, we multiply the monetary policy stance variable by sub-period dummies reflecting the monetary policy regime. In this way we can report the results in Tables 2b and 2c for the tight and loose monetary policy periods. The resulting coefficient estimates verify the constraining impact of tight monetary policy on the access of firms of all types to bank loans (the coefficient on the monetary policy variable is negative and significant in the tight period and positive and significant in the loose period). The constraining mechanism may work through the supply of bank loans or through the demand side, although we have already conditioned for GDP growth to remove demand-side influences. The interaction between TP and monetary policy should therefore capture the influence of the supply-side as loan supply tightens, providing evidence 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. In fact, there is substantial evidence for a bank-lending channel, and it is not independent of firm-specific characteristics[23].

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indebtedness is perceived as a weakness during tight periods because the higher interest rate reduces the cash flow of firms and this increases the debt-servicing burden.

[23] A scientifically rigorous and open-minded study by Fisher (1999) concludes that for his particular specification of a quantitative general equilibrium model the parameter values consistent with a lending view are 'implausible'. The concluding discussion presents several reasons why, in comparison with other recent research, these results may have been obtained from simulations. These reasons relate to the role of price stickiness in the transmission mechanism in Bernanke and Blinder (1988), for example, and the approach to modeling credit market imperfections in papers that are

Second, we create a binary variable for each firm-specific characteristic, FCD_j and interact this dummy with the monetary stance variable, $MPS*FCD_j$. The overall impact of a change in the monetary policy stance variable on the liability composition of firm group may be calculated by adding the coefficient of respective interaction terms (reported in row 2 of Table 2a) to the coefficients of *MPS*. Terms for small, risky, young and highly indebted firms that are subject to supply constraints are negative and larger in absolute terms than for large, secure, old and low indebted firms. This implies that there is a greater response in the mix variable for smaller, more risky, younger and highly indebted firms when monetary policy tightens. The coefficients of interaction terms for large, secure, and old firms are positive and significant, which may imply that these firms were not confronted with short-term bank finance constraints when monetary policy was tightened. Small, young and risky firms were more likely to be financially constrained and were more reliant on bank finance, thus their financial positions were much more significantly affected by a change in monetary policy regime. The sign and significance of firm characteristic dummies indicates a shift in the mix for firms of specific types.

In Tables 2b and 2c we can see the effects of interacting the tight period and loose dummies with the firm characteristics dummies and the monetary stance variable. Small, risky, young, and highly indebted firms experienced a greater decline in the mix than did the large, secure, old, and low indebted firms. This is consistent with the traditional credit channel story, but it identifies the specific characteristics of firms that are subject to constraints on bank finance. It is confirmed by the reversal of signs for financially healthy firms, which are generally larger, older and more secure. For the loose monetary policy period, the impact of monetary policy on *MIX1* is positive for small, risky, and young firms, while it is negative for large, secure, and old firms. It appears that small, young and risky firms are more likely to get bank loans during the loose period, increasing the mix variable, while those firms that are financially strong (large, secure, old, low indebted) were able to assess cheaper market finance in this period. All these results confirm the properties of the model.

Table 3 provides a summary of the magnitudes, signs and significance of the results for the other mix variables, *MIX2 and MIX3,* in comparison to *MIX1*. We omit the details of the responses to the control variables although they are very similar to the results for *MIX1*, in order to concentrate on the responses to the monetary policy variable and the interaction terms. Here we see that all the mix measures respond in a similar fashion during tight and loose monetary regimes; despite the differences in magnitude, all the coefficients have common signs and significance.

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more supportive of the lending view compared to Fisher's paper. Subsequent work by Kishan and Opiela (2000) on the behavior of banks (as opposed to firms) confirms evidence in favor of the lending view.

Oliner and Rudebusch (1996) criticize Kashyap *et al.* (1993), who find support for the bank lending channel from aggregate data, by claiming that the decline in their mix measure is more likely to originate from shifting bank loans between small and large firms, and not necessarily from a decline in the supply of bank funds. We observe that the empirical evidence supports Oliner and Rudebusch (1996) to some extent, since we confirm a shift in bank loans from small to large firms in the tight monetary regime, but this result does not undermine the evidence for the bank lending channel. The coefficients for monetary stance are generally negative across all firm groups during tight periods, and crucially for the interchange between Kashyap *et al.* (1993, 1996) and Oliner and Rudebusch (1996), we find similar responses irrespective of the choice of mix measures used to represent firms' responses to monetary policy. We conclude that there is substantial evidence for different reactions to monetary policy through the influence of the credit channel and these depend heavily on firm-specific characteristics.

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 extended a theoretical framework, based on Diamond (1991) and Hoshi *et al.* (1993), in which to analyse the effects of monetary policy and firm-specific characteristics. This model makes predictions about the response in financial structure to firm-specific characteristics and monetary policy conditions. 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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Table 1a. Basic Statistics across Periods

	MIX1	SCORE	RASSET	AGE	SOLV	COL	GEAR	BRATE	GDP
Whole Period, 1990-1990									
Obs	144838	143133	145191	145246	143983	140927	128774	145246	145246
Mean	29.26	58.84	8.38	30.56	39.83	0.31	183.94	41.05	2.26
Std. Dev.	27.12	22.05	1.65	23.81	27.05	0.20	562.84	23.47	1.60
Tight Period, 1990-1992									
Obs	35860	35309	35906	35919	35630	35140	31853	35919	35919
Mean	28.21	56.96	8.39	29.10	38.29	0.32	197.87	76.35	-0.20
Std. Dev.	26.84	22.22	1.66	24.26	26.57	0.20	608.81	15.81	0.90
Loose Period, 1993-1999									
Obs	108978	107824	109285	109327	108353	105787	96921	109327	109327
Mean	29.61	59.46	8.37	31.03	40.34	0.31	179.36	29.45	3.06
Std. Dev.	27.20	21.96	1.64	23.64	27.19	0.20	546.82	10.30	0.72

Table 1b. Basic Statistics across Firm Characteristics

	MIX1	SCORE	RASSET	AGE	SOLV	COL	GEAR
Small Firms							
Obs	30525	29841	30635	30643	30003	29740	25098
Mean	27.88	57.05	6.80	23.34	37.24	0.28	200.74
Std. Dev.	27.70	23.55	0.90	18.93	30.66	0.21	629.14
Large Firms							
Obs	42780	42371	42813	42815	42656	42066	40120
Mean	34.31	58.59	10.26	38.42	37.72	0.32	211.25
Std. Dev.	26.40	21.36	1.32	27.48	24.54	0.19	598.29
Risky Firms							
Obs	30792	31080	31037	31080	30602	29986	24382
Mean	43.92	29.62	8.19	24.96	12.85	0.28	529.64
Std. Dev.	28.59	9.40	1.65	21.03	22.20	0.20	1007.16
Secure Firms							
Obs	66337	64241	66343	66354	65645	63962	58623
Mean	20.96	79.36	8.45	34.31	57.74	0.32	54.01
Std. Dev.	24.77	11.28	1.66	24.96	22.72	0.20	230.48
Young Firms							
Obs	62356	61171	62485	62517	61630	60587	54051
Mean	29.41	54.94	7.98	11.70	34.03	0.30	208.79
Std. Dev.	27.51	21.74	1.50	4.69	27.06	0.20	594.95
Old Firms							
Obs	82482	81962	82706	82729	82353	80340	74723
Mean	29.15	61.75	8.68	44.80	44.18	0.32	165.97
Std. Dev.	26.81	21.82	1.68	22.52	26.22	0.20	537.72
Highly Indebted Firms							
Obs	48288	46632	48612	48661	47398	46159	32189
Mean	40.62	44.38	8.30	27.08	19.00	0.29	601.12
Std. Dev.	30.77	21.48	1.79	22.47	29.80	0.21	1015.29
Low Indebted Firms							
Obs	32163	32122	32181	32181	32181	31362	32181
Mean	9.00	77.75	8.15	34.27	64.69	0.27	6.78
Std. Dev.	16.44	16.84	1.38	24.24	17.73	0.18	5.07

Table 2a. The Base Rates Interacted with Firm Characteristics: Dependent Variable: MIX1

	Whole	Small	Large	Risky	Secure	Young	Old	HIndebted	LIndebted
BRATE	-0.025***	-0.014***	-0.043***	-0.024***	-0.031***	-0.015***	-0.045***	-0.022***	-0.016***
	(5.35)	(2.96)	(8.81)	(5.05)	(6.38)	(3.15)	(8.40)	(4.74)	(3.56)
BRATE*FCD		-0.072***	0.047***	-0.005	0.015***	-0.030***	0.030***	-0.000	0.001
		(14.71)	(11.53)	(1.08)	(3.97)	(7.56)	(7.56)	(0.00)	(0.32)
FCD		8.266***	-4.973***	1.773***	-0.750***	0.000	0.000	13.696***	-20.160***
		(28.48)	(16.70)	(6.48)	(3.08)	(.)	(.)	(54.00)	(85.62)
RASSET	3.997***	4.863***	4.433***	3.990***	3.993***	3.893***	3.893***	3.702***	3.431***
	(27.47)	(32.64)	(29.46)	(27.43)	(27.43)	(26.64)	(26.64)	(26.15)	(25.25)
SCORE	-0.618***	-0.618***	-0.618***	-0.595***	-0.616***	-0.617***	-0.617***	-0.603***	-0.602***
	(121.64)	(122.19)	(121.80)	(104.41)	(100.56)	(121.62)	(121.62)	(122.00)	(126.98)
AGE	0.843***	0.872***	0.867***	0.840***	0.842***	0.865***	0.865***	0.748***	0.731***
	(27.27)	(28.32)	(28.06)	(27.19)	(27.24)	(27.86)	(27.86)	(24.88)	(25.34)
SOLV	0.186***	0.185***	0.183***	0.184***	0.187***	0.184***	0.184***	0.370***	0.414***
	(30.17)	(30.12)	(29.64)	(29.77)	(30.30)	(29.77)	(29.77)	(57.59)	(68.66)
COL	0.902	1.079*	0.861	1.061*	0.912*	0.938*	0.938*	-0.517	-5.491***
	(1.63)	(1.96)	(1.56)	(1.92)	(1.65)	(1.70)	(1.70)	(0.96)	(10.58)
GEAR	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***	0.002***	0.004***
	(28.55)	(27.81)	(28.20)	(27.50)	(28.55)	(28.55)	(28.55)	(20.64)	(40.78)
GDP	-0.726***	-0.759***	-0.769***	-0.720***	-0.725***	-0.753***	-0.753***	-0.643***	-0.594***
	(11.66)	(12.21)	(12.34)	(11.56)	(11.64)	(12.07)	(12.07)	(10.61)	(10.22)
year92	1.044***	0.995***	1.042***	1.040***	1.047***	1.071***	1.071***	0.913***	0.805***
	(5.84)	(5.59)	(5.84)	(5.82)	(5.86)	(5.99)	(5.99)	(5.25)	(4.83)
year93	0.168	0.063	0.099	0.174	0.168	0.148	0.148	0.182	0.189
	(0.84)	(0.32)	(0.50)	(0.87)	(0.84)	(0.74)	(0.74)	(0.94)	(1.01)
year95	-0.516***	-0.448***	-0.484***	-0.505***	-0.516***	-0.509***	-0.509***	-0.408***	-0.516***
	(3.36)	(2.92)	(3.15)	(3.28)	(3.35)	(3.31)	(3.31)	(2.73)	(3.60)
year96	-1.054***	-0.992***	-1.071***	-1.034***	-1.044***	-1.106***	-1.106***	-0.798***	-0.903***
	(5.89)	(5.57)	(5.99)	(5.78)	(5.83)	(6.18)	(6.18)	(4.59)	(5.41)
year97	-0.119	-0.062	-0.092	-0.111	-0.112	-0.125	-0.125	0.039	-0.106
	(0.72)	(0.38)	(0.56)	(0.67)	(0.68)	(0.76)	(0.76)	(0.25)	(0.69)
year99	-1.370***	-1.536***	-1.496***	-1.379***	-1.344***	-1.490***	-1.490***	-1.311***	-1.085***
	(5.87)	(6.60)	(6.41)	(5.91)	(5.76)	(6.37)	(6.37)	(5.77)	(4.98)
Constant	-0.220	-9.826***	-2.675*	-1.710	0.048	0.215	0.215	-6.431***	3.837***
	(0.16)	(6.78)	(1.86)	(1.20)	(0.03)	(0.15)	(0.15)	(4.68)	(2.91)
R-squared	**0.19**	**0.20**	**0.19**	**0.19**	**0.19**	**0.19**	**0.19**	**0.23**	**0.29**

Absolute value of t-statistics in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%, N.of observations (firms): 125 832 (15 555)

Table 2b. The Base Rates Interacted with Firm Characteristics and Tight Period: Dependent Variable: MIX1

	Whole	Small	Large	Risky	Secure	Young	Old	HIndebted	LIndebted
BRATE	0.016**	-0.010**	-0.053***	-0.026***	-0.032***	-0.017***	-0.046***	-0.036***	-0.006
	(2.54)	(2.02)	(10.62)	(5.37)	(6.18)	(3.43)	(7.69)	(7.58)	(1.19)
BRATE*FCD*TP	-0.050***	-0.211***	0.157***	0.008	0.028**	-0.045***	0.045***	0.053***	-0.046***
	(5.87)	(15.08)	(13.37)	(0.55)	(2.47)	(3.90)	(3.90)	(4.09)	(3.57)
FCD*TP	0.000	15.846***	-10.770***	-0.150	-1.272	1.559*	-1.559*	2.216**	-6.208***
	(.)	(14.78)	(11.56)	(0.14)	(1.44)	(1.74)	(1.74)	(2.21)	(6.13)
RASSET	3.997***	3.985***	3.921***	3.997***	3.996***	3.827***	3.827***	4.007***	3.922***
	(27.47)	(27.20)	(26.84)	(27.46)	(27.46)	(26.08)	(26.08)	(27.62)	(27.17)
SCORE	-0.618***	-0.619***	-0.619***	-0.615***	-0.623***	-0.617***	-0.617***	-0.611***	-0.606***
	(121.64)	(121.92)	(121.97)	(117.85)	(119.37)	(121.57)	(121.57)	(120.57)	(120.22)
AGE	0.500***	0.794***	0.951***	0.850***	0.887***	0.790***	0.985***	0.950***	0.631***
	(9.70)	(25.50)	(29.80)	(27.18)	(27.47)	(25.09)	(28.29)	(30.40)	(20.18)
SOLV	0.186***	0.187***	0.186***	0.185***	0.187***	0.182***	0.182***	0.204***	0.205***
	(30.17)	(30.35)	(30.16)	(30.01)	(30.30)	(29.47)	(29.47)	(32.96)	(33.40)
COL	0.902	0.921*	0.908	0.917*	0.885	0.944*	0.944*	0.858	0.151
	(1.63)	(1.67)	(1.64)	(1.66)	(1.60)	(1.71)	(1.71)	(1.56)	(0.27)
GEAR	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***
	(28.55)	(28.47)	(28.45)	(28.44)	(28.51)	(28.53)	(28.53)	(26.53)	(29.19)
GDP	-0.786***	-0.568***	-1.001***	-0.724***	-0.754***	-0.734***	-0.806***	-0.642***	-0.832***
	(11.46)	(8.95)	(15.15)	(11.33)	(11.21)	(11.29)	(10.80)	(10.02)	(12.97)
year92	1.302***	0.190	1.693***	1.046***	1.143***	0.989***	1.207***	0.769***	1.432***
	(7.53)	(1.01)	(9.00)	(5.60)	(5.81)	(5.03)	(5.62)	(4.09)	(7.74)
year93	-0.605**	0.348*	-0.113	0.187	0.202	0.026	0.279	0.548***	-0.411**
	(2.24)	(1.74)	(0.56)	(0.93)	(1.00)	(0.13)	(1.34)	(2.74)	(2.06)
year95	-1.174***	-0.523***	-0.474***	-0.498***	-0.459***	-0.642***	-0.324**	-0.215	-0.902***
	(5.47)	(3.40)	(3.07)	(3.23)	(2.97)	(4.16)	(2.08)	(1.40)	(5.90)
year96	-0.942***	-0.801***	-1.502***	-1.056***	-1.117***	-1.031***	-1.245***	-0.995***	-1.075***
	(5.55)	(4.46)	(8.25)	(5.86)	(6.11)	(5.70)	(6.56)	(5.53)	(5.99)
year97	-0.044	-0.106	-0.144	-0.122	-0.127	-0.105	-0.149	-0.139	-0.069
	(0.27)	(0.64)	(0.88)	(0.74)	(0.77)	(0.64)	(0.91)	(0.85)	(0.42)
year99	0.000	-0.845***	-2.362***	-1.400***	-1.612***	-1.102***	-2.091***	-1.751***	-0.733***
	(.)	(3.59)	(9.71)	(5.90)	(6.56)	(4.60)	(7.82)	(7.37)	(3.09)
Constant	9.810***	0.417	-1.057	-0.547	-1.051	2.821*	-2.307	-4.841***	5.815***
	(4.97)	(0.29)	(0.75)	(0.38)	(0.74)	(1.95)	(1.62)	(3.42)	(4.14)
R-squared	**0.19**	**0.19**	**0.19**	**0.19**	**0.19**	**0.19**	**0.19**	**0.19**	**0.20**

Absolute value of t-statistics in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%, N.of observations (firms): 125 832 (15 555)

Table 2c. Base Rates Interacted with Firm Characteristics and Loose Period: Dependent Variable: MIX1

	Whole	Small	Large	Risky	Secure	Young	Old	HIndebted	LIndebted
BRATE	-0.034***	-0.025***	-0.029***	-0.025***	-0.023***	-0.026***	-0.027***	-0.015***	-0.035***
	(6.17)	(5.26)	(6.09)	(5.27)	(4.71)	(5.48)	(5.27)	(3.18)	(7.78)
BRATE*FCD*LP	0.050***	0.032**	-0.018*	0.017	-0.019*	0.026***	-0.026***	0.023**	-0.041***
	(5.87)	(2.52)	(1.74)	(1.32)	(1.90)	(2.68)	(2.68)	(2.02)	(3.71)
FCD*LP	0.000	4.232***	-2.075***	0.903**	-0.067	1.086***	-1.086***	9.112***	-13.631***
	(.)	(10.33)	(5.80)	(2.15)	(0.20)	(3.07)	(3.07)	(24.47)	(38.08)
RASSET	3.997***	4.529***	4.229***	3.990***	3.979***	3.811***	3.811***	3.763***	3.681***
	(27.47)	(30.91)	(28.89)	(27.42)	(27.33)	(25.94)	(25.94)	(26.22)	(26.23)
SCORE	-0.618***	-0.620***	-0.618***	-0.604***	-0.610***	-0.617***	-0.617***	-0.618***	-0.623***
	(121.64)	(122.38)	(121.89)	(112.50)	(111.29)	(121.52)	(121.52)	(123.39)	(127.32)
AGE	0.500***	0.780***	0.951***	0.808***	0.907***	0.757***	1.012***	0.606***	1.108***
	(9.70)	(23.93)	(27.05)	(24.67)	(23.58)	(20.62)	(24.02)	(18.22)	(33.97)
SOLV	0.186***	0.184***	0.183***	0.186***	0.187***	0.182***	0.182***	0.290***	0.325***
	(30.17)	(30.02)	(29.66)	(30.16)	(30.35)	(29.41)	(29.41)	(45.70)	(52.97)
COL	0.902	1.002*	0.855	0.988*	0.916*	0.926*	0.926*	-0.047	-2.673***
	(1.63)	(1.82)	(1.55)	(1.78)	(1.65)	(1.67)	(1.67)	(0.09)	(5.00)
GEAR	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***	0.003***	0.004***
	(28.55)	(27.98)	(28.25)	(27.95)	(28.76)	(28.54)	(28.54)	(26.20)	(36.28)
GDP	-0.786***	-0.844***	-0.698***	-0.746***	-0.715***	-0.785***	-0.666***	-0.889***	-0.389***
	(11.46)	(13.53)	(11.19)	(11.96)	(11.39)	(12.45)	(10.54)	(14.44)	(6.46)
year92	1.302***	1.351***	0.854***	1.120***	0.999***	1.254***	0.807***	1.731***	0.032
	(7.53)	(7.56)	(4.76)	(6.25)	(5.54)	(6.91)	(4.42)	(9.79)	(0.18)
year93	-0.605**	-0.279	0.384*	0.061	0.303	-0.132	0.573***	-0.580***	1.252***
	(2.24)	(1.39)	(1.91)	(0.31)	(1.49)	(0.65)	(2.78)	(2.93)	(6.46)
year95	-1.174***	-0.716***	-0.318**	-0.594***	-0.418***	-0.730***	-0.201	-0.963***	0.151
	(5.47)	(4.62)	(2.04)	(3.82)	(2.66)	(4.62)	(1.24)	(6.27)	(1.01)
year96	-0.942***	-1.097***	-1.045***	-1.056***	-1.080***	-1.080***	-1.058***	-1.092***	-0.815***
	(5.55)	(6.15)	(5.82)	(5.90)	(5.98)	(6.00)	(5.87)	(6.18)	(4.71)
year97	-0.044	-0.062	-0.124	-0.104	-0.137	-0.096	-0.151	0.026	-0.195
	(0.27)	(0.37)	(0.75)	(0.63)	(0.83)	(0.58)	(0.92)	(0.16)	(1.23)
year99	0.000	-1.285***	-1.736***	-1.288***	-1.622***	-1.046***	-1.920***	-0.905***	-2.090***
	(.)	(5.40)	(7.04)	(5.40)	(6.26)	(4.13)	(7.26)	(3.80)	(8.93)
Constant	9.810***	-3.053**	-4.602***	-0.058	-2.472	3.749**	-3.043*	3.303**	-7.804***
	(4.97)	(2.09)	(3.04)	(0.04)	(1.54)	(2.35)	(1.87)	(2.27)	(5.47)
R-squared	**0.19**	**0.19**	**0.19**	**0.19**	**0.19**	**0.19**	**0.19**	**0.21**	**0.25**

Absolute value of t-statistics in parentheses,* significant at 10%; ** significant at 5%; *** significant at 1%, N.of observations (firms): 125 832 (15 555)

Table 3. Monetary Stance Variables Interacted with Firm Characteristics

Dependent Variable: MIX1- Number of observations (firms): 125 832 (15 555)

	Whole	Small	Large	Risky	Secure	Young	Old	Hindebted	Lindebted
Tight Monetary Policy Regime Period, Including Tight Period Dummy in the Interaction Term									
BRATE	0.016**	-0.010**	-0.053***	-0.026***	-0.032***	-0.017***	-0.046***	-0.036***	-0.006
BRATE*FCD*TP	-0.050***	-0.211***	0.157***	0.008	0.028**	-0.045***	0.045***	0.053***	-0.046***
FCD*TP	0.000	15.846***	-10.770***	-0.150	-1.272	1.559*	-1.559*	2.216**	-6.208***
Loose Monetary Policy Regime Period, Including Loose Period Dummy in the Interaction Term									
BRATE	-0.034***	-0.025***	-0.029***	-0.025***	-0.023***	-0.026***	-0.027***	-0.015***	-0.035***
BRATE*FCD*LP	0.050***	0.032**	-0.018*	0.017	-0.019*	0.026***	-0.026***	0.023**	-0.041***
FCD*LP	0.000	4.232***	-2.075***	0.903**	-0.067	1.086***	-1.086***	9.112***	-13.631***

Dependent Variable: MIX2- Number of observations (firms): 118 391 (15 377)

Tight Monetary Policy Regime Period, Including Tight Period Dummy in the Interaction Term									
BRATE	0.005	-0.031***	-0.058***	-0.041***	-0.049***	-0.038***	-0.049***	-0.049***	-0.024***
BRATE*FCD*TP	-0.058***	-0.144***	0.104***	-0.009	0.029**	-0.023*	0.023*	0.013	-0.030**
FCD*TP	0.000	11.727***	-8.496***	0.754	-1.162	1.697*	-1.697*	5.285***	-9.501***
Loose Monetary Policy Regime Period, Including Loose Period Dummy in the Interaction Term									
BRATE	-0.053***	-0.042***	-0.043***	-0.042***	-0.040***	-0.042***	-0.040***	-0.031***	-0.052***
BRATE*FCD*LP	0.058***	0.040***	-0.030***	0.014	-0.013	0.005	-0.005	0.028**	-0.035***
FCD*LP	0.000	2.065***	-1.166***	0.159	0.044	-0.144	0.144	8.989***	-15.750***

Dependent Variable: MIX3- Number of observations (firms): 113 505 (15 273)

Tight Monetary Policy Regime Period, Including Tight Period Dummy in the Interaction Term									
BRATE	0.018*	0.003	-0.108***	-0.039***	-0.034***	-0.015*	-0.082***	-0.060***	0.015**
BRATE*FCD*TP	-0.064***	-0.522***	0.323***	0.051**	0.007	-0.101***	0.101***	0.181***	-0.406***
FCD*TP	0.000	32.256***	-17.392***	-3.077*	-0.702	2.935**	-2.935**	-8.580***	20.192***
Loose Monetary Policy Regime Period, Including Loose Period Dummy in the Interaction Term									
BRATE	-0.046***	-0.030***	-0.048***	-0.032***	-0.033***	-0.033***	-0.044***	-0.029***	-0.034***
BRATE*FCD*LP	0.064***	-0.028	0.021	0.010	-0.011	0.034**	-0.034**	-0.018	0.021
FCD*LP	0.000	4.590***	-5.640***	2.407***	-0.493	3.693***	-3.693***	2.482***	0.250

Absolute value of t-statistics in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%