

Monetary Policy and Corporate Credit Conditions: Accounting for Firm-Specific Characteristics

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Abstract

This paper examines the relationship between UK firms' choices over bank-based and market-based finance under different monetary conditions. The evolving financial environment facing the corporate sector provides many non-bank external finance options available as an alternative to bank finance. The paper shows that firms distributed according to their type (asset size, rating etc) have differential access to bank lending. As monetary policy tightens weak firms are excluded from bank credit and will seek alternative external funding, such as non-bank external finance or trade credit. We intend to look at the external finance 'mix' using a panel of 16,000 UK firm records taken from the FAME database for the years 1990 through 1999. **The paper provides evidence consistent with a credit channel by demonstrating that there are distributional implications from tightening monetary policy. Non-bank forms of external finance are close substitutes for certain types of firms who switch into these types of finance from bank lending.**

1. Introduction

The monetary transmission mechanism has traditionally focused on money, the *liabilities* side of the banking sector's balance sheet, rather than credit; yet a considerable body of literature has built up to explore the 'credit channel', operating through the *asset* side of banks' balance sheets. There are two principal lines of argument. The first is the traditional credit channel view supported by the twin-pillars of the 'balance-sheet channel' and the 'bank-lending channel'¹. The balance-sheet channel argues that business cycles may be propagated to the extent that the state of firms' balance sheets affects their ability to borrow and to spend, and can give rise to the possibility of 'endogenous credit cycles' and accelerator effects (see Kiyotaki and Moore, 1995). The bank-lending channel focuses upon bank loans as the primary source of loanable funds; the effects of a monetary contraction would be magnified by the reduction in loans supplied by banks as well as through the traditional money channel on output and loan demand (see Gertler and Gilchrist, 1994, Kashyap, Lamont and Stein, 1994). Bank lending is often regarded as *special* because firms, and particularly small firms, are constrained in their ability to draw credit from other external sources. The absence of available substitutes gives rise to dependence on sources of funds from banks and imparts a particular leverage from bank lending to real activity. This is thought to amplify the demand side effects on expenditure decisions of the private sector. Therefore the extent to which the traditional bank lending channel is important depends on the substitutability between internal and external sources of funds and between bank lending and other forms of external finance.

The second stresses the importance of relationship banking (see Sharpe, 1990, Rajan, 1992 and Boot, 2000). Banks can be regarded as special because they form relationships with firms over time to diminish the effects of information asymmetries. Relationship banking involves forming multiple lender-customer interactions in order to collect and evaluate customer-specific information, often of a proprietary nature. The advantages this brings over arm's length lending allows for cross-subsidisation of loan rates in bad times (Berlin and Mester, 1999). Although this does not necessarily advantage banks over non-bank intermediaries, it can be used to justify the existence of banks (see Carey, Post and Sharpe, 1998, Berger, 1999, Boot 2000). The upshot

of this theory is that far from amplifying the monetary cycle, bank lending may mute it. Older firms may have had time to establish these relationships with banks and the banks may gain from their relationships with these firms. They can then use the informational advantages to maintain bank lending during a monetary contraction at low risk and low cost to themselves.

Differentiating between these two views of the credit channel is an empirical matter. Assessment of the traditional bank lending channel or the relationship banking model has been hard to verify at the macroeconomic level because bank lending is influenced by loan supply and loan demand, which are hard to distinguish. Positive correlations between bank loans and indicators of economic activity could arise from the demand side rather than from the supply-side. Attempts to resolve this issue have lead researchers to identify robust indicators of monetary policy shifts that allow them to separate demand and supply effects. Since most of the studies use US data, these have been based on indicators such as the spread of the Fed Funds over Treasury Bill rates (Bernanke and Blinder, 1992) and the careful reading of Fed minutes (the ‘narrative’ approach leading to ‘Romer dates’, Romer and Romer, 1990)². Comparison of the behaviour of bank loans, other sources of external finance and the ‘mix’ of bank lending to total external funding at points when these indicators show monetary contractions have taken place have been a useful means of determining whether bank lending and other sources of funds are substitutes (see Kashyap, Stein and Wilcox, 1993 and Oliner and Rudebusch, 1996). This paper examines the evidence in tight and benign periods of monetary policy in the United Kingdom corresponding to the tightening of 1990-92, where interest rates were increased in order to meet the external objective of monetary policy, and the period 1993-99, where the objective of monetary policy was inflation targeting, and interest rates were reduced as inflation fell to low levels by historical standards. We are able to differentiate between firms according to size, credit rating, solvency, indebtedness and age, and can therefore determine whether monetary policy tightening influences firms’ according to their type. We can then judge whether the effects of monetary

¹ A full exposition of the transmission mechanism has been provided by the Bank of England for the House of Common Treasury Select Committee, see Bank of England (1999).

² The bulk of the empirical studies are addressed to the United States, where a well-developed commercial paper market offers an alternative (non-bank) source of funds for corporations. A few studies have investigated Japanese firms, which draw loans from insurance companies as the main form of non-bank financing (see Hoshi *et al.*, 1993), but firms in other countries have not received much attention.

policy tightening operate through a traditional credit channel, amplifying the effects of the direct money channel, or whether bank-firm relationships mute the effects.

The paper is organised as follows. Section 2 outlines the traditional bank lending channel argument, the concept of relationship banking and the explanations for the growth of non-bank finance. Section 3 explains the data sources and properties. Section 4 explains the methodology, and Section 5 presents the empirical evidence. Section 6 concludes.

2. Corporate Credit and External Finance

2.1 Two Views of the Credit Channel

The Modigliani-Miller theorem asserts that a firm cannot increase its value by changing the composition of its liabilities. Modigliani and Miller (1958) show that the marginal investment decision depends only upon the expected rate of return on the project relative to some ‘constant’ average cost and not on the source of finance. There should not be a bias towards internal finance or any suggestion that firms should have preferences between different forms of external finance. The Modigliani-Miller theorem holds within the context of perfect capital markets – it is a ‘benchmark’ framework – but if it holds there is nothing special about banks, no hierarchy of finance, and no bank-lending channel.

Researchers have sought to investigate the behaviour of agents in imperfect capital markets relative to this special case. Myers and Majluf (1984) indicate that in a less perfect world firms may have a preference ordering over alternative sources of finance which ranks internal sources, based on retained earnings, above external sources, such as trade credit, bank borrowing, and non-bank finance. The reasons for this rank ordering are likely to be the additional costs associated with external sources of finance, which can be pecuniary or non-pecuniary, in the form of non-price terms and conditions which external providers of finance attach to credit provision.

Attention has focussed on the distortions introduced by taxation, transaction costs and imperfect information that gives rise to an “external finance premium”. The first two of these explanations are plausible but difficult to justify empirically without specific knowledge of individual and institutional circumstances facing firms. Falling rates of corporation tax could potentially explain

the shift away from bank finance towards equity finance, and we could also consider taxes, but the explanatory power of taxes (such as capital gains taxation, affecting the return to shareholders, and investment tax credits) are ‘highly sensitive to assumptions about the marginal investor’s tax rate’ p. 1441, Rajan and Zingales (1995). Equally, transaction costs, which arise because of the need to match the size, maturity and liquidity of funds and to meet the diversification requirements of (risk-neutral) lenders, could explain why external finance is more expensive than internal finance and why there may be cost differentials between bank and non-bank finance, but they are difficult to quantify.

Instead, concentration has focused on the specialness of banks. Under imperfect information borrowers have a better idea of their likelihood of defaulting on a loan than do lenders, see Jaffee and Russell (1976) and Stiglitz and Weiss (1981). This leads to adverse selection and moral hazard problems that create an external finance premium, which can vary in degree since some lenders (banks) may have information advantages over others. Banks (as opposed to non-banks) can overcome the adverse selection and moral hazard problems because they can gain from ongoing depositor-lender relationships with firms. They can match their liability structure to the term to maturity of loans and gather information on financial background of companies (see Leland and Pyle, 1977; Fama, 1985; Himmelberg and Morgan, 1995). This reduces their exposure to costs incurred through adverse selection, Diamond (1984).

A further argument for the specialness of banks is the dispersion argument. Chant (1992) argues that holders of the marketable securities for any one firm tend to be more dispersed than banks. The co-ordination and monitoring problems may result in higher costs of funds and even the possibility that funding may not be fulfilled *at all*, since those that incur the cost of monitoring only reap a share of the benefits. A bank, as a single entity providing a large proportion or all of the external funds for a project, would not face this problem to the same degree. Again banks would have advantages over non-banks in being able to co-ordinate lending to firms. Some firms can overcome these problems if they are willing to make information available to potential holders of marketable securities in order to alleviate the need for monitoring. The existence of a ‘track record’ may allow larger and more established firms to obtain funds from external sources at a lower premium than smaller firms. To the extent that small firms are disadvantaged in this way, we could explain the heterogeneity in bank dependency for different sized firms. Even

large firms may be dependent upon bank finance if making information available in order to obtain non-bank finance compromises informational advantages they may possess over competitors.

Imperfect substitutability can also arise on the supply side since banks themselves might not regard bank loans and securities as perfect substitutes in their own portfolios, if the former are held for return whilst the latter are held for liquidity. When securities and loans are imperfect substitutes the response of the banking sector to a monetary tightening has a direct effect on the provision of loans. If this theory is correct interest rate spreads do not represent true differentials in prices in substitutable sources of funds that can be exploited by firms. Rather imperfect access to other sources of finance restricts substitution away from bank lending preventing arbitrage and allowing differentials between loan rates and other borrowing rates to persist. Under certain circumstances firms may need to borrow from banks, even at higher rates if they cannot obtain funds elsewhere. Small and medium sized firms may be unable to access other markets for funds and therefore have a certain dependence on banks for external sources of funds (see Gertler and Gilchrist, 1994; Bernanke and Gertler, 1995). This gives banks a special place in the credit market³.

2.2 The Effects of Monetary Policy Tightening on Firms' Financial Choice

Relaxing the assumption of perfect financial markets by introducing informational asymmetries and agency cost problems⁴ among agents has changed the dimension of economic research in this field. The credit view of monetary transmission appears when the assumptions of perfect substitutability among financial variables and of flexible prices are relaxed. In general, the credit channel implies that external and internal funds as liabilities of non-financial firms, loans and securities as assets of banks, and insured and large certificates of deposits as liabilities of banks are not perfectly substitutable. Bernanke and Blinder (1988), Romer and Romer (1990),

³ The classic statements of this view is given by Fama (1985). A contrary argument to this view is that deposit-taking intermediaries such as banks tend to hold a large proportion of their assets as non-marketable securities (loans) whereas other intermediaries e.g. mutual funds acquire mainly marketable securities (corporate debt, equity). For non-marketable securities, information *acquisition* is the responsibility of the lender whereas for marketable securities information *provision* is the responsibility of the borrower. This might suggest that banks would face more severe information asymmetries, not less.

⁴ After the seminal study of Akerlof (1970), Myers and Majluf (1984), Mankiw (1986) have first introduced the problem of asymmetric information into the analysis of financial markets.

Friedman and Kuttner (1993), Kashyap, Stein and Wilcox (1993) incorporated the credit channel into the standard IS-LM framework.

Market imperfections can generate cycles in economic and financial activities. Fluctuations in the activity of financial and non-financial firms become more significant with a rise in the degree of informational problems. A contractionary monetary shock is expected to weaken the financial positions of financial and non-financial firms and it may undermine the ability of the borrowers to finance their investment through external funds as well as that of lenders to extend loanable funds. Poorly capitalized firms, whose balance sheets are weak in terms of net worth, will have to pay a high cost for external funds relative to large well-capitalized firms. In other words, an initial decline in the economic activity as a result of a tight monetary policy will have a large impact on the borrowing and spending decisions of the agents facing credit market frictions, such as small firms (Bernanke and Gertler, 1995). This view is called the broad credit channel of monetary transmission⁵ in which a high degree of informational problems increases the cost of transactions realized between lenders and borrowers and differentiates the cost of funds among different categories of internal and external finance.

Monetary policy may have some influences on the lending ability of banks not only through the broad channel but also through a lending channel⁶ in which banks cannot recover (without incurring a cost) the loss of insured deposits that tend to decline following a reduction in reserves⁷ by issuing large certificate of deposits to finance bank credits (uninsured deposits). In other words, a tight monetary policy is expected to reduce the supply of bank credits if insured deposits and large certificates of deposits on the liability side of banks balance sheet, and loans and securities on the asset side, are not perfectly substitutes. In this framework, the extent of the reduction in the loan supply as a result of a tight monetary policy depends on the degree informational asymmetry between banks and the depositors, which, in turn, affects the cost raising new uninsured deposits. As in the case of non-financial firms where financial position, net worth, and size affect their investments, similarly, these factors change the lending behavior of banks and thus their loan supply (Kashyap and Stein; 1995, Stein; 1998, Kishan and Opiela; 2000). All this is to argue that with informational asymmetries, and the lack of close substitutes,

⁵ See Hubbard (1994) for a survey on the broad credit channel.

⁶ Kashyap and Stein (1993) survey the lending channel literature.

monetary policy contractions will be amplified by the credit market effects implemented by banks through loan supply.

A contrary argument is proposed by Sharpe (1990) and Rajan (1992), who suggest that far from the credit channel *amplifying* monetary policy, it may in fact *mute it*. They argue that it is in the interests of both banks and firms to form workable relationships that can endure the cyclical variations of monetary policy. Indeed the *raison d'être* of banks is to provide such relationships. Relationship banking involves multiple lender-customer interactions over time and across products that allow the collection of customer-specific information (often of a proprietary nature), and the evaluation of the profitability of lending through multiple financial services. This creates conditions by which gains can be made over arm's length lenders, but the split does not necessarily correspond directly to a bank/non-bank intermediaries (see Carey, Post and Sharpe, 1998, Berger 1999, Boot 2000). It may involve investment as well as commercial banks, and other financial intermediaries that can make use of proprietary information to offer favourable terms on loans, and offer other financial services such as letters of credit, cheque clearing, and cash management services. In assessing the impact of credit provision over the monetary cycle, relationship banking may allow the lender to offer cross-subsidisation of loan rates in bad times by charging marginally higher rates in good times (Berlin and Mester, 1999). It is assumed that these facilities are primarily offered by banks and that this gives banks their special place in the market for loans. Thus, the contraction brought about in monetary policy by higher interest rates may in fact be offset by the banks who allow lending rates to move counter to the policy rate over the cycle. Instead of bank lending declining with the monetary policy contraction, the relationship between bank and firm will allow the bank to maintain its lending (access to proprietary information lowers the risk of this activity and cheap funds e.g. deposits obtained through multiple financial services avoid the need to resort to costly wholesale sources). In short, there will be no amplification of monetary policy from the credit market.

A third possibility exists, which is that non-banks may offer external finance, so that this close substitute for bank loans can be obtained at a premium over the cost of bank loans. Extensions of the standard IS/LM model can allow for the coexistence of bonds and bank loans under the assumptions of imperfect substitutability, and also for firm heterogeneity, so that they can

⁷ Insured bank deposits are determined through the reserve requirement ratio.

investigate the interaction between the financial structure of lenders and borrowers within the framework of asymmetric information. The models in this literature can be classified along two main lines. The first is related to the financial accelerator literature in which policy shocks lead to cycles at the aggregate level through the financial positions of borrowers and intermediaries (Bernanke and Gertler; 1989, Fuerst; 1995, Bernanke, Gertler and Gilchrist; 1996, Kiyotaki and Moore; 1997, Carlstrom and Fuerst; 1997, Bernanke, Gertler and Gilchrist; 1998).

The second is related to the principal-agent literature in which policy shocks affect the cost, availability and demand of internal and external financial funds given informational asymmetries and incentive problems. This can also be classified into two groups of models. The models in the first group tend to analyze the impact of policy shocks on the supply and cost of funds (lending channel) and the financial structure of fund suppliers, which are mainly intermediaries (Stein; 1998, Fisher; 1999, Jayaratne and Morgan; 2000 and Kishan and Opeila; 2000). The second group of models classifies the external finance of non-financial firms as intermediary finance and various forms of market finance according to their ability to provide monitoring services that ameliorate informational problems (Diamond; 1991, Hoshi et al; 1993, Besanko and Kanatas; 1993, Holmsrom and Tirole; 1997, Repullo and Suarez; 2000, Bolton and Freixas; 2000).

The interaction between the change in the composition of firm external finance and monetary policy stance is investigated by Kashyap, Stein and Wilcox (1993) and Oliner and Rudebush (1996). The model tests the impact of tight monetary policy in the US on the ratio of bank loans to sum of commercial paper and bank loan (the mix) using aggregate data. The monetary policy tightness is determined by reference to Romer dates (Romer and Romer, 1990), the federal funds rate and the spread between federal funds and Treasury bonds. The empirical evidence shows that tight monetary policy leads to a shift in the firms' external finance from the bank loans to the commercial paper. The decline in the banks' loans is due to reduction in the bank loan supply rather than reduction in the demand for the bank loans. In fact, this study shows that an increase in the volume of the commercial paper issuance relative to total short-term external finance is evidence of a bank-lending channel. This result implies that loans and bonds as bank assets and loans and other form of finance as corporate liabilities must be imperfect substitutes.

The main criticism of the Kashyap et al (1993) paper is that it uses aggregate data that fails to allow for firm heterogeneity. Gertler and Gilchrist (1994) are able to analyse the different responses of small versus large manufacturing firms to monetary policy in an imperfect financial environment. In this seminal paper, they aim to find evidence on the importance of the financial propagation mechanism for aggregate activities as a result of monetary shocks. Monetary policy affects firms' balance sheets directly and indirectly, in the first stage, a rise in the interest rates weakens the balance sheets by increasing short-term interest payment (reducing cash flow) and lowering the value of collateral assets that constrain the borrowers' spending. The balance sheet of firm will further deteriorate after initial drop of firms' spending in the meantime. In fact, the empirical evidence for US economy shows that the decline in the credit volume and economic activities generally coincide after 6-9 months period following a tight monetary policy. The study emphasises a substantial decline in the activity of the small size firms (mainly inventory demand) during the tight monetary policy. In other words, the evidence implies that the responses of the small and large firms to monetary policy differ considerably. The distributional impacts of monetary policy can be discussed in this context. This study emphasises that small firms rely proportionally more heavily on information-intensive financing, that is, they use more bank finance relative to mean manufacturing and generally do not issue so much commercial paper. The informational frictions that increase the cost of external finance apply mainly to younger firms with a high degree of idiosyncratic risk, and to the firms that are not well collateralised. Small firms rely on intermediary credits, while large firms generally use direct credits, including equity, public debt, and commercial papers. The financial constraints are likely to bind for small-scale firms during the recessions rather than in boom periods. Prior to recession periods, the short-term debt growth for large firm rises before declining as recession sets in.

Based on the idea of firm heterogeneity, Oliner and Rudebusch (1996) comment on Kashyap, Stein and Wilcox (1993) and find new evidence by using micro data that denies the bank-lending channel. Oliner and Rudebusch (1996) conclude that there is no evidence that monetary policy reduces the bank loan supply relative to non-bank finance by mid-1970's. Although Oliner and Rudebusch (1996) confirm the broad credit channel functioning through informational asymmetries faced by all type of loans rather than only bank loans; they argue that it is the larger firms rather than the small firms relying more on bank finance that issue

commercial papers during the contraction. Kashyap, Stein and Wilcox (1996) reply to this comment and conclude that a contractionary monetary policy, which reallocates funds away from smaller firms towards the large firms, based on the results of Gertler and Gilchrist (1994), does not work against the bank lending channel. In other words, distributional impacts of monetary policy should not be seen as an argument that rejects the bank lending view.

3. Data

3.1. Data sources and definitions

The FAME database covers all UK registered companies including those that have recently formed and up to 11 years of detailed information (modified accounts) for about 500,000 large, small and medium sized British companies⁸. Large firms provide balance sheets, profit-loss accounts and some important ratios based on firms' accounting thresholds refereed in the section 248 of Companies Act 1985. In this framework, certain companies are permitted to deliver modified accounts to the Registrar of Companies. Individual companies, which meet the criteria of small and medium-sized status, have some advantages relative to large companies of not preparing detailed accounts. For small-sized companies there is no obligation to file a profit and loss accounts, turnover, or the number of employees; only an abridged balance sheet is required. For medium-sized companies there is no requirement to disclose turnover details.

We construct a sample from the FAME Database that allows us some flexibility in analysing some aspects of the monetary transmission mechanism and in emphasising the role of non-financial firms' financial positions for corporate sector activity. We limited the sample to the

⁸ 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 are classified as small or medium sized company. These criteria are based on turnover, balance sheet (total assets) and number of employees.

manufacturing sector, which has a similar business cycle to the overall economy. The sample is extracted from the FAME Database based on the following criteria⁹:

- Firms whose primary activity is classified in the manufacturing industry according to 1992 SIC UK Code¹⁰.
- Firms established in 1989 and before are selected to construct a data set allowing us to observe firms during the period and to evaluate the link between shocks and the financial positions of firms.
- All active firms in England, Scotland, Northern Ireland, Wales are included.
- Firms that have information at least for the years 1999 and 2000 are included to make sure that firms have the latest information¹¹.

The data has an exemption structure that allows some missing observations in company's accounts held on the FAME Database, and these are prevalent in the first couple of years of the sample period. This means that the sample is not a balanced panel, in the sense that we can not observe information about most of firms whose turnover is under the threshold. The sample also tends to represent the upper tail of the population in terms of firm size distribution because we do not observe information of whole firms in manufacturing but only those have their turnover over exemption threshold. The sample does include some information about certain firms whose turnover is under £90,000, which is the upper threshold for totally exempted firms, however. This sort of limitation in the sample requires us to ensure that we cope with truncated and censored samples.

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 forms of short term non-bank finance, not merely commercial paper. We derive three different measures of the financial mix that corresponds to

⁹ 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.

¹⁰ The software included also 940 firms (5.7 percent of total sample) whose secondary activity is classified in the manufacturing sector rather than primary activity.

¹¹ 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 exemption threshold.

these measures – short-term debt to current liabilities; total debt to total liabilities; and short-term debt to total debt – these are defined as follows. 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. Similarly, current liabilities are made of short-term debt, trade creditors and total other current liabilities that are supposed to 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. Shifting between forms of finance with different terms and characteristics involves a cost for non-financial firms that are subject to informational asymmetries. For example, firms with poor capital and reputation are less likely to get long-term bank loans and funds from market directly. They can have an access to more costly finance, in turn make them choose risky projects.

We also use a number of measures of the properties of the firms, namely perceived riskiness (QuiScore); age; solvency; gearing; real asset size. The database contains quite rich information about the credit ratings of the firms. QuiScore that is produced by Qui Credit Assessment Ltd¹² measures 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 100¹³. For ease of interpretation, that range may be considered as comprising five distinct bands, the details of which are reported in Table 2. 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 QuiScore during the recession is low. Only 9,000 firms reported this figure in 1990, but it increased to 14,000 in 1992 and on average 16,000 firms reported a QuiScore per year in the period 1993-1999. Firms whose QuiScore figures are at most 40, were labelled risky firms while those have QuiScore over 60 were labelled secure firms.

¹² Firm's analysis reflects the current economic conditions and includes post mortems on failed companies.

¹³ 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 sort insignificant amounts of unsecured trade credit and liquidated companies that have a surplus of assets over liabilities.

We have the information about the year of corporation for all firms. We introduce the age as an explanatory variable and classified 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. The logarithm of real total asset is used to cover both the impact of size and activity level of firms on the form of finance. The real assets variable is calculated by deflating nominal total assets by the relevant sectoral producer price index. We divided firms into size categories based on criteria given in Table 1 where firms should satisfy at least two criteria to be classified into a group.

3.2 Properties of the Data

Not all firms in the sample did report their balance sheet information regularly. Only two thirds of them reported their balance sheets in the period of 1990-1992, while almost all of them (16,000 firms) reported in the period of 1993-1999. The distribution of firms across size categories in our sample and the number of reported firms by year are shown in Figure 1. The number of medium and large firms grew over the sample period parallel to increase in the number of firms that reported balance sheet items while the number of small firms grew in the early 1990s but declined by mid 1990s. The possible reasons for poor reporting observed for the period of 1990-1992 may be attributed to the following facts.

- The regime of audit exemption thresholds changed in 1993, taking effect in 1994. Before 1994, the exemption regime entailed auditing for all firms.
- The recovery in the economy from 1993 may have led to an increase in the sizes of firms and thus the number of firms eligible for reporting. Likewise the impact of the recession in the early 1990s may have affected the reporting efficiency for the firms that were financially in trouble.

- Data collection may have improved.

Figure 2 records the distribution of firms across QuiScore bands highlights the impact of the recession in the early 1990s on the firms' financial health. As we might expect the shares of the firms in the fourth and fifth bands are higher during the recession (black column) than during the recovery period (shaded column), the share of the firms in the secure and stable bands are higher during the upswing period. In other words, in our sample we have more risky firms during the recession than during a recovery. Other priors can be confirmed with our sample. For example, large and old firms have on average higher ratings than small and young firms, which have inadequate collateral assets and no track record. The small and the young are more likely to be subject to financial difficulties in the period of slowing down, and this is reflected in the QuiScore.

Figure 3 shows how the distribution of QuiScores varies with the business cycle. First, there is a downward slope from right to left, indicating that there the firms in the upper tail of total assets (large firms) have relatively higher credit scores than those in the lower tail (small firms) irrespective of the business cycle. Second, there is a noticeable downward shift in the entire distribution of QuiScores in the recession compared to the recovery, with lower average scores evident throughout. Third, the margin between the two curves grows as the asset size declines, with the largest firms virtually unaffected by the recession but the small and medium sized firms significantly affected in accordance with their size.

The sensitivity of the composition of external finance to the monetary stance the main concern of this study. The distribution of the liability side items in Table 3 across asset size bands for the early 1990s recession period and following recovery era. This type of analysis gives us some preliminary indication of the kinds of results we may expect to find when we carry out a more rigorous econometric analysis. Four stylised facts were uncovered from the sample. First, small firms tend to use more short-term finance relatively, more specifically, current liabilities constitute large part of total liabilities for all firms while the share of current liabilities for small firms is higher than that for large firms. This results confirms the fact that the net worth is a determinant of external finance composition. Banks may have avoid extending long term funds to firms who are poor in terms of collateral and track record. Second, the average short-term

debt seems to constitute a large proportion of current liabilities in the period of recovery while the shift in the short term debt finance is more significant for small firms. This result confirms the fact that a credit crunch reduces the short-term debt finance for all firms but the reduction in the short-term debt finance is more severe for small and weak firms in terms of collateral. Third, small firms shift to other short-term liabilities such as trade credit and other current liabilities to compensate for the decline in the short-term bank loans as monetary policy contracts. The increase in the short-term non-bank liabilities relative to the short-term debt is generally claimed as evidence of a bank lending channel (Kashyap *et al.*, 1993), while the difference in the composition of short-term liabilities across firms size can be considered as an evidence for the broad credit channel. Four, although average long-term debt increases gradually with the firm size, the increase in the other long-term liabilities increased very sharply implying that large firms have flexibility in raising funds from non-bank sources. We now explain our methodology before we consider the responsiveness (elasticities) of bank-based and market-based finance to these explanatory variables.

4. Methodology

Our paper seeks to determine whether firms with different size, age and financial positions have different reaction to the monetary policy stance once we have conditioned for the firm's type. For example, small and financially weak firms may have difficulties in accessing to relatively low external premium funds during the tight periods and thus they tend to substitute more costly funds to finance risky projects that increase the extent of moral hazard and adverse selection problems. Alternatively, a general increase in the demand for bank funds in tight periods may raise the possibility of financial constraints for small and weak firms who have limited collateral. In this context, differentiation in the reaction of the mix to the monetary stance across different groups can be evaluated as evidence for a broad credit channel. In addition, we can derive some information about the bank-lending channel even though there are difficulties over observing the supply side. In fact, a decline in the mix in tight periods across firm groups with different characteristics may be taken as evidence for bank lending channel.

Our approach is to explain the mixture of liabilities that a firm draws upon over the cycle with a combination of environmental (monetary policy determined) conditions and firm specific

characteristics. Our measure of the liabilities that firms choose is based on three different measures: the ratio of short-term debt to current liabilities, short-term debt to total debt, and total debt to total liabilities. These are readily available from the FAME data set and we have coverage for about 16,000 firms.

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. The period coincided with a recession, tightening monetary policy and a harsh environment for existing and new corporate borrowers. Nevertheless high rates of interest in Germany after reunification and the perceived weakness of sterling as a currency contributed to keep interest rates high during this period. The second period followed the recession and 1993-1999 witnessed a period of sustained economic growth and 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.

Our measures of the firm-specific characteristics are explained using indicators reflecting the financial position of firm such as solvency (the ratio of shareholders' equity to total asset), the gearing of the firm (the ratio of total debt to total equity) and its basic characteristics such as total assets, age, default risk (rating). We categorise firms and run regressions based on size, age, rating and indebtedness to emphasise the importance firm heterogeneity in this framework. This allows us to compare small, medium and large firms, young and old firms, risky and secure firms, low-indebted and high-indebted firms and to determine how the explanatory variables influenced the mix when monetary policy is tight compared to when it is benign.

The empirical model we use is based on ideas adapted from Kashyap *et al* (1993), Hoshi *et al* (1993) and Oliner and Rudebush (1996) in which the composition of the firm's financial source is determined by monetary policy, probability of having good and bad projects, gearing, collateral, monitoring cost, project size as well as distribution of firms in terms of investment opportunities.

By taking following derivative, we can observe main implications of Kashyap *et al* (1993) model

$$dL/dM = \alpha^* dI/dM + Id\alpha^*/dM \quad (1)$$

$$dB/dM = (1-\alpha^*)dI/dM - Id\alpha^*/dM \quad (2)$$

$$d\alpha^*/dM = F' d(r_l - r_p)/dM \quad (3)$$

where L , B , M , I , α^* , r_l , and r_p denote loans, commercial paper, money supply, investment, the mix, lending rate and paper rate, respectively. That is, the impact of a change in the monetary stance on supply of loans and bonds is a function of the mix. The impact on the mix is function of the wedge between lending and paper rates given assumptions of imperfect substitutability between loans versus paper, both as bank assets and corporate liabilities.

Equation (1) implies that when the loans and bonds as bank assets are perfectly substitutable, then, the effect of money supply on bank loans depends only on the change of investment arising from monetary shock. If the loans and bonds are not perfectly substitutable, the weight of bank finance changes because of non-zero loan rate and bond rate spread. Equation (2) implies that monetary tightening will have opposite impacts on the bond finance; a reduction in money supply reduces investment and thus the demand for all source of finance as well as bond finance, but the demand for bond finance may increase as a result of substituting bond finance to loan finance and the proposition of monetary policy affects the composition of finance if the bond and loans are not perfect substitutes can be observed from equation (3).

From investment demand equation, $I = I_d(Y, k)$

$$dI = (I_y/dy)*dy + I_k dr_p + I_k \alpha^* (dr_l - dr_p) \quad (4)$$

The term in right hand side disappears in case of perfect substitution between loans and bonds and thus change in investment is determined only by income and bond rate. The hypothesis that loans and bonds are imperfect substitutes as firms' liabilities can be tested through adding the share of bank loans in total short-term finance (mix variable) as an independent variable into investment equation in addition to interest rate variable in a framework of homogeneous firms.

Excluding the interest rate as an explanatory variable would not be able to verify the existence of an independent lending channel of transmission. In other words, without using the interest rate as an explanatory variable together with mix variable, it is unlikely that we could identify the proper impact of loans on investments. Empirically, Kashyap *et al* (1993) tended to explain the mix by using its lags, monetary policy stance lags and lags of GNP growth to control for cyclical factors other than monetary policy.

Oliner and Rudebush (1996) criticised the empirical method used by Kashyap *et al* (1993) and used disaggregated firm level data instead to explain the mix. They control for firm heterogeneity so that the source of shift in the mix decomposed into shift and fixed components. That is, the mix changes mainly because of shift in the debt ratios across small and large firms as well as the mix itself across firm categories. Therefore, any shift in the debt ratio across firm groups may be taken as evidence for broad credit channel, provided that the mix does not change as result of monetary policy change. However, if the debt ratios across firm types remain constant, any change in the mix across firm types may be considered as evidence for the bank-lending channel.

We reconcile the idea of the mix and firm heterogeneity with the evidence extracted from Hoshi *et al* (1993) in which a moral hazard model allows us to derive some implications about the determinants of the change in the composition of bank finance and market finance. The model implies that the change in the composition of firm finance depends on firm's collateral, debt, asset size, probability of good and bad projects, monitoring cost, interest rate, project size, ownership structure, distribution of firms in terms of investment opportunities.

The model employed is therefore:

$$MIX = f(\text{monetary stance, credit rating, age, solvency, gearing, real total assets, time, industrial dummies})$$

We employed panel data methods to exploit the information inherited in our data better. In other words, panel data enable us to control firm specific unobservable effects, which may be correlated with other explanatory variables. The panel data is the ideal way to observe the firm heterogeneity that is important for our hypothesis.

A standard model of panel data is specified in the following form;

$$y_{it} = \alpha_i + X_{it}\beta + \varepsilon_{it}, \quad (5)$$

where $i = 1, 2, \dots, N$ refers to a cross section unit (firms in this study), $t = 1, 2, \dots, T$ 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. Restrictive assumptions on the nature of individual effects lead to various panel data models. There are two basic frameworks to generalise this model, namely fixed effects and 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 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. If the sample is drawn from a large population, the random effects model is the most suitable approach for estimation, because it is more likely that firm specific constant terms distribute randomly across cross-sectional units, that is, there is no correlation between firm specific constant terms and explanatory variables.

More specifically we can write the random effects model as follows:

$$y_{it} = X_{it}\beta + \varepsilon_{it}, \quad \varepsilon_{it} = \alpha_i + e_{it}, \quad (6)$$

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} , idiosyncratic disturbances. The estimation process involved unbalanced panel data techniques to test our hypothesis. By dividing the firms across size, age, rating, gearing we test the sensitivity of the composition of external finance of different firm categories to the monetary policy stance. We rejected the hypothesis of no systematic difference between coefficients obtained from the random effects and fixed effects models by using Hausman test. Therefore, the results obtained from random effects model are reported here.

5. Results

We report our findings in Tables 4 and 5. Here we partition the results into estimations for the tight period of monetary policy from 1990-92 and the benign period from 1993-99. We also separate out the responses of firms according to size – small, medium, SMEs and large firms in columns 2-5, credit rating – risky and secure firms in columns 6 and 7, age – young and old firms in columns 8 and 9 and gearing – highly and low indebted firms in columns 10 and 11. Our tables have three panels 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. We discuss the impact of monetary tightness, credit score, age, solvency, gearing and asset size in turn on the three measures of the financial mix.

Consider the results in Table 4. The coefficients on the measure of monetary tightness (MPTightness), based on the cumulative base rate in the regression, explaining the ratio of short-term debt to current liabilities (the mix) are negative and significant across all firm sizes except large firms, all credit ratings, ages and indebtedness. But the absolute values of these coefficients are larger for small, risky, young and highly indebted firms than for medium sized, secure, old or low indebted firms. This means that there is a greater response in the mix variable for smaller, more risky, younger and highly indebted firms when monetary policy tightens. Although the coefficient of monetary stance variable is not significant for large firms, a positive coefficient may imply that large firms do not confront with short-term bank finance constraint when monetary policy tightens. This result may be explained in the framework where large and well-capitalised firms are most likely to be eligible for bank finance during tight periods as asymmetric information literature proposes.

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. In fact, the coefficient of monetary stance variable is positive and significant for the ratio of short-term debt to total debt regression while it is negative and significant for the ratio of total debt to total liabilities for large firms. The shift in short-term liabilities is more significant than the shift in long-term liabilities as we might expect for small firms. The result is also supported if we use the apparent interest rate, 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 (results not reported). By comparison, the results in Table 5 show that the coefficients on the MPTightness variable for the period of 1993-1999 are positive and significant, and they do not show significant differences across firm categories. Introducing time dummies does not change estimated coefficient significantly.

Two main implications may be highlighted from this evidence. First, all firm groups except large firms in the regressions of the ratio of short-term debt to current liabilities and the ratio of short-term debt to total debt - whether they are small, risky, secure, young, old, highly indebted or low indebted - are less likely to have access to short-term loans during recessionary periods. This result confirms that a bank-lending channel operates as suggested by Kashyap *et al.* (1993), so that banks or other intermediaries reduce loans extended to the corporate sector during the recession in the early 1990s. This result confirms the theoretical framework forwarded by Bernanke and Blinder (1988) and Kashyap *et al.* (1993) where a tight monetary policy constrains loan supply by reducing reserves. However, the result for large firms does not support this hypothesis, thus any generalisation should be interpreted cautiously. Second, there is substantial heterogeneity in the impact of monetary policy stance on the form of firm finance across firm categories and estimation periods - small, young risky and highly indebted firms are affected more severely than larger, older more secure and low indebted 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 as an important evidence for the broad credit channel confirming the findings in Oliner and Rudebusch (1996).

The QuiScore may be interpreted as the perception of the financial health of firms. Estimation results imply that it an important explanatory variable for the different version of the mix across firm categories and time periods. The coefficient estimates are consistently negative and significant in all cases, while the coefficients are larger for the recession period as expected. That is, the firms with high rating may have chance to extend alternative finance rather than debt and this fact is more important during the recession, when the supply of loans is more likely to be constrained, than in the recovery. The coefficients on the QuiScore do not seem to

vary across firm categories in recession period but they do differ significantly in recovery period across firm types. In addition, during the recovery period, the mix is relatively less sensitive to QuiScore for small, young and highly indebted firms implying that these firms are relatively less constrained in terms of rating during easy times.

Age appears to be a significant explanatory variable in the period of recovery across firm categories for the regressions of short-term debt-current liabilities (the mix) and short-term debt-total debt ratios except for secure firms. That is, old firms are more likely to have access to short-term bank loans when monetary policy is relatively loose; however, the story is quite different during the recession. Small and risky firms have positive and significant coefficients on the mix regression, which means that the age of the firm tends to compensate for other features such as size and perceived riskiness. Also, for young firms the mix appears to be more sensitive to the age than for older firms. For large, secure and old firms the mix is reduced by the age and this negative coefficient suggests that older, secure firms have alternative sources of funds. Age can also provide confirmation of the importance of a track record for certain types of firms and this is a direct test of the relationship-banking proposition of Sharpe (1990), Rajan (1992) and Boot (2000). Small and financially weak firms are less likely subject to financial constraints by having access to bank loans in tight periods if they have a track record.

Firm solvency (ratio of equity to total asset) appears to be another important determinant of the mix. Almost in all the regressions, the coefficient of the firm solvency is significantly positive, as expected, except in the regression of total debt to total liabilities ratio in the recovery period. The important observation is that the coefficients are relatively higher in recession period implying that firm solvency is a more important factor for explaining the change in the composition of firm finance during the recession. This result provides support for the financial accelerator theory proposed by Kiyotaki and Moore (1997), where financially weak firms are more likely subject to constraints during tight periods.

Gearing also appears to be a significant factor. Hoshi *et al* (1993) suggest that a rise in firm debt relative to assets will lead to an increase in the demand for intermediary finance. 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. The positive and significant

coefficients for gearing in all regression may confirm this fact. We classified firms based on their gearing to measure the impact of monetary policy on the composition of external finance across low and highly indebted firms (we called these low-debt and high-debt 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. High indebtedness is perceived as a weakness during tight periods when high interest rate reduces the cash flow of firms that have heavy debt servicing burdens. While the coefficients of base rate are negative and significant in recession period, they are positive but significant for low-debt firms.

Lastly, real assets provide an indicator of firm size, and this is found to be an important determinant of the mix. The sensitivity of the mix to this variable is relatively high; coefficients are positively signed and generally significant in all regressions during the recession period except for the ratio of short-term to total debt of small firms. **In contrast they are negative in short-term debt to total debt regressions for all categories except for large firms in the recovery period. This confirms the fact that positive macro and micro conditions lead firms to substitute long term debt as economic activity increases.**

6. Conclusions

This paper has examined the influence of tightening monetary conditions on corporate credit in the United Kingdom by comparing the uptake of bank loans and other external credit during tight and benign periods of monetary policy. The paper differentiates between firms according to their size, their credit rating, solvency, indebtedness and age, and can therefore determine whether monetary policy tightening influences firms' according to their type.

Our results show that smaller, more risky or highly indebted and younger firms are more affected by monetary tightening than larger, secure, less-indebted or older firms. This confirms for UK data the findings of major US studies - that there is a broad credit channel effect (as found by Oliner and Rudebusch, 1996), a bank-lending channel (first discovered by Kashyap et al. 1993, Gertler and Gilchrist, 1994), accelerator effects (predicted by Kiyotaki and Moore, 1997), relationship banking when age proxies for the development of such bank-firm relationships (Rajan, 1992 and Boot, 2000), and influence from 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 than by the financially healthy, large companies with good credit ratings. Relationship banking only favours larger, older and more secure firms rather than those that are affected most by the tightening monetary conditions. Larger companies are almost unaffected in their credit ratings 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. In short, we find plenty of evidence for credit channel effects.

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Table 1: Definitions of Small and Medium Sized Firms

Criteria	Small Sized Companies	Medium Sized Companies
Turnover	Maximum £2.8 million	Maximum £11.2 million
Balance Sheet	Maximum £1.4 million	Maximum £5.6 million
Number of Employee	Max 50	Max 250

Source: DTI web page.

Table 2 The QuiScore Measure of Risk

Band Name	Score	Band Description
The Secure Band	81-100	Companies in this sector tend to be large and successful public companies. Failure is very unusual
The Stable Band	61-80	Again 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 than those in the Normal Band.
The High Risk Band	0-20	Companies in the High-Risk band are unlikely to be able to continue trading unless significant remedial action is undertaken.

Source: QuiScore Assessment Ltd.

Table 3: The Composition of Firm Liabilities across Sizeband

	0-10 Perc.	10-24 Perc.	25-49 Perc.	50-74 Perc	75-89 Perc.	90-100 Perc.
<i>1990-1992 Average (1)</i>						
Current Liabilities	85.88	84.21	81.56	79.35	75.80	61.08
Trade Creditors	27.00	27.41	32.22	31.11	28.02	23.69
Short Term Loans & Overdrafts	21.42	20.11	25.15	30.26	31.58	21.81
Total Other Current Liabilities	37.45	36.70	24.19	17.98	16.20	15.58
Long Term Liabilities	14.12	15.79	18.44	20.65	24.20	38.92
Long Term Debt	10.49	11.35	13.20	15.24	17.34	21.40
Total Other Long Term Liab.	3.64	4.44	5.24	5.41	6.85	17.52
<i>1993-1999 Average (2)</i>						
Current Liabilities	82.72	84.84	81.77	81.01	78.13	62.85
Trade Creditors	20.46	21.42	25.59	25.94	22.57	13.28
Short Term Loans & Overdrafts	31.82	24.50	26.97	31.43	33.77	25.92
Total Other Current Liabilities	30.44	38.91	29.20	23.64	21.79	23.65
Long Term Liabilities	17.28	15.16	18.23	18.99	21.87	37.15
Long Term Debt	13.50	10.39	13.80	15.10	17.38	21.44
Total Other Long Term Liab.	3.78	4.78	4.44	3.89	4.50	15.71
<i>Ratios (1)/(2)</i>						
Current Liabilities	1.04	0.99	1.00	0.98	0.97	0.97
Trade Creditors	1.32	1.28	1.26	1.20	1.24	1.78
Short Term Loans & Overdrafts	0.67	0.82	0.93	0.96	0.94	0.84
Total Other Current Liabilities	1.23	0.94	0.83	0.76	0.74	0.66
Long Term Liabilities	0.82	1.04	1.01	1.09	1.11	1.05
Long Term Debt	0.78	1.09	0.96	1.01	1.00	1.00
Total Other Long Term Liab.	0.96	0.93	1.18	1.39	1.52	1.11

Table 4: Estimation Results for the Period 1990-1992

<i>Dependent variable: Short-Term Debt/Current Liabilities</i>										
	Small	Medium	SMEs	Large	Risky Firms	Secure Firms	Young Firms	Old Firms	Highly Indebted	Low Indebted
MPTightness	-0.2732	-0.1031	-0.1658	0.0109	-0.1238	-0.0717	-0.1152	-0.0867	-0.0763	-0.0288
	-20.50	-12.57	-23.28	1.46	-9.28	-9.01	-12.01	-13.53	-7.08	-4.99
QuiScore	-0.7105	-0.7211	-0.7206	-0.7674	-0.7761	-0.5569	-0.7276	-0.7137	-0.7364	-0.1809
	-32.86	-46.55	-54.14	-47.75	-23.59	-27.34	-44.44	-56.18	-42.49	-15.35
Age	0.0397	0.0116	0.0117	-0.0039	0.0600	-0.0364	0.1742	-0.0224	0.0627	-0.0488
	2.05	0.98	1.07	-0.31	3.58	-3.44	2.60	-2.02	4.24	-6.29
Solvency	36.6457	27.6296	36.2547	30.1362	45.1897	18.6473	41.5088	27.7580	130.6770	53.3038
	15.49	15.48	24.61	15.49	16.55	10.95	22.16	19.07	36.62	41.62
Gearing	0.6683	0.5426	0.7025	0.2520	0.5182	0.7504	0.6402	0.4645	0.5218	130.0901
	15.53	15.38	24.48	7.95	17.38	9.10	20.23	16.20	21.92	57.4
RealTAsset	3.9321	8.7058	4.8165	1.2672	4.0092	2.8160	3.7229	3.0869	1.4946	0.7744
	8.64	20.72	18.37	5.19	18.01	17.83	20.19	20.92	7.74	5.82
Constant	41.5924	-4.1638	27.4285	53.2957	31.8854	35.8226	29.0354	40.8560	41.8779	-23.2030
	12.80	-1.2	13.62	20.32	14.01	18.14	15.27	28.38	22.98	-19.14
Overall R2	0.219	0.274	0.224	0.221	0.215	0.089	0.236	0.242	0.182	0.283
No. of Observation	6907	12163	19271	9156	6814	12485	11682	18551	7512	10426

Note: z-values are given below the coefficients

Table 4: Estimation Results for the Period 1990-1992 (Cont.)

<i>Dependent variable: Total Debt/Total Liabilities</i>										
	Small	Medium	SMEs	Large	Risky Firms	Secure Firms	Young Firms	Old Firms	Highly Indebted	Low Indebted
MPTightness	-0.2398	-0.1190	-0.1569	-0.0426	-0.1382	-0.0899	-0.1192	-0.1094	-0.0944	-0.0093
	-20.14	-16.98	-25.37	-6.54	-11.72	-13.34	-14.42	-19.75	-10.91	-1.88
QuiScore	-0.4663	-0.4991	-0.4804	-0.5097	-0.6393	-0.3303	-0.4754	-0.4945	-0.4427	-0.1596
	-24.5	-37.77	-41.71	-37.07	-22.09	-19.2	-33.86	-45.85	-32.26	-16.21
Age	0.0183	-0.0103	0.0031	-0.0012	0.0566	-0.0330	0.0563	-0.0136	0.0579	-0.0401
	1.07	-1.01	0.32	-0.12	3.86	-3.67	0.97	-1.43	4.87	-6.2
Solvency	13.7992	7.1345	13.9221	3.5166	36.4249	-8.3551	18.3258	6.3913	93.2445	47.0946
	6.66	4.71	10.95	2.15	15.76	-5.87	11.45	5.22	32.68	44.65
Gearing	0.5611	0.4485	0.6032	0.1686	0.4745	0.6513	0.5358	0.3855	0.4178	128.2613
	14.54	14.66	23.79	6.07	18.11	9.03	19.32	15.43	21.74	66.72
RealTAsset	3.3305	6.4337	4.0220	1.2620	3.1216	2.0461	2.9556	2.4619	0.8228	0.2718
	8.42	17.87	17.47	6.15	16.00	15.18	18.42	19.47	5.3	2.47
Constant	41.6444	12.7742	29.8386	52.3540	36.3301	43.0121	32.7565	43.9664	44.7252	-17.7506
	14.69	4.31	16.88	23.67	18.20	25.77	19.88	35.66	30.56	-17.51
Overall R2	0.200	0.271	0.208	0.240	0.200	0.117	0.2009	0.252	0.149	0.307
No. of Observation	7011	12544	20100	9717	6991	13487	12309	19486	8484	11145

Note: z-values are given below the coefficients

Table 4: Estimation Results for the Period 1990-1992 (Cont.)

<i>Dependent variable: Short Debt/Total Debt</i>										
	Small	Medium	SMEs	Large	Risky Firms	Secure Firms	Young Firms	Old Firms	Highly Indebted	Low Indebted
MPTightness	-0.4794	-0.0255	-0.2175	0.1536	-0.0701	-0.0483	-0.1089	-0.0191	0.0666	-0.3484
	-19.39	-1.71	-15.99	11.99	-3.40	-2.93	-6.49	-1.65	4.38	-13.98
QuiScore	-0.9985	-0.7944	-0.9199	-0.9208	-0.5743	-0.8113	-0.9124	-0.8273	-0.9871	0.1832
	-27.68	-30.26	-39.63	-35.85	-11.99	-20.91	-33.83	-39.22	-40.54	4.2
Age	0.1502	0.0561	0.0815	0.0350	0.1244	0.0119	0.6680	-0.0478	0.1077	-0.0317
	4.8	2.96	4.51	1.98	5.59	0.64	6.35	-2.77	5.05	-1.18
Solvency	100.3819	83.9761	91.5500	101.3471	39.2436	103.7416	89.9586	87.1415	89.1752	52.1047
	25.51	28.07	35.9	33.46	10.50	33.32	29.26	36.56	17.55	11.17
Gearing	0.5121	0.3872	0.5017	0.1303	0.1536	0.1810	0.3287	0.3459	0.1228	112.8420
	7.18	6.47	10.1	2.53	3.57	1.19	6.24	7.26	3.62	12.75
RealTAsset	-5.1631	2.8477	3.2161	-3.0629	0.3770	1.5524	1.0698	1.3082	-1.0088	4.0693
	-7.2	4.16	7.34	-8.6	1.26	5.6	3.68	5.68	-3.62	8.95
Constant	145.5960	55.9684	68.4550	101.0720	81.9154	57.0522	71.2468	71.9062	88.5635	4.6346
	28.08	9.93	20.21	26.13	25.58	15.69	23.5	31.45	33.8	1.04
Overall R2	0.152	0.085	0.104	0.146	0.040	0.123	0.1042	0.089	0.122	0.194
No. of Observation	6232	11640	17719	9388	6724	11561	11217	17748	6318	9142

Note: z-values are given below the coefficients

Table 5: Estimation Results for the Period 1993-1999

<i>Dependent variable: Short-Term Debt/Current Liabilities</i>										
	Small	Medium	SMEs	Large	Risky Firms	Secure Firms	Young Firms	Old Firms	Highly Indebted	Low Indebted
MPTightness	0.0334	0.0372	0.0444	0.0427	0.0453	0.0434	0.0245	0.0483	0.0413	0.0117
	3.03	5.67	7.67	5.65	4.05	6.20	3.31	7.65	4.67	2.08
QuiScore	-0.4624	-0.6126	-0.5514	-0.6817	-0.5190	-0.5081	-0.5639	-0.5981	-0.6563	-0.2129
	-36.86	-72.85	-78.04	-75.91	-27.07	-44.67	-67.45	-78.95	-65.11	-29.51
Age	0.0929	0.0305	0.0442	0.0259	0.0633	0.0003	0.5727	0.0532	0.0839	-0.0520
	5.45	3.1800	4.95	2.53	4.83	0.04	17.03	5.28	7.41	-7.49
Solvency	8.9590	16.4876	14.5049	24.2842	24.3530	17.4435	25.2394	18.7015	104.5897	68.2581
	6.38	16.99	17.98	22.67	15.49	18.05	26.33	21.71	53.11	82.55
Gearing	0.3404	0.2935	0.3357	0.2910	0.2975	0.8260	0.4445	0.3303	0.3749	142.6236
	13.14	15.38	21.71	15.39	18.90	14.91	25.53	19.08	28.57	98.55
RealTAsset	5.1266	8.0008	4.7024	2.1039	3.7411	2.2172	3.1402	2.3218	1.6519	0.5137
	16.75	33.37	29.49	11.9	22.73	18.06	23.43	18.83	12.03	4.82
Constant	13.3966	-7.2529	17.6201	41.7899	21.5311	33.5903	18.8579	35.5055	36.9141	-29.3950
	6.25	-3.73	14.14	23.01	14.03	27.01	16.43	30.99	30.22	-31.39
Overall R2	0.117	0.206	0.159	0.177	0.180	0.057	0.155	0.180	0.216	0.374
No. of Observation	17919	39462	57381	29041	17138	41886	42334	50267	22411	23521

Note: z-values are given below the coefficients

Table 5: Estimation Results for the Period 1993-1999 (Cont.)

<i>Dependent variable: Total Debt/Total Liabilities</i>										
	Small	Medium	SMEs	Large	Risky Firms	Secure Firms	Young Firms	Old Firms	Highly Indebted	Low Indebted
MPTightness	0.0326	0.0362	0.0427	0.0382	0.0275	0.0457	0.0225	0.0441	0.0364	0.0096
	3.29	6.32	8.36	5.95	4.27	4.41	3.43	8.00	5.13	2.01
QuiScore	-0.3170	-0.4075	-0.3673	-0.4368	-0.4105	-0.4176	-0.3729	-0.3780	-0.4011	-0.1447
	-28.26	-55.82	-59.28	-57.79	-55.55	-23.74	-50.61	-58.23	-50.24	-23.51
Age	0.0740	0.0255	0.0348	0.0264	0.0552	0.0589	0.5263	0.0559	0.0747	-0.0408
	4.83	3.03	4.42	3.06	6.24	5.07	17.62	6.39	8.19	-6.48
Solvency	-5.3957	-3.4585	-3.5690	-0.4734	9.9591	14.6445	6.5478	-3.4635	75.6859	56.7423
	-4.31	-4.11	-5.05	-0.53	12.04	10.73	7.81	-4.72	48.12	80.19
Gearing	0.2934	0.2373	0.2776	0.2227	0.3553	0.2748	0.3969	0.2665	0.3127	142.7444
	12.59	14.19	20.29	13.68	21.08	18.96	25.34	17.37	29.71	114.51
RealTAsset	4.4250	6.8867	4.1341	1.9401	3.3657	3.2454	2.8895	2.1056	1.3347	0.3344
	16.12	32.83	29.35	13.00	29.29	22.16	24.39	19.63	12.07	3.52
Constant	17.4976	-0.6929	20.2126	39.3822	16.6459	23.1830	18.4805	34.0287	35.3954	-26.1250
	9.10	-0.41	18.35	25.66	14.97	16.84	18.29	34.18	36.06	-31.46
Overall R2	0.122	0.220	0.171	0.203	0.166	0.085	0.151	0.204	0.17	0.365
No. of Observation	18031	40057	58088	30365	17510	44891	44415	52471	22717	26339

Note: z-values are given below the coefficients

Table 5: Estimation Results for the Period 1993-1999 (Cont.)

<i>Dependent variable: Total Debt/Total Liabilities</i>										
	Small	Medium	SMEs	Large	Risky Firms	Secure Firms	Young Firms	Old Firms	Highly Indebted	Low Indebted
MPTightness	0.0149	0.0330	0.0350	0.0743	0.0470	0.0481	0.0342	0.0516	0.0518	0.0392
	0.94	3.37	4.17	6.80	3.19	4.52	3.21	5.69	4.45	2.5
QuiScore	-0.6114	-0.7777	-0.7124	-0.8475	-0.4534	-0.7092	-0.6919	-0.7132	-0.9261	-0.0621
	-35.34	-63.76	-71.68	-66.76	-18.55	-42.29	-59.12	-68.48	-70.37	-3.44
Age	0.0784	0.0329	0.0472	-0.0141	0.0642	-0.0135	0.6883	-0.0398	0.0799	-0.0055
	3.59	2.5	3.99	-1.04	4.31	-1.12	14.71	-2.99	5.21	-0.35
Solvency	71.2505	84.5552	79.2030	92.9114	22.8876	98.8870	73.6993	79.5924	74.2578	30.0853
	36.89	59.99	69.65	61.95	12.11	69.79	54.89	66.93	28.54	14.58
Gearing	0.0871	0.1385	0.1262	0.2096	-0.0315	-0.1241	0.1684	0.1626	0.0312	-15.3488
	2.45	5.04	5.84	7.70	-1.54	-1.56	6.81	6.74	1.79	-4
RealTAsset	-3.2447	-0.8717	-1.7515	-2.9800	-0.6562	-1.0499	-0.9388	-1.2471	-1.6378	0.4457
	-8	-2.55	-8	-12.46	-3.43	-6.09	-5.17	-7.57	-8.82	1.83
Constant	99.7989	86.6025	92.0184	110.6501	89.3822	75.4548	77.6102	91.1665	102.1550	60.8801
	34.95	31.15	53.58	44.94	48.49	42.26	49.04	59.28	61.93	26.54
Overall R2	0.090	0.111	0.105	0.136	0.021	0.168	0.0934	0.114	0.203	0.02
No. of Observation	16297	37163	53460	29393	16756	38326	40078	47498	22414	19225

Note: z-values are given below the coefficients

Figure 1: Distribution of the Firms Across Size Based on Balance Sheet

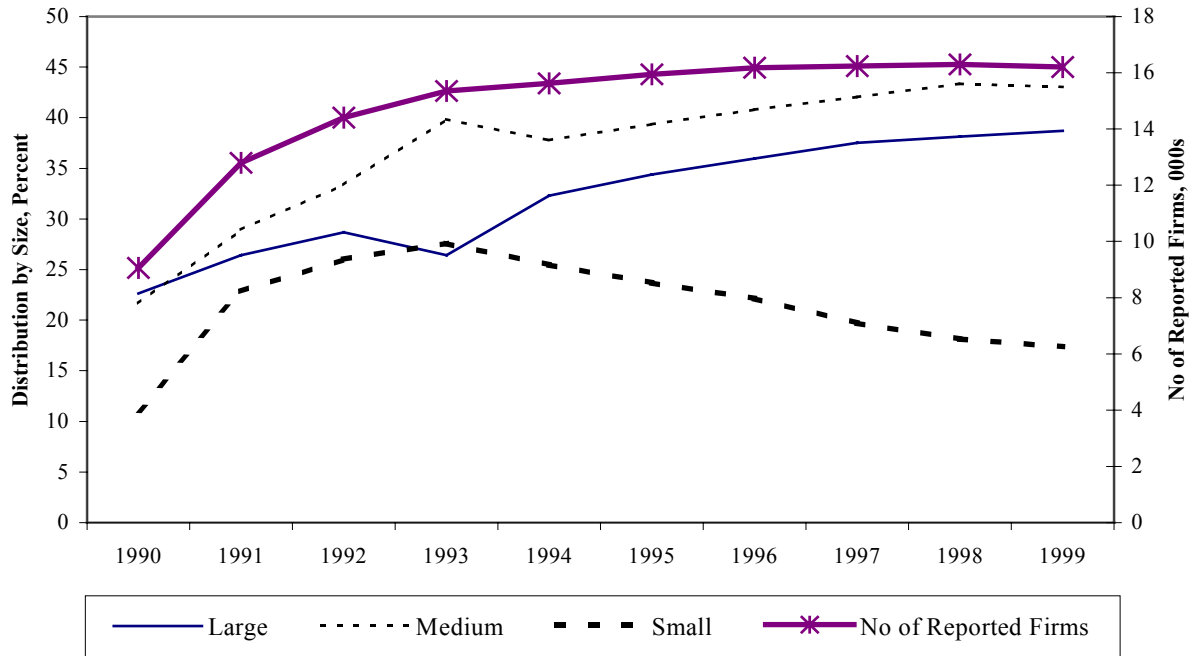


Figure 2: Distribution of Firms Across QuiScore

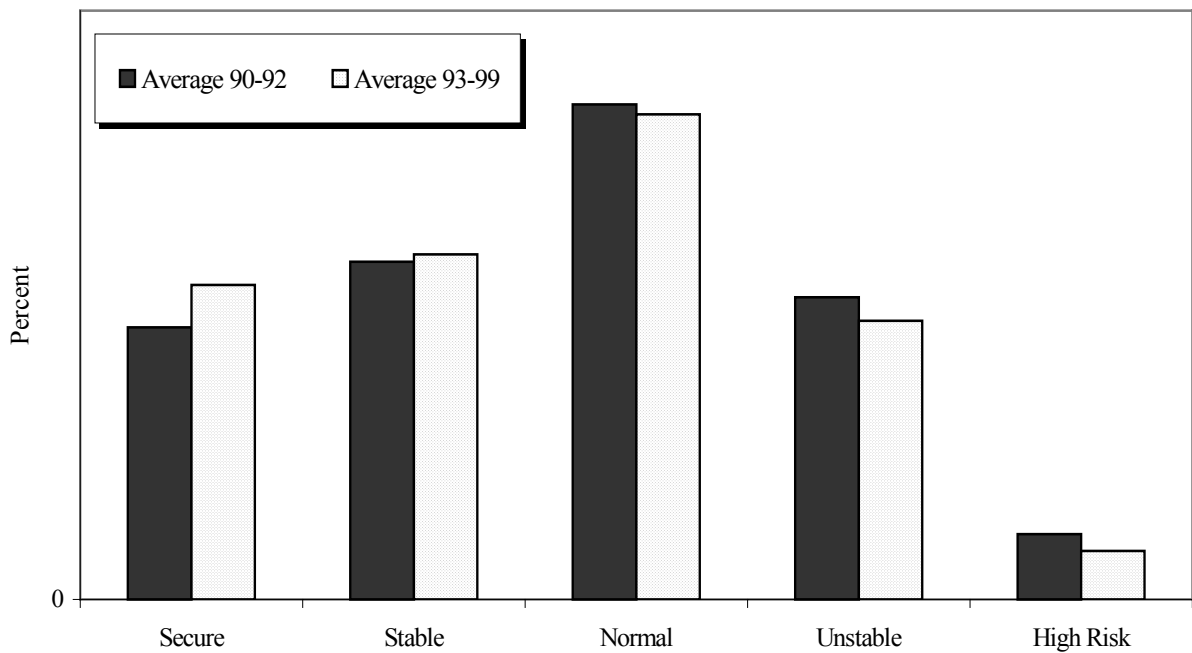


Figure 3: Average QuiScore Across Firm Size in Business Cycle

