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New Ventures and their Credit Terms

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ABSTRACT. Using UK bank data for 466 new venture loan applications, we explore the determinants of interest margin, the sanctioning decision and the amount borrowed when these factors are considered simultaneously. Collateral levels greatly influence the size of credits to new ventures, a finding consistent with existing work on firm foundation rates and assets (Black et al., *Economic Journal* **106**, 60–75, 1996; de Meza and Webb, *The Economic Journal* **109**, 153–163, 1999; Evans and Jovanovic, *Journal of Political Economy* **97**(4), 808–827, 1989; Holtz-Eakin et al., 1994). Consistent with the *RAND Journal of Economics* **25**, 334–347, Diversionary Models of debt, firms with larger credits enjoy discounted interest margins even when we have controlled for firm size.

KEY WORDS: collateral; entrepreneurship; information asymmetry; interest margins

JEL CLASSIFICATION: D82 D81

1. Introduction

Despite the attempts to encourage alternative methods of finance such as venture capital, small businesses are still very reliant on bank funding. The UK Federation of Small Business (FSB) reported that in 2002, 66% of respondents used bank finance.[1] The report argued that,

> *"banks should give more consideration to factors such as business performance and cash flow projections in lending decisions, rather than on the availability of collateral such as the business owner's home"*[P.1]

This call for greater use of cash flow projections was accompanied by a plea to lenders to reduce their over-reliance on asset backed lending, such as mortgaged backed borrowing. Supporting this view that security is important in influencing lenders to extend credit, studies show that asset ownership is highly correlated with firm foundation rates (Black et al., 1996; de Meza and Webb, 1999; Evans and Jovanovic, 1989; Holtz-Eakin et al., 1994). The conclusion is that entrepreneurs are prevented by their limited wealth from entering self-employment.

There are reasons why lenders may be wary of cash flow or growth projections and rely heavily on assets. These reasons may also help explain lender reliance on security. A lender's reluctance to match credit size to a borrower's growth forecast may be driven by (1) uncertainty of income flows from the project and (2) the lack of credibility of borrower reported forecasts. The problem of uncertainty is a feature of lending to new ventures. Meanwhile, the issue of borrower credibility is raised by Manove and Padilla (1999) and de Meza and Southey (1996).

Our analysis confirms the results of studies which find a correlation between new venture formations and assets, by finding a positive relationship between borrowing levels and collateral.[2] We agree with the Evans and Jovanovic (1989) finding that capital constraints appear to bind in the market for first time business finance.

Interestingly, we also find that higher borrowing levels are associated with lower margins, even when we have controlled for the main driver of transactions costs, which is firm size. New ventures

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successfully applying for larger credits enjoy cost advantages over their counterparts, all things equal. Although this finding is predicted in the Diversionary models of the financial intermediation literature, it is also plausible that such a relationship is manifested where borrowers believe that lenders are less likely to take action on non-repayment of small credits, hence the risk premium carried by small credits.

The structure of our paper is as follows. We describe the relevant models from the financial intermediation literature in Section 2. This is followed by a discussion of new venture lending in Section 3. In Section 4 we present the methodology. This is followed in Section 5 by a description of our data. Section 6 contains our analysis and Section 7 concludes.

2. Collateral and credit size in the financial intermediation literature

Coco (2000) agues that not all models of collateral and credit size reflect what we observe in practice. An investigation of loan contracts reveals that (1) riskier loans (ex post) are more likely to be collateralised, (2) riskier loans are associated with higher interest margins and that (3) higher amounts of collateral are required to leverage higher amounts of credit. Coco singles out two groups of theoretical models which he argues reflect these empirical facts. Both the Diversionary and the Costly-state Verification Models reflect some of these statistical regularities.

2.1. *Diversionary models*

The basic idea behind these models is that entrepreneurs stand to gain all the positive revenue from the success of their project. Meanwhile the lender is limited to recovering (at best) the full value of the loan repayments. The value recovered by the bank in the 'good state' if the project succeeds, D, is made up of the interest rate, r, and the size of the initial credit L. The higher the value of D, the greater is the incentive for the borrower to default on loan repayments. In this case, there is a high incentive to divert the lender's funds. Funds diversion arises when a borrower squanders, or 'diverts' the whole value of D, the only downside being the repossession of the borrower's collateral, C, by the lender. Therefore, larger loan repayments (driven by higher interest margins), merely raise the chance of wasteful diversion of the lender's money and depress bank profits. The lender counteracts this tendency towards diversion (a feature of higher net repayments), by cutting the interest margin on higher loan amounts, assuming that collateral is fixed.[3]

We see in Barro (1976) that for a given piece of collateral, an increase in the loan size decreases the profit-maximising interest rate (see Figure 1). However, higher values of collateral shift the whole profit function upwards and allow larger loans to be made. We can see in Figure 1 that as loan size increases from L0 to a high of L_{max}, collateral remaining constant, that the lender's profits decline. This decline in lender profits is caused by increased diversion of lender funds. The profit-maximising interest margin falls in each case.

2.2. *Costly-State Verification Models*

Bester (1994) highlights the role of 'time inconsistency' in the formulation of a credit contract. Essentially, this implies that by the time the lender has foreclosed on the borrower and called in its credit, the borrower can already have defaulted. The pressure is on the lender to keep the business as a going-concern in order to recover the full value of its initial investment. The incentive to recover its investment will make a lender increasingly open to renegotiating the original terms of the loan with the borrower. The borrower can exploit this knowledge

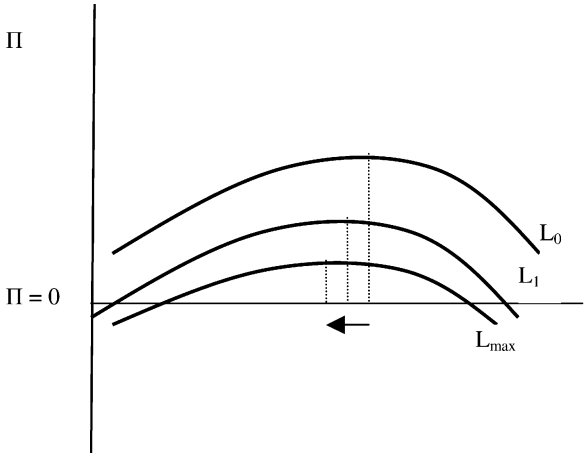

Figure 1. Iso-profit curves in Barro (1976)

and default, even without any real reason to (i.e. in a good state), in order to get a better credit deal from the lender.

The lender uses collateral in order to minimise this moral hazard. Although it will not foreclose on all bankrupt loans, the lender will repossess collateral in a fraction of all defaulted credits in order to deter borrowers from adopting this adverse action. The borrowers for whom this incentive of renegotiation is most appealing (riskiest borrowers), will find that the imposition of a collateral requirement, makes default less appealing i.e. collateral serves to discipline them. According to the Bester (1994) model, collateral is most likely to be posted on the riskiest investments (high credit amounts, a long time window, high ex ante borrower risk).

Summarising the predictions of the theoretical models from the financial intermediation literature.

Hypothesis 1: Larger loans necessitate higher collateral amounts.

Hypothesis 2: The interest margin falls, all things equal, with higher borrowed amounts.

Hypothesis 3: Ex ante riskier borrowers are charged higher collateral.

3. Collateral, start-ups and the lending decision

In a situation where lenders have no business track record to refer to when making a loan, as in the case of new ventures, we expect information problems to be most acute (Cressy, 1996a). While much work has focused on establishing the effects of business–bank relationships in influencing the access to or price of credit (See Berger and Udell, 1995; Cole, 1998; Degryse and Van Cayseele, 2000; Harhoff and Körting, 1998; Petersen and Rajan, 1994), fewer studies have investigated the terms of credit extended to business start-ups. Yet, precisely at this early 'Big Bang' stage of infancy, relationships between some credit terms such as collateral and the size of borrowing should be most clear-cut.

3.1. *Collateral is exogenous*

In our model and subsequent estimations, C, is treated as a given. This assumption is made in the light of our knowledge of how start-up loans are financed and collateralised.

1. Borrowers typically offer the family home, or more rarely, the business premises as cover on a first loan
   Implication: One large, indivisible asset is typically available
2. When a business is still in its infancy, it typically borrows from one lender.
   Implication: The correlation between security and loan size is most clear-cut for start-ups, even where data is available for only one lender

The implications of current practices with respect to collateralisation of start-up loans, suggest that collateral is best treated as a given.

3.2. *The decision to extend credit*

Ideally, any analysis of new venture loan terms, on grounds of sample bias, will include those applicants who were denied credit. A reason for denying credit to an applicant could be due to the higher risk of this applicant. However, if risk is fixed, the availability/or lack of collateral can also play a role. Empirical evidence on the role of assets in influencing the aggregate supply of bank finance (Black et al., 1996; Evans and Jovanovic, 1989) as well as predictions from the theoretical models (see Hypothesis 1), point to the role of collateral in the credit decision. Accordingly, the posting of security should raise an applicant's probability of getting funding.

Hypothesis 4: An applicant's prospects of obtaining credit rise with higher collateral levels, all things equal.

The decision to lend should, in part, be driven by business risk but also in the firm's potential for overtrading. The classic symptom of overtrading, which implies high sales volume coupled with low liquidity, is a reliance on working capital finance. This intuition is consistent with the finding by Cowling and Mitchell (2003) that working capital loans exhibit higher attrition rates. The lending decision is therefore modelled as a function of the requirement for working capital, *'working = 1'* and projected growth, *'growth'*.[4]

4. Methodology

In view of the potentially simultaneous nature of the size of a credit extended to a new venture (loan size), whether it is approved or not (sanctioning decision) and the interest margin that is charged on the credit, our analysis must consider a methodology that takes into account the simultaneity of these variables.

4.1. *Reduced form model*

All existing empirical analyses employ data from either the lender, as in the case of Cressy (1996a, b), Cressy and Toivanen (2001), Degryse and Van Cayseele (2000), or alternatively firm survey data (see Avery et al., 1998; Berger and Udell, 1995, 1990; Cole, 1998; Petersen and Rajan, 1994). Accordingly, collateral, the lending decision and interest margins are represented by reduced form equations in all studies to date.[5] Reduced form models can be used to describe the elasticities of variables such as interest margins to the level of collateral provided. However, reduced form equations cannot help us to answer questions such as 'how does the *ability* to provide collateral affect interest margins?' This latter question is a pure supply side issue. To remedy this problem, one can insert a pure supply side variable such as 'Business premises is leased' to describe asset ownership. This latter variable describes the borrower's ability to provide collateral. While this is not an overall panacea to the problem of interpreting reduced form equations, it does allow us to observe some pure supply side effects.

4.2. *Modelling collateral, interest margins and the credit extension decision*

We adopt a 2-stage least squares methodology similar to that used by Cressy (1996b) when he addressed simultaneity among various credit terms. This allows us to first regress the potentially endogenous variables, interest margin, *'intrate'*, and the sanctioning decision, *'con'*, as separate equations using instruments. We then use the predicted values from the instrumented regressions for the interest margin and the credit extension decision. These predicted values are integrated into the final model as *'intrate_in'* and *'con_in'*, respectively. Our final second stage model investigates the determinants of loan size, where loan size is represented by the variable *'newborr'* (see Appendix A for variables used).

Specifically, the steps involved in this estimation framework are as follows: (i) regress *'intrate'* and *'con'* on a vector of instruments (say Z) plus orthogonal variables that also appear in the final stage (say X). (ii) Plug the predicted values for interest margin (say *'intrate_in'*) and the sanctioning decision (say *'con_in'*) from the regressions performed in step (i) into the model determining loan size, *'newborr'*.

Thus the final estimation equation can be expressed as

$$newborr_i = \alpha_1 intrate + \alpha_2 con + X_i\beta + \varepsilon_i \qquad (1)$$

In the above equation, i, represents an index of individual entrepreneurs and ε represents a random error term.

The particular variant of instrumental variables regression that we use applies the Generalised Method of Moments (GMM) estimator. This allows us to subsequently diagnose validity of the instruments applying Hansen's J-statistic instead of the usual Sargan's statistic, the former remaining robust in the presence of heteroskedasticity.

4.3. *Controlling variables in the lending decision*

The covariate vector described as X in Section 4.2 contains a set of moderating variables, in particular risk and scale variables. These variables must be included before we can infer how collateral, credit extension, interest margins and loan size interact with one another. For ease of interpretation, we group the covariates according to whether they are descriptors of collateral, pricing, risk, size or miscellaneous. Although we do not have a comprehensive set of variables describing business risk, inexperienced entrepreneurs who are short of working capital, would arguably be described as high risk, an assumption consistent with recent findings by Cowling and Mitchell (2003). Accordingly, we group the length of work experience and loan purpose together in this category.

Specifically, our response variables: credit decision, interest margins and loan size are driven by borrower risk factors. From the Diversionary

Models, we expect that higher loans carry a higher risk of being wasted or 'diverted' by applicants. However, a potential force working in the opposite direction is the effect of scale: larger firms, all things equal, carry lower per unit monitoring costs. Hence, it is necessary to include some measure of enterprise size before we can infer how risk affects our response variables.

Although most covariates are self explanatory, we note the fact that ownership shareholding, *'low_share'* represents the extent to which ownership is diversified across several owners. A similar ownership variable was shown by Harhoff and Körting (1998) to be associated with lower interest margins because enterprises with more diversified ownership structures are less reliant on bank credit. The higher self-financing ability of firms with diversified ownership structures is to some extent due to the higher self-financing power that arises when several partners can contribute towards the enterprise's finances. Similarly, we expect enterprises with higher self-financing ability (high owner cash injections, *'non_borr'*), to receive lower interest margins than other firms. More experienced business applicants (higher *'exper'*) are expected to receive lower margins because their accumulated business knowledge lowers the probability of business failure. This in turn lowers the probability of credit default.

One further issue, which has not to date been investigated, is the impact of entrepreneurial growth projections on credit terms and the lending decision. We hypothesise, on the basis of the literature on investment psychology, that growth expectations are likely to be upbeat (de Meza and Southey, 1996; Manove and Padilla, 1999). However, we do not have data which would allow us to establish the extent to which ex ante entrepreneurial growth projections fall short of achieved ex post growth rates.

4.4. *Tests for validity*

In any analysis of this kind, where no existing theory deals simultaneously with all variables in the lending decision, it is important to apply standard diagnostics to check the appropriateness of the model specification.

We are careful to check the appropriateness of the instrumental variables in two respects. First, their *validity*, in the sense of having no correlation with the equation error, is formally tested with the aid of Hansen's (1982) test for overidentifying restrictions. Second, we ascertain that they are *relevant* in that they exhibit sufficiently strong correlation with the potentially endogenous regressor. It has been noted in the econometric literature that when the partial correlation between the instruments and the endogenous variable is low, instrumental variables regression is biased in the direction of OLS estimator (see e.g. Staiger and Stock, 1997). Staiger and Stock (1997) recommend that the F-statistics[6] (or the partial r^2 values) from the first-stage regression be routinely reported in applied work. A high partial r^2 of the excluded instruments or a large F-statistic suggests the instruments are relevant, instrumental variable estimates are reliable in finite samples. By contrast, when the F-statistic is small or the partial r^2 value is low, inference based on instrumental variable estimates would be unreliable. In this paper, we report the partial r^2 measure proposed by Shea (1997). We also consider a Hausman test of whether or not a simple uninstrumented OLS operates more consistently and efficiently than our 2-stage model.

The next question we address is the choice of instruments and covariates. We have a finite number of regressors to draw from and allocate to each of the three endogenous variables. It follows that, the eventual models are informed by a mixture of theory, intuition and pragmatism because the aim of this analysis is partially exploratory and therefore shaped by the relationships that we find in the data. This approach, in some respects, mirrors that adopted by Cressy (1996b) in his examination of interrelationships between loan terms and conditions, in a similar context.

Since there is a degree of overlap between potential regressors (See correlation matrix: Appendix B) where variables such as owner's equity *('non_borr'*) are significantly linked to two endogenous variables, namely interest margin and amount borrowed, choices must be made in assigning the regressor to the response variable where it has an *a priori* hypothesised relationship. We summarise how the relationships between the selected instrumental variables in addition to the fully orthogonal variables, feed through to the final model estimating the size of new venture borrow-

TABLE I

Covariates	1st stage models	Loan is rejected (con = 1)	Final stage model	Existing empirical research
	Interest Rate (intrate)		Borrowing level (newborr)	
Projected business growth (growth)		(+) if projected growth fully equates with overconfidence		Manove and Padilla (1999)
Loan purpose (working capital = 1)	(+) working capital loans carry higher margins	(+) working capital loans riskier because of overtrading fears and higher default risk	Expected to feed into borrowing level via decisioning variable (con = 1)	Cressy and Toivanen (2001): Loan purpose exogenous to borrowing level Cole (1998): Working capital loans examined separately for determinants of rejection decision Cowling and Mitchell (2003): working capital loans exhibit higher default rates
Years work experience (exper)	(−) reduces default risk & risk premium	(−) reduces default risk and enhances access to credit	Expected to feed into borrowing level via either margins or decisioning	
Owner's equity contribution (non_borr)	(−) a liquidity variable showing ability to self-finance. Risk reducing & survival enhancing	(−)	Expected to feed into borrowing level via interest margin	Berger and Udell, (1990): quick ratio, a liquidity measure, negatively related to margin Cressy, (1996b): empirical where equity dummy, PERFIN, exogenous to margin Bernanke and Gertler (1987): owner's equity injection reduces divergence between lender's and borrower's motivation
	Interest Rate (intrate)	Loan is rejected (con = 1)	Borrowing level (newborr)	
Size (rec_st)	(−) Lower transactions costs and risk	(−) Lower info. asymmetry with size, reduces Pr (loan rejected)	Collinear with other covariates, most especially collateral level (noncash) and equity level (non_borr)	Harhoff and Körting, (1998)

TABLE I
Continued

	Interest Rate (intrate)	Loan is rejected (con = 1)	Borrowing level (newborr)	
				Winker (1999)
Corporate governance (low_share = 1)	(−) Lower risk, larger ventures with higher likelihood of diversified finance base		Expected to feed into borrowing level via interest margin	Harhoff and Körting (1998) firms with diversified ownership enjoy lower margins
Collateral and/or wealth (noncash)			(+) Assists firm's ability to leverage finance	Black et al. (1996)
				Evans and Jovanovic, (1989)
				Holz-Eakin et al., (1994)
Leased business premises (leased = 1)			(−) Leverages less credit with diminishing asset availability. See 'noncash'	
Endogenous covariates				
Loan is rejected (con = 1)			(+) Expect that rejected loans are larger on the basis that they increase the lender's exposure, all things equal.	
Interest margin (intrate)			(−) Lower average cost with higher loan size. Also, lower risk applicants in receipt of lower margins, should have access to larger loans	(−) Cressy and Toivanen (2001): Negative relationship between loan size and margin in simple OLS but sign reversed when endogeneity considered (in 2SLS)

ing, *'newborr'* (Table I). We also note associated empirical work by other researchers in Table I.

5. Data and descriptive statistics

Our data consists of client data collected by a major UK retain bank for commercial loans – bank anonymity was a precondition of securing the data. The observations include 466 new ventures applying to the bank during the period January 1998 until December 1999. None of these applicants had banked with the lender before and hence we expect that information asymmetry problems (no track record at the lender's institution) and risk (new ventures) are reasonably acute in our data.

All businesses are either Sole Proprietorships or Partnerships with a small number of Limited Liability companies (approximately 2%). Information on corporate governance can only be gauged by looking at details such as guarantee provision (a feature of companies with Limited Liability status) and ownership structure (percentage stake in business owned by applicant). Under UK Company Law, all companies designated as having Unlimited Liability (Sole Proprietorships and Partnerships without Limited Liability) forfeit not only the assets that they invest in the business but also their personal property in the event of bankruptcy, until creditors' claims are satisfied (Gower, 1992).

Table II provides some summary statistics for the variables in our data (see Appendix A for a description of how the variables are defined and derived). We see that in some cases, extreme values induce a difference between the average and median values. The median credit request is approximately £64,000 and the median amount of finance that the entrepreneur is able or willing to invest in the proposed project is £16,000. The median value of collateral (*'noncash'*) is approximately £5000, although here we witness a wide gap between the average and median amounts. Finally, entrepreneurs expect to grow 10% based on median growth projections.

From Table II we note that the majority of credit applications are to cover asset purchases rather than working capital. Approximately 44 percent of applicants enjoy the benefits of diversified ownership.

In Tables III and IV we investigate the breakdown in data values by the size of the credit. This simple analysis allows us to observe scale effects. We see that applicants for finance in excess of the median amount are charged significantly lower interest margins than those applying for lower amounts of finance (Table III). This relationship may underline the lower average cost of extending larger loans. We know from the Diversification Models that larger loans should, other things equal, carry a higher risk of being squandered by the borrower. Accordingly, lenders need to cut margins in order to discourage the higher incentive for funds diversion with higher loans.

We now look at the corresponding breakdowns for binary variables in our data across the size of loan request (Table IV). We observe that using

TABLE II
Description of the data

	mean	median	min	max	obs.
intrate	3.0	3.0	1.0	7.3	404
newborr	91,555	63,988	1500	1,000,000	466
exper	7.1	3	0	45	310
non_borr	30,861.3	16,000	0	400,000	466
noncash	47,519.3	4637	0	840,000	466
growth	0.2	0.1	−0.9	2.7	466
size	223,690	133,485	816	4,293,809	466
Percentage of respondents:					
Application declined (con = 1)	30.7%				466
Working capital (working = 1)	14.2%				466
Leased business premises (leased = 1)	39.7%				466
Dispersed Ownership (low_share = 1)	44.4%				466

TABLE III
Description of variables by borrowing request (newborr)

	Borrowing < £63,988	Borrowing > = £63,988	t stat.	df	sig.
	Mean	Mean			
intrate	3.4	2.6	9.05***	342.8	0.00
exper	7.6	6.6	0.9966	298.0	0.16
non_borr	16,141	455,814	−7.28***	288.9	0.00
noncash	15,548	79,490	−7.96***	248.1	0.00
growth	0.2	0.2	0.1	441.2	0.47
size	159,513	287,866	−4.49***	320.7	0.00

* significant at 10%; ** significant at 5%; *** significant at 1%.

TABLE IV
Description of indicator variables by borrowing request (newborr)

	% respondents with borrowing < £63,988	% respondents with borrowing > = £63,988	χ^2	Pr
Loan declined (con)	50%	50%	0.01	0.92
Working capital (working)	74%	26%	18.1***	0.00
Business premises is leased (leased)	67%	33%	35.6***	0.00
Owner's shareholding less than 50% (low_share)	44%	56%	5.4**	0.02

* significant at 10%; ** significant at 5%; *** significant at 1%.

credit for purposes other than working capital (*'working'* = 0) and the possession of a freely held collateralisible business premises (*'leased'* = 0), is associated with larger loans. We also see that more diversified ownership structures, *'low_share'*, where individual partners can donate equity to the project, are associated with significantly larger loans.

6. Analysis

Having commented on the simple bivariate relationships between our variables in the previous section, we now move on to investigating these relationships in a causal framework. As described in the Methodology (Section 4), we represent the choice variables (whether a loan is sanctioned or not, the size of a credit and the interest margin charged) as endogenous to the set of covariates in our data.

6.1. *Instrumented variables model*

In Table V we estimate separate models for interest margin (column 1), the sanctioning decision (column 2), the final restricted model for borrowing level (column 3) and finally straightforward OLS, without consideration for potential simultaneity problems.

In the first stage where we estimate the drivers of interest margins, we see that both collateral variables, *'noncash'* and *'nonborr'*, significantly reduce the cost of finance suggesting a collateral/price tradeoff. Although the risk variables have the expected signs, neither is significant, although only marginally so.[7] The lower unit transactions cost of extending and monitoring loans to larger firms is seen in the significance of the size variable, *'rec_st'*.[8] All covariates show the conjectured signs and are jointly significant, as indicated by the corresponding partial F statistic. Overall the model is significant, as evidenced by the significant F statistic and a reported model fit of 0.14.

Model 2 describes the lender's decision to extend a credit or not, bearing in mind that this was the most difficult relationship to model. This difficulty arose of the degree of homogeneity between applicants who had their applications accepted or rejected, the only significant difference arising in interest margins charged, itself an endogenous variable (See Appendix B).

TABLE V
New ventures' borrowing terms

	intrate 1st Stage	con 1st Stage	newborr (GMM) 2nd Stage	newborr (OLS)
Collateral				
Collateral value in 1000s (noncash)	−0.001	-8.0^{10-5}	518.8	639.4
	(−1.85)*	(−0.26)	(6.10)***	(11.03)**
Cash equity in 1000s (non_borr)	-3.76^{10-3}	-1.08^{10-3}		571.7
	(−3.49)***	(−1.82)*		(3.89)**
Risk				
Entrepreneur's experience in yrs (exper)	−0.010	-1.6^{10-3}		−613.9
	(−1.61)	(−0.47)		−0.97
Working capital loan (working)	0.23	0.10		−39,035
	(1.59)	(1.23)		(5.70)**
Size				
Sales in 1000s (rec_st)	-4.3^{10-4}	1.14^{10-4}	26.7	52.3
	(−1.94)**	(0.93)	−0.54	(3.55)**
Other				
Diversified ownership (low_share)	−0.157	0.061		−1,395
	(−1.44)	(1.02)		−0.2
Growth proj. (growth)	−0.02	0.022		18,498
	(−0.14)	(0.34)		−1.85
Pricing and decision				
Margin instrumented (intrate_in)			−105,634	
			(−2.30)**	
Appln. refused instrumented (con_in)			−174,562.0	
			−(1.3)	
Margin uninstrumented (intrate)				−14,520
				(4.71)**
Appln. refused uninstrumented (con)				12,234
				−1.76
Constant	3.41	0.26	431,272	78,196
	(31.76)***	(4.42)***	(3.58)***	(5.11)**
Observations	270	270	270	270
R-squared	0.14	0.04	0.10	0.73
Prob > F	0.0000	0.1930		0.0000
Hansen J (Ha: overidentified by instr.)			4.87	
χ^2: p-value			0.18	
Hausman (Ha: coeffic. GMM = OLS)				23.14
χ^2: p-value				0.0001

Notes: *, **, **: significant at 10,5 and 1% respectively.

Notwithstanding these modelling issues, we felt it useful to decision to extend finance in the context of other credit terms and covariates. We initially conjectured that business growth, which can lead to overtrading and be biased by over-optimism, should raise the rejection probability if the lender believes that the borrower is now more likely to default on repayments. We find insufficient evidence that working capital loans are significantly more likely to be rejected (p-value of 0.22). Self-financing ability appears to improve an applicant's chances of obtaining a loan, as evidenced by the significance of *'non_borr'*. The partial F test provides evidence to support the hypothesis of joint significance (p-value of 0.03) but the full F test suggests overall model rejection on the grounds of its limited explanatory power (also evidenced in the low level of fit for the pseudo r^2).[9]

We finally proceed to the restricted 2-stage model applying in column (3) where the instrumented endogenous regressors, *'intrate_in'* and *'con_in'* enter the model along with the orthogonal regressor *'noncash'* and the scalar, *'rec_st'*.

Looking at the collateral grouping, consistent with the financial intermediation literature that higher security permits higher borrowing levels, we observe a positive and highly significant sign on the coefficient of collateral, *'noncash'*.[10] Moving on to the impact of pricing on borrowing levels, similar to Cressy and Toivanen (2001), we observe an inverse relationship between margins and amount borrowed, consistent with the lower average cost associated with higher credits.[11] Contrary to what we would expect, the instrumented sanctioning decision, *'con_in'* exhibits a negative relationship, suggesting that rejected applicants are linked to smaller loans. We already know from the 1st stage, that applicants with lower self-financing (low values of *'non_borr'*) are significantly more likely to have their applications rejected. It is possible that lenders are likely to reject lower credit requests if these projects are synonymous with underinvestment and hence pose a higher failure risk. However, the low Shea test statistic for the 1st stage estimations of the sanctioning decision suggests caution when interpreting the coefficient of *'con_in'*.

6.2. *Diagnostics*

Before we test whether the instrumental variables model is more efficient than a standard OLS, we need to comment on the issue of over-identification. With any model containing a number of potentially endogenous variables, the issue of over-identification must be addressed. The Hansen test, a variant of the Sargan test but remaining robust under heteroscedasticity, requires a low enough $\chi 2$ value to ensure that the instruments are not overidentified. Fortunately, we cannot reject the null because of the high p-value of 0.18, and therefore we remain reasonably confident that the restricted model is not overidentified.

Finally, we test whether the parameters of a straightforward OLS regression are more efficient than the parameters of the instrumental variables model. There are fundamental differences between the results obtained in the standard OLS and the instrumental variables regression. In the OLS, we see that applicants who had their applications rejected by the lender were associated with higher borrowing requirements while in the instrumental variables regression, rejection was linked to lower borrowing requirements (the sign is reversed). However, the highly significant Hausman test statistic of 23.14 allows us reject the null that the coefficients are equivalent and supports the use of the instrumented model.

6.3. *Marginal effects*

We now try to illustrate the impact of margins and collateral provision on borrowing levels by looking at some simple marginal effects. Our starting point is the GMM model of borrowing levels from Table V (column 3) where borrowing is modelled as a function of collateral and pricing.

We recall the financial intermediation models, in particular Barro (1976), predicting an inverse relationship between margins and borrowing (see Section 2.1) due to the scope for funds diversion. Keeping business size constant, the relationship between interest margin (encapsulating risk) and borrowing levels net of scale effects can be observed. Figure 2 shows that lower interest margins are predicted for higher borrowing exposures, even when we have controlled for business size and hence transactions costs. The most expensive loans are therefore the smallest. Although this outcome conforms with the predictions from the Diversionary models, it is also intuitive if lenders are indifferent between a small loan carrying a high interest margin and a large loan carrying a small interest margin. In both cases the net payoff is similar, the only difference being overall exposure which is higher for larger loans. If smaller loans are riskier, in the sense of bearing higher default risk, the lender might not be as worried about exposure as about ex post default when pricing credits.

We add the shock to Figure 2 of increasing security cover from 0 to £100 K and observe the borrowing level shift upwards. Again, this is what we expect from the literature, where higher security cover permits higher borrowing.

7. Conclusions

On the basis of evidence presented here, we find that borrowing levels are increasing in collateral

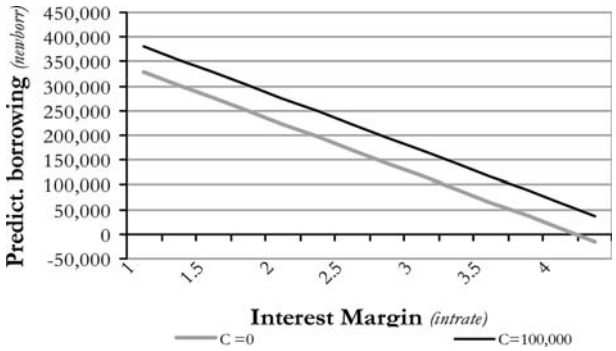

Figure 2. Simulated Borrowing Amounts.
Notes: Values simulated from Table IV, GMM equation Values for covariates at medians

and falling in interest margins. The finding of an inverse relationship between collateral and borrowing is an intuitive one. It is also well documented in the financial literature for bank level data (see Cressy and Toivanen, 2001) or in examinations of wealth in the formation of new business ventures (Black et al., 1996; Evans and Jovanovic, 1989; Holz-Eakin et al., 1994)

The finding that higher borrowing levels command lower margins requires more careful interpretation. The Diversionary Models within the financial intermediation literature also predict a tradeoff between margins and borrowing level, the rationale being that cutting margins as credit size rises, eases the overall repayment burden and reduces moral hazard.

Alternatively we can interpret this result in the context of borrower motivation: smaller credits are taken less seriously than larger credits, all things equal. This latter result holds if firms know that lenders are more likely to press bankruptcy charges for default on larger credits. Accordingly, a premium price is charged on smaller credits to compensate for their lower quality. The corollary is that large credits already induce higher borrower motivation because the borrower stands to lose a lot in the event of default and the risk rate reflects this higher motivation.

A third perspective on this result is that smaller loans are symptomatic of borrower underinvestment and hence carry a lower success rate. This lower success rate is reflected in a higher risk margin.

Ideally, we would need ex post information on credit quality (default rates) before we could choose between the competing explanations above. However, our results tie in with the Diversionary Models as they stand, and appear robust to alternative model specifications.

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APPENDIX A
List of variables used

asset_b = 1	asset_b (loan used to purchase as asset)
con = 1	Request Declined (con)
con_in	Instrumented lending decision (using growth as regressor)
exper	work experience of business owner in industrial sector
growth	(projsal - size) / size
intrate	interest margin net of base rate
intrate_in	instrumented interest margin, intrate
leased = 1	business premises is leased (yes coded as 1)
low_share = 1	applicant's stake in business is less than 50%
newborr	newborr (new business borrowing in this application)
non_borr	owner's cash injection
noncash	collateralised assets (land, buildings, life policies)
odrft	odrft (business overdraft coded as 1 for 'yes')
projsal	entrepreneur's projected sales estimates
rec_st	recent sales turnover
working = 1	borowing is for working capital

APPENDIX B

Correlation matrix

	newborr	con	intrate	low_share	growth	exper	non_borr	asset_b	working	odrft	size	noncash	leased
newborr	1												
con	0.0347	1											
intrate	−0.3623*	0.1501*	1										
low_share	0.0364	0.0138	−0.0708	1									
growth	0.0669	0.0677	0.0364	0.0238	1								
exper	0.0603	−0.0261	−0.1068	−0.0799	0.0585	1							
non_borr	0.4107*	−0.096	−0.2713*	0.0838	−0.1191	−0.0264	1						
asset_b	0.0715	−0.0783	−0.1311*	−0.0161	−0.0669	−0.0694	0.1974*	1					
working	−0.1673*	0.1034	0.1276	0.1571*	0.1067	0.1374	−0.1891*	−0.3623*	1				
odrft	−0.1474*	0.0221	0.1429*	0.0947	0.1166	0.1098	−0.1765*	−0.3821*	0.7626*	1			
size	0.2517*	−0.0096	−0.1918*	0.1264*	−0.0914	0.1949*	0.1328*	−0.1212*	0.2262*	0.2345*	1		
noncash	0.7124*	−0.0182	−0.2338*	0.0169	0.0526	0.1412	0.1359*	−0.0324	−0.0263	−0.0241	0.2911*	1	
leased	−0.2596*	0.0307	0.2245*	0.0073	0.0075	0.0202	−0.1793*	−0.0408	0.1107	0.0809	0.0651	−0.2153*	1

Note: Significant Classification denote with *

Notes

1 http://www.fsb.org.uk/policy/BRIEFS/finance/default.asp for results of the "Small Businesses' Finance and the Economy" survey, (December 1998)

2 Unlike Cressy and Toivanen (2001) or Cowling and Mitchell (2003), we are unable to comment on the subsequent quality of these new ventures and hence are unable to link project size with ex post project quality. This latter extension would have enabled us to consider whether this asset shortfall induces underinvestment which leads to poorer quality business formations.

3 This idea is very similar to the argument first advanced in Stiglitz and Weiss (1981), that higher interest margins induce borrowers to take higher chances. Hence the supply schedule for lender funds is backward sloping as interest rates rise

4 Although, working capital borrowing overlaps with the loan purpose variable, *'odrft'*, denoting overdraft finance (correlation coefficient of 0.76), only the working capital dummy was included in our final regressions because of its higher ability to explain variation in the lending decision.

5 By reduced form we mean that we observe values where the supply and demand curves intersect i.e. the lender's offer (supply) that was accepted by the borrower (demand)

6 The F-statistic tests the hypothesis that the instruments should be excluded from the first-stage regressions.

7 Length of business experience and the working capital dummy have p-values of 0.108 and 0.112 respectively.

8 It could also be argued that loans to larger firms are perceived by lenders as low risk and hence larger firms do not experience as much rationing as smaller firms (Winker, 1999). However, rejection rates in our data are invariant to size, possibly because of the more homogeneous nature of our data, which is restricted to start-ups (see Table IV).

9 We did reformulate the growth variable as growth quartiles in an effort to see if model fit was improved, but unsuccessfully.

10 In earlier versions of the paper, we replaced *'noncash'* in a separate estimation with the pure, demand side variable, *'leased'* denoting that the borrower owns the business premises. This was insignificant.

11 Cressy and Toivanen (2001) observed an inverse relationship between margins and loan size in the OLS regressions only but a direct relationship in their 2-stage regressions

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