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Business and Proprietor
Characteristics, Complementary Finance Sources, Collateral and Bank Lending: The Case of UK Business Starts

by

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BUSINESS AND PROPRIETOR CHARACTERISTICS, COMPLEMENTARY FINANCE SOURCES, COLLATERAL & BANK LENDING: THE CASE OF UK BUSINESS STARTS

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1 National Westminster Bank Principal Research Fellow and Assistant Director(Research) of Warwick University SME Centre. This research is part of a wider study financed by the National Westminster Bank of Great Britain. I am indebted to the Bank for the provision of the raw data, to Nigel Daniel of NatWest and to David Storey of the SME Centre for advice and encouragement. Needless to say the views expressed here are those of the author and not necessarily those of NatWest.
BUSINESS AND PROPRIETOR CHARACTERISTICS, COMPLEMENTARY FINANCE SOURCES, COLLATERAL & BANK LENDING: THE CASE OF UK BUSINESS STARTS

ABSTRACT

This paper provides the first attempt in the literature to estimate a model of bank lending in which the probability of bankruptcy as calculated by the bank is used together with bank data on business and proprietor characteristics to explain bank lending decisions.

The paper answers six main questions:

- What types of businesses and what sorts of proprietors borrow from their bank to start in business?

- Does the likelihood of the bank lending to startups depend on availability of proprietors' equity as theory and recent empirical evidence suggests?

- Are sources of debt and equity raised by the proprietors homogeneous or do different sources play different roles in raising own-bank finance?

- Does availability of collateral in the form of owner house equity increase the chances of getting startup finance?

- Does the probability of bankruptcy of the business figure (negatively) in the bank's lending decision as some current theories of asymmetric information claim?

- Is incorporated status important in using bank funds at startup as recent empirical evidence has suggested?

These questions are answered by estimating a two-stage logit model of business startup bank-debt finance on a new UK bank-database. Using available estimates of the bank's equation for the probability of bankruptcy own-bank startup finance is regressed on background characteristics of businesses and proprietors, other sources of finance used and the probability of business bankruptcy.

Borrowing at startup is more likely if the business is a Limited company, upgrading from a Personal to a Business account, rather than a de novo start or business purchase. It is more likely if the business is located in Other Industries (rather than Transport or Motor Industry) and if it is owned by mature, educated individuals who do not own their initial business premises. Borrowing is more likely if proprietors have access to other sources of finance, most typically owners' equity and loans from friends or relatives. However institutional sources of information deter startup borrowers and experience of running a
business in the same area as the current start performs a similar role. Finally two quite surprising results emerge. The probability of bankruptcy of the business estimated from bank data and availability of collateral in the form of house equity play no role in business access to/use of bank debt at startup. Convincing explanations for both these results are offered.

In summary the most important individual factors determining own-bank debt finance takeup are availability of complementary finance, information sources used to set up and the business' legal status.
1. INTRODUCTION
In Great Britain in the last quarter of 1990 no less than 550,000 businesses opened business accounts with the major banks. The majority of these businesses were Sole Traders and Partnerships. The majority of them opened checking accounts. However only 40% or some 220,000 of them borrowed from the banks they opened accounts with. Some 30% of the proprietors commencing business came from unemployment. Finally over the next two years some 14% of these businesses failed to trade, 8% discontinued trading without bankruptcy and 7% became bankrupt (Cressy, 1992a).

Despite the obvious importance of the startup market to the banks, to the starters themselves and to the broader economy, until recently very little has been known about the characteristics of these businesses or of their finances. In another paper (Cressy, 1992a) I outlined the characteristics of a large random sample of UK startup proprietors and their businesses. The present paper attempts to provide some basic facts about the finances of this sample and to identify the characteristics of proprietors and their businesses that are likely to result in bank borrowing. Some simple hypotheses from the mainstream finance literature on lending under asymmetric information are also set against the evidence. In particular for the first time in the literature an empirical examination of the dependence of bank lending on the probability of bankruptcy of borrowers is made.

2. THE STARTUP FINANCE LITERATURE
Although the role of aggregate finance in the decision to switch from wage employment to self-employment has been given some attention in the literature (e.g. Evans & Leighton, 1987; Evans & Jovanovic, 1989; Blanchflower & Oswald, 1990) very little empirical work has been done to examine the determinants of startup financial structure in particular the gearing ratios used by startup businesses and the origins of startup funding.

A recent exception is Bates (1990) who finds evidence of complementarity of debt and equity in small firm bank funding. His finding is that access to one form of finance (equity) improves access to another (debt).

However no study to date has examined the full range of capital sources used by startups or identified individual sources and associated characteristics. Similarly, whilst bankers are popularly supposed to use the background characteristics of entrepreneurs and their businesses as a basis for business lending decisions scientific research to establish the influence of these on loan parameters is scant. The absence of track record makes startup data ideal for the purpose of establishing the
impact of proprietor and business characteristics alone on bank lending. However this kind of data has rarely been used to date.

Bates(1990) explores the role of human capital variables such as entrepreneurial education and age in the levels of bank finance granted to small businesses. Buck, Friedman and Dunkelberg(1991) examine the effect of bank size, business legal type, industry, business age and gearing on small business loan application approval.

The above studies do not however use the full range of business characteristics data that may be available to bank managers at the lending decision stage, nor do they distinguish different sources of equity and debt financing with attendant potential differences in lending parameters, and finally neither contribution focusses exclusively on startups.

Borrower quality as measured by the probability of default is central to the theory of lending under asymmetric information. Recent theoretical contributions using incentive compatibility constraints (e.g. Boot, Thakor & Udell (1991), henceforth BTU) suggest that the probability of lending is positively related to the probability of success of the business. This implies that higher 'quality' businesses are more likely to get loans. Such theories also suggest the complementarity of debt and equity in the lending process (e.g. Boot, Thakor and Udell, 1987), as do theories of signalling (e.g. Leland and Pyle, 1977). However despite a burgeoning theoretical literature apparently no empirical work has been done to estimate the probability of bankruptcy (at startup or otherwise) from the point of view of the bank.

Bates(1990) estimates the probability of survival using a limited set of biodata and age of the business. This latter variable by definition is unobserved at startup and is therefore unavailable to bank managers at the startup stage when initial lending decisions are made. Reid(1991) estimates the probability of survival of a sample of small UK firms

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2 The Friedman et al (and indeed Bates) sample is not exclusively composed of startups.

3 To avoid confusion BTU do not strictly discuss a model in which the probability of lending is endogenous to the model. This is done in e.g. Besanko & Thakor(1987) where it is shown that the probability of lending is unity for each borrower type (risk) and therefore independent of type. However a variant of the BTU analysis with Private Information does generate this result. In a model without moral hazard but with a variable loan amount and now including the probability of lending as an exogenous variable one can show that the high risk borrower gets a higher interest rate and a lower probability of getting a loan. This latter condition is required to achieve incentive compatibility and avoids the high risk borrower coveting the low risk borrower's contract.
on a limited range of personal characteristics supplemented by a range of accounting and product market variables. His data are again not startup businesses and his dependent variable allows other outcomes than bankruptcy as an alternative to survival. Other recent empirical work (Berger & Udell, 1991) uses quite different measures of borrower risk.

Given the paucity of treatment in the literature it is of considerable interest to determine not only whether borrower 'quality' as measured by the probability of bankruptcy plays a role in startup lending decisions but also to examine its quantitative significance alongside other variables proxying human and financial capital inputs.

3. THE PRESENT STUDY
The present paper attempts to throw some empirical light on these three issues. A new new bank database is used. Firstly some basic statistics on finance combinations used by startups are mapped out. Then a two-stage model of the probability of startup finance usage is estimated. At the first stage the probability of bankruptcy is estimated as a function of human and financial capital inputs. At the second stage a model of startup lending decisions is estimated including the first stage estimates of the bankruptcy probability together with human and financial capital variables.

The data used is based on a questionnaire put to a nationwide random sample of some 2,000 startups opening business accounts at the National Westminster Bank of Great Britain in 1988. Replies to some 35 questions put to businesses at startup stage were recorded. In addition information on bankruptcies of these same businesses up to eight quarters later is available.

The paper is organised as follows. Section 4 states and justifies the hypotheses to be tested. Section 5 describes the underlying statistics of startup finance and explains ownbank finance use with the two-stage logit model. Section 6 interprets and evaluates the findings and Section 7 concludes.

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4 These questions relate to the nature of the business, the backgrounds and qualifications of the proprietors, the sources of finance used to start up and the initial banking requirements of the owners. A full analysis of the database is found in Cressy (1992a).
4. THE HYPOTHESES

The paper tests the following hypotheses:

H1. Businesses are loyal to their bank

H2. The typical business uses a combination of finance sources at startup stage with single sources of debt and equity the most common combination

H3a. Startup businesses use a variety of finance sources because of the existence of rationing by individual sources or due to the favourable signalling effect of usage or the proxy-judgement effects of other lender/donors

H3. If proxy-judgement is the explanation for multiple finance usage then different sources will have different marginal impacts on the probability of gaining ownbank finance

H4. The probability of using own-bank finance is a function of the probability of bankruptcy/insolvency of the business (1-p) with higher quality projects (higher p) more likely to get finance

H5. Owner human capital inputs are positively related to the chances of using own-bank finance at startup

H6. Collateral availability in the form of house equity increases the probability of getting own-bank finance

H7. Limited Company status increases the chances of borrowing at startup

The justification of these 6 hypotheses and their statistical implications is as follows.

Hypothesis 1: Businesses are loyal to their bank.
Recent theoretical analysis (e.g. Sharpe, 1990) explains long-term bank-business relationships in terms of asymmetric information and a learning process by the bank. A familiar firm gets better lending terms than an unfamiliar one and so has an incentive to build up a relationship with one bank. This in turn makes bank switching increasingly less likely in the long run. Tautologically this relationship cannot be tested on startups. However if a business approaches on average only one bank for startup funding this is at least consistent with the theory of exclusive long term relationships. Thus

Hypothesis 1 predicts that the typical startup borrower uses only one bank (its 'own' or main) bank
Hypothesis 2: The typical business uses a combination of finance sources at startup stage with unique sources of debt and equity the most common combination

Theories of lending under private information⁵ (e.g. Besanko & Thakor, 1987) indicate that an increase in owners' equity (measured by owners' wealth committed to the business) will reduce the interest rate charged a borrower of given riskiness, thus increasing lending to the business. In the presence of moral hazard, owner equity may be used to increase unobservable effort levels of the borrower (e.g. Boot, Thakor and Udell, 1987). Theories of signalling show that a higher proportion of equity held by the entrepreneur may be used to indicate to potential lenders a higher return to investment in a particular firm (e.g. Leland and Pyle, 1977). Finally, risk aversion on the part of banks and borrowers suggests scope for optimal risk-sharing implying that neither bank nor firm bear all the risk of the project.

In summary committed owners' wealth may be considered by the lending bank as a means of overcoming private information and moral hazard aspects of lending which threaten to reduce bank profitability and also as a means of sharing risk between risk averse borrowers and lenders.

Complementary debt sources are slightly more difficult to rationalise. Rationing by individual sources of finance and/or more favourable lending terms by non-institutional sources may explain their use⁶. This analysis suggests that higher quality businesses (those with lower probabilities of bankruptcy) will use a more debt and a wider range of debt sources. They will order sources of debt in terms of total cost per £ offered (measured by interest rates and collateral requirements). The cheapest source will be used first up to its maximum, then the next cheapest source up to its maximum and so on. (See Cressy, 1992b for details.)

Finally if the availability of multiple sources of finance is itself evidence of others' judgement of (inside information on) an entrepreneur's ability, this ability being not directly

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⁵ Operationally, Other bank finance(OTHBNKF)=0 for all businesses, and own-bank finance(NWBFIN)=1 for some businesses

⁶ Private information is used by BTU to indicate asymmetric information without moral hazard. Only the borrower knows his own type but (s)he does not subsequently choose to be diligent or lazy and thereby affect the probability distribution of returns after lending has taken place.

⁷ Bizer and DeMarzo (1992) offer a different explanation for the phenomenon of multiple debt sources based on moral hazard.
observable by the lending bank, then we should expect the bank's assessment of others' judgement to vary across sources. A prediction of this theory would then be that different sources would have different marginal impacts on the probability of ownbank finance provision. Call this the proxy-judgement hypothesis.

The above reasoning suggests an operationalisation of Hypothesis 3:

H3a. No business will use finance combinations of solely debt or solely equity to start the business. Thus

Ownbank finance(NWBFIN) or personal money/savings(PERFIN) is predicted not to be used alone to start a business

H3b. Availability of finance from other sources will increase the chances of gaining own-bank finance ceteris paribus. Thus

In the logit analysis the signs of the complementary finance sources representing personal savings (PERFIN), borrowings from friends and relatives (FRIENDF), borrowings from other banks(OTHBNKF) and finance houses (FINHFSFIN), and use of Venture Capital finance(VENTFIN) are predicted to be positively related to the probability of own-bank finance

H3c. If the proxy-judgement hypothesis holds the marginal impact of different finance sources (listed in H3b above) will be different. Thus

In the logit analysis the size of the standardised logit coefficients will differ across complementary finance sources

Hypothesis 4: Probability of Bankruptcy
The probability of bankruptcy is a bottom-line measure of the riskiness of a loan. It is furthermore a measure on which the recent literature on lending has almost exclusively concentrated. Only recently however has it been established that the bank can generate an unbiased estimate of the probability of bankruptcy of a business applying to it on the

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8 Thus FRIENDF and OTHBNKF should have different coefficients in the logit equation.

9 It is not the only measure as pointed out in Boot, Thakor and Udell(1991). These authors discuss variance of project income to the bank as an alternative measure.
basis of data volunteered by the businesses themselves (Cressy, 1992c)\textsuperscript{10}. This result is of importance since under asymmetric information with incentive compatibility the Revelation Principle shows that the borrower will have an incentive to reveal to the bank information on its 'type' or probability of bankruptcy (Myers, 1979; Besanko & Thakor, 1987; Boot, Thakor and Udell, 1991). Thus availability of an unbiased estimate of the bankruptcy probability is evidence in favour of incentive compatible theories of lending over other versions (e.g. Stiglitz-Weiss, 1983). However existence of an estimate leaves open the question of whether the probability of bankruptcy plays a role or is \textbf{important} in lending decisions.

A policy of full collateralisation of debt (allowing for costless recovery of monies owed in the event of default) would mean that the probability of bankruptcy would be irrelevant to the lending decision. However given the fixed costs of 'perfecting' collateral it seems unlikely that the bank would find it optimal to do this. Lower cost solutions such as Personal Guarantees are however often taken by the bank in lieu of full security. However anecdotal evidence points to a perceived tradeoff between security and interest rates charged by bankers. Thus there seems to be a willingness to lend even if lending is 'not completely secure'. This implies that bankers will prefer less bankruptcy risk to more.

Hence even if lending is on average below the economic threshold for security we should expect interest margins to reflect the increased risk (and lower expected return) associated with no collateral. Thus higher interest margins for fixed collateral may reflect higher bankruptcy risk. It is not clear however how this will in turn affect the probability of getting ownbank finance since if the higher risk is adequately compensated for by higher interest rates risk-types become 'equivalents' in terms of expected return to the bank.

Under debt rationing with symmetric information if one debt source is insufficient to supply all a business' needs theory suggests that higher quality businesses with larger expected returns will wish to finance larger projects and therefore are more likely to use several finance sources to do so (Cressy, 1992b).

In summary, an operationalisation of Hypothesis 4 is that a higher probability of bankruptcy dissuades lending:

\textbf{H4. The sign of the probability of bankruptcy(INSOLVPR) in the probability of own-bank finance equation is predicted to be negative}

\textbf{Hypothesis 5: Human Capital Inputs}
Components of human capital applicable to business include educational & vocational qualifications (FNOLEV, FNALEV, FDEG, 

\textsuperscript{10} See Cressy (1992) for details.
FTRAD, FPROF, FHND), variables reflecting job experience in the same area as the start (FMANFLD, FSUPFLD, FOTHFLD), and variables reflecting general work experience, especially in managerial or supervisory capacity (FREC DIR, FRECMAN, FRECSUP). Finally, variables reflecting information on starting a business (NWBINFO, OTHBKINFO, FPRDINFO, AGYINFO, SPFINFO, ACNTINFO, SOLINFO, OTHINFO) might be thought to enhance the probability of success and hence the likelihood of loan offers. However, more information may engender more caution in taking up offered funds. Thus, information cannot simply be identified with human capital and the signs of the information variables are therefore a priori ambiguous.

Human capital variables are expected to increase the probability of getting own-bank finance insofar as human capital predicts business success and loans are not fully collateralised. Thus an operationalisation of Hypothesis 5 is:

H5. The signs of coefficients of human capital variables in the own-bank finance equation are predicted negative in the case of vocational qualifications (FTRAD, FPROF, FHND), positive in the case of academic qualifications (FNOLEV, FNALEV, FDEG), positive in the case of work experience variables (FREC DIR, FRECMAN, FRECSUP) and positive in the case of information variables (NWBINFO, OTHBKINFO, SOLINFO, ACNTINFO, GOVINFO, OTHINFO)

Small business experience in the same area as the startup (FEXSB) would seem to have an ambiguous impact on own-bank finance usage. On the one hand, availability of trade credit in the case of previously successful businesses (other things equal) will reduce the need for own-bank finance at startup. However, previously failed businesses may actually find their potential sources of trade credit more restricted than if they had started de novo. Thus, the net effect is ambiguous.

Hypothesis 6: Availability of collateral in the form of house equity increases the chances of getting own-bank finance. Theories of lending under asymmetric information with endogenous collateral emphasise its role in solving the Moral Hazard.

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11 Some 80% of loans in the present database are not fully securitised. A loan is said to be 'secure' if the bank has a tangible asset (e.g., second mortgage on the proprietor's house) to back it up. Personal guarantees are in general insufficient for security.

12 Because of the definitions of the academic qualifications variables a negative sign will indicate a positive influence of human capital. See the Appendix for definitions.

13 There is unfortunately no information in the database to determine whether such 'reincarnated' businessmen/women were successful in previous 'lives'.
problem. Since collateral is only relinquished by the borrower in the event of default the posting of more collateral at the margin reduces the expected marginal return to the borrowing firm. The borrower's optimality condition can only be restored if (s)he puts more effort into the business thereby increasing the chances not relinquishing collateral. Thus if collateral were not available or were limited in quantity relative to the size of the loan we should expect borrowers to be rationed by collateral, those with collateral being more likely to get loans at a given interest rate. However bank lending policy motivated by high unit costs of 'perfecting' collateral does not require the manager to obtain security for loans below a certain threshold. Thus the manager may not be more motivated on average to lend to businesses who have collateral available in the form of house equity if loans at startup are on average below the threshold value. Call this the threshold effect. Thus:

H6. If the motivational effect from greater ex post borrower effort operating in favour of collateral requirements for lending dominates the threshold effect operating against collateral requirements we should expect the sign of house valuation (AVVAL) for fixed mortgage value(AVMOR) to be positively related to the probability of ownbank finance.

Hypothesis 7: Limited Companies are more likely to borrow at startup
Incorporation may increase the chances of borrowing independently of the size of the business\textsuperscript{14}. The main reason for this is the status or credibility effect of being a Limited Company. Limited Companies are regarded by outsiders (in particular banks) as 'more sophisticated' businesses perhaps with higher earnings potential (Chittenden et al,1989;Freedman and Godwin, 1991). Looked at in this light the choice of incorporated status may simply be signalling the superior human capital of the proprietors. Bankers perceiving this signal correctly may therefore be more inclined to lend to such businesses. Thus operationalising Hypothesis 7:

H7. In the logit equation and with Limited Company legal status as the control case, the signs of Sole Trader(ST) and Partnership(PTNR) status are predicted to be negative

5. STARTUP FINANCE SOURCES
Table 1 provides an analysis of the various finance combinations used by owners to start their businesses.

\textsuperscript{14} Limited companies tend also to be larger than Sole Traders/Partnerships.
<table>
<thead>
<tr>
<th>Number of elements in Combination</th>
<th>Name of Combination</th>
<th>Frequency of Combination</th>
<th>Valid Percent of Total Sources Used</th>
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\[15\] The definitions of variables in this Table and elsewhere in the paper are provided in the Appendix.
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</tr>
<tr>
<td></td>
<td>&amp; FINHSFIN &amp; GOVFIN</td>
<td></td>
<td></td>
</tr>
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<td></td>
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<td>0.0</td>
</tr>
<tr>
<td></td>
<td>(</td>
<td>1</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>&amp; PERFIN &amp; FINHSFIN</td>
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<tr>
<td></td>
<td>SUBTOTAL(4):</td>
<td>4</td>
<td>0.2</td>
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Table 1 shows that a very substantial proportion of startups (one in five) use no finance at all at the startup stage. At first sight this is surprising. Bearing in mind however that the sample is of very small businesses, mainly Sole Traders in the Service sectors for whom at startup fixed capital and even working capital requirements are at a minimum the statistic becomes plausible.\(^{16}\)

Only a very small minority of businesses borrowed from two banks, NWBFIN & OTHBNKF representing less than 1% of all businesses. This therefore lends support to widely held view that businesses tend to be 'loyal' to one bank.

**Evidence from Table 1 thus confirms Hypothesis 1 above that startups are 'loyal' to their bank.\(^{17}\)**

The startling feature of Table 1 is that over half of business starts use just one source of finance to set up business. Equity in the form of personal savings (PERFIN) is the most important type of finance used in single-source businesses (accounting for half of single sources used). Avoidance of institutional finance sources might have been predicted on the basis of the small business owners fierce desire to remain 'independent' (Bolton, 1971). However this does not so clearly explain why some businesses prefer to use only their owners equity or why banks are prepared to lend to businesses that do not invest money of their own in the enterprise. It entirely contradicts the idea of risk-spreading implicit in Hypothesis 2 above. Finally the proportion of single-source borrowing in the form of Overdrafts and Term Loans from their own bank (NWBFIN) is not an

\(^{16}\) 68% of starts in the present database are Sole Traders, a high proportion are in the Personal Services sector with an average size of about 1.3 full-time employees. The example of the window-cleaner or gardener using his/her own materials and household equipment at the startup stage and not requiring even trade credit to commence trading is probably representative of non-users of startup finance.

\(^{17}\) The loyalty of these businesses to their bank over time is a more complex issue and will be explored in another paper.
insignificant proportion of the total and accounts for 1 in 6 single-source starts. These businesses are thus initially infinitely geared and therefore apparently infinitely vulnerable to changes in the market place that influence their revenue flows!

Dual sources of finance are listed by one in five businesses with the preferred combination being personal (PERFIN) and own-bank finance (NWBFIN). Thus unique debt-equity combinations are indeed used by startups. However

Evidence from Table 1 contradicts Hypothesis 2 above that a mixture of debt and equity is the typical financial structure of startups

In fact the typical startup financial structure is debt or equity alone with owner personal savings quoted by 1 in 3 and own bank debt by 1 in 6 businesses as their sole source of startup finance

Finally equity finance seems to be obtained from a variety of sources including the proprietor's own savings, gifts from friends and relatives, and Government sources.

Table 1 shows that few businesses borrow from more than two sources. This suggests that either that they obtain enough from two sources or that the costs of approaching more sources outweigh the expected benefits from additional funds. However two (or more) sources of debt finance occur in about 3 percent of cases.

Personal finance (PERFIN) can be found in three quarters of dual combinations, suggesting that it is a crucial complement to borrowing from most other sources.

6. LOGIT ANALYSIS
The determinants of using startup finance from the business' own bank are now examined. The econometric methodology employed is outlined first.

Econometric Methodology
A two-stage procedure is adopted. First the probability of bankruptcy of a business is estimated as a function of proprietor and business characteristics together with lending variables

\[ 18 \text{ Whilst Overdraft usage to start the business is not reported separately we know that about } 60\% \text{ of requests for finance at Interview stage were for overdrafts.} \]

\[ 19 \text{ This calculation is based on summation of percentages for all combinations that include NWBFIN, OTHBNKF, FRIENDF and FINHSFIN. OTHFIN was excluded because the full breakdown of this category was not known.} \]
including the own-bank finance variable\(^{20}\). If own-bank finance amounts were available it would then be possible to estimate amount of own-bank lending as a function of the probability of bankruptcy. However since we observe only whether own-bank borrowing is made \(\text{and not the amounts lent}\) we estimate the \textbf{probability} of own-bank finance being \textbf{actually} offered by the bank \textbf{given} the probability of bankruptcy of the business. The latter is conditional on own-bank finance \textbf{having been offered}.

To see the logic of this note that the financial performance of the business \((\text{BANK}_i^*)\) depends on both biodata characteristics \((x_i)\) and on whether it gets own-bank finance \((\text{NWBFIN}_i)\):

\[
\text{BANK}_i^* = \beta' x_i + \beta_0 \text{NWBFIN}_i + u_i
\]  
(1)

where \(\text{NWBFIN}_i = 1\) if the business uses ownbank finance and \(=0\) if it does not. \(u_i\) is a random error term.

We do not observe \(\text{BANK}_i^*\) but rather the binary outcome \(\text{BANK}_i = 1, 0\) (bankruptcy or non-bankruptcy) depending on the value of the performance variable \(\text{BANK}_i^*\):

\[
\text{BANK}_i = 1 \text{ iff } \text{BANK}_i^* > 0
\]  
(2)

Hence

\[
\Pr(\text{BANK}_i = 1) = \phi(\beta' x_i + \beta_0 \text{NWBFIN}_i)
\]  
(3)

and hence

\[
\Pr(\text{BANK}_i = 1 | \text{NWBFIN}_i = 1) = \phi(\beta' x_i + \beta_0)
\]  
(4)

where \(\phi(w)\) is the Normal cdf of \(w\). In the estimation the coefficient \(\beta_0\) is subsumed in the intercept term \(\text{implicit in the vector } \beta\) since it cannot be estimated separately.

The bank's offer of finance \((\text{NWBFIN}_i^*)\) depends on its estimate of the probability of bankruptcy \textbf{if} it makes the offer \((\text{NWBFIN}_i = 1)\):

\[
\text{NWBFIN}_i^* = \gamma' z_i + \gamma_0 \Pr(\text{BANK}_i = 1 | \text{NWBFIN}_i = 1) + v_i
\]  
(5)

\[
= \gamma' z_i + \gamma_0 \phi(\beta' x_i) + v_i
\]  
(6)

where \(\gamma' z_i\) is a linear function of proprietor/business characteristics including other finance sources available to the business and \(v_i\) is a random error term.

\(^{20}\) The lending variables other than NWBFIN are assumed to be fixed known numbers at the point the business' own bank makes its decision. This assumption is justified by the fact that 78% of the business starts are entirely new and decisions on startup finance are therefore being made at the time of interview with their ownbank.
Due to data limitations we observe not NWBFIN\textsubscript{i} but rather the binary outcome NWBFIN\textsubscript{i}. Hence

$$Pr(NWBFIN_i = 1) = Pr(NWBFIN_i^* > 0) = \phi(\gamma'z_i + \gamma_0\phi(\beta'x_i))$$ (7)

The probability of bankruptcy is estimated at the first stage (equation 3)\textsuperscript{21}. Then with the estimates of $\beta$ a second logit is estimated for ownbank finance takeup with NWBFIN as the dependent variable and biodata, probability of bankruptcy and other sources of finance as regressors\textsuperscript{22}. Biodata variables used here include characteristics of the businesses and personal characteristics of the owners.

Empirical Results

1. Probability of Bankruptcy
This equation has been presented and its credentials discussed in another paper (Cressy, 1992c). Saved results from that analysis are included as a regressor in the Own-bank finance equation.

2. Probability of Own-bank Finance
The dependent variable used in the ownbank finance logit NWBFIN is defined as follows.

NWBFIN=1 if the business applied for, was offered and accepted an Overdraft\textsuperscript{23}, Business Development loan or L03 loan to start their business\textsuperscript{24}

NWBFIN=0 otherwise

Table 2 provides the parameter estimates.

Goodness-of-fit
The sample size used in the full logistic regression is 1065

\textsuperscript{21} Bankruptcy/insolvency is defined as having occurred if the business account went into Recoveries the period 88q1-90q4.

\textsuperscript{22} The literature on lending under asymmetric information argues that in the structural form of the model the probability of default should enter as an explanatory variable in the equilibrium loan quantity equation. (See Besanko & Thakor, 1987).

\textsuperscript{23} An Overdraft is a Line of Credit in American parlance.

\textsuperscript{24} The last two items are term loans with respectively fixed interest rate independent of Base Rate and Base rate-related flat interest rate. Base rate is the cost of the bank's funds.
observations. The regression as a whole is significant at 1/100% and explains about 13% of the variation in finance rates across the sample.

Variables Correlated with Ownbank Finance Takeup
A range of factors seem to explain the take-up of own-bank finance at startup. The most important individual factors are

- finance Sources used (OTHBNKF,FRIENDF, PERFIN,OTHFIN)
- legal Status of business (ST,PTNR)
- type of start (NEW,PURCH,UPGRAD)
- sources of information used(NWINFO, AGYINFO,OTHINFO)
- initial premises used(LEASPREM,OWNPREM)

25 This figure is well below the 2,048 observations of the original sample due to missing data on individual variables. Sample attrition occurs for two main reasons. Firstly about 150 observations were 'lost' because of errors in bank staff logging in or subsequent untraceable changes to bank sortcodes (Branch identifiers.) Secondly some 150 observations were omitted due to non-returns to the account cessations questionnaire the results of which were used in the bankruptcy analysis. Finally, further attrition occurred because of missing values to individual variables the probability of which is high given the number of explanatory variables included in the original equation.

To examine the question of potential bias resulting from the omission of this large number of observations mean vectors were calculated for all variables in the multivariate analysis and for the total sample. No significant differences were identified.

26 The measure referred to is McFadden's R-squared (see Maddala, 1983) adjusted for degrees of freedom (number of covariates) and defined as:

\[ HR^2 = MR^2 + p/\log(L_s) \]

where \( p \) = number of covariates or independent variables in the model and

\[ MR^2 = 1 - \log(L_B)/\log(L_s) \]

where \( L_B \), \( L_s \) = the unrestricted and restricted Likelihoods respectively.

27 The bases from which the dummies included in the regression are measured as deviations are listed in the Appendix.
- average age of the proprietors (AVAGE)
- industry effects (PROP, MOTOR, TRANS)
- human capital inputs (FNONEV, AVQUAL, FTRAD, FRECMAN, FRECSUP, FEXSB)
- initial size of the business (FT)

Interpretation
Partial Chi-squares and size of standardised coefficients indicate that other finance sources, especially owner equity inputs and borrowings from friends and relatives, are extremely important in gaining access to ownbank finance. Thus:

H3b. The regression results are consistent with Hypothesis 3b above that other sources of finance enhance the probability of getting loans from a business' own bank. (This provides independent confirmation of Bates' (1990) findings.)

We note also that the marginal effects of these different sources measured by the standardised coefficients have different impacts on the chances of ownbank finance. Thus:

H3c. Regression coefficients for FRIENDF, PERFIN and OTHFIN differ in magnitude indicating support for the proxy-judgement hypothesis 3c and the implication of different donor/lender characteristics

In addition to these financial variables Table 2 shows that information variables, in particular information from own-bank used to start the business (NWBINFO), Government Agency information (AGYINFO) and miscellaneous sources of information (OTHINFO) are important in determining the likelihood of using ownbank finance to start. However their impact is negative, indicating that more informed entrepreneurs are less likely to use own-bank finance.²⁸

²⁸ This is at first surprising, but may be rationalised by noting that (i) small businesses are well-known to distrust what they regard as outside interference in their operations (Bolton, 1971) and (ii) the banks' own promotional literature may err on the side of caution with respect to financial overcommitment.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Parameter Estimate</th>
<th>Pr&gt;(X^2)</th>
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Criteria for Assessing Model Fit

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<tr>
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<th>Intercept</th>
<th>Intercept &amp; Covariates</th>
<th>Chi-square for Covariates (Sig. Level)</th>
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Notes: * indicates that this variable has no observations in the regression. McFadden's $R^2$ adjusted for df = 0.14

The negative sign of the bankruptcy probability estimate (INSOLVPR) in the full regression (presented in the Appendix) suggests some influence of borrower bankruptcy risk on the chances of borrowing at startup. However this may be due to bias introduced by other irrelevant variables. When added to the optimal regression of Table 2 this variable is insignificant. Thus:

**H4. The probability of bankruptcy does not influence the probability of ownbank finance usage, disconfirming Hypothesis 4 above that higher 'quality' businesses are more likely to borrow at startup**

Given that an estimate of the probability of bankruptcy is available to the bank it would seem likely it would use this information in lending decisions. The fact that it seems not to may be arise because managers who make lending decisions to startups have estimates of the bankruptcy probability with a much larger standard error than those available to Head Office and used here.

Table 2 confirm expectations that that owner human capital inputs in the form of educational and vocational qualifications of the proprietors positively influence the chance of loan takeup: fraction of proprietors with at most 'O' Levels(FNOLEV) is negatively correlated with the rate of own-bank finance. This implies that businesses with more academic qualifications amongst proprietors are more likely to use own-bank finance.

On the other hand, human capital in the sense of recent job experience at managerial or supervisory level(FRECMAN,FRECSUP) and experience in running a small business in the same area as the current start (FEXSB) is negatively correlated with loan takeup. Therefore:

---

29 The former is moreover the case when income prior to the start, and measures of proprietor wealth (house ownership, equity) are held constant. Thus the result cannot be due to higher income/wealth reducing the need for finance to start the business.
H5. The data do not entirely confirm a positive association of human capital variables with bank borrowing (Hypothesis 5), although human capital proxied by education levels is as in Bates (1990) a (positive) predictor of finance usage.

Finally Table 2 shows independence of ownbank finance probability from the house equity of proprietors. Thus

H6. The data contradict the hypothesised positive association of collateral availability and likelihood of ownbank startup finance. The two are empirically independent.

We conclude that collateral may not increase the chances of getting startup finance because of the reasons discussed in Section 4 above, namely that for small loans the costs of perfecting security outweigh the gains from lending unsecured.\(^\text{30}\)

The negative signs and the significance of the Legal Status variables (Sole Trader(ST) and Partnership(PTRN)) lead to confirmation of Hypothesis 7:

H7. The logit results confirm Hypothesis 7 that Limited Companies are more likely to borrow to start their businesses

7. SUMMARY & CONCLUSIONS
Ownbank borrowing to start in business has been shown to be more likely if the business is a Limited company, upgrading from a Personal to a Business account, rather than a de novo start or business purchase. It is more likely if the business is located in Other Industries (rather than Transport or Motor Industry), is owned by mature, educated individuals who do not own their initial premises. If the business' Proprietors have access to other sources of finance, most typically owners' equity and loans from friends or relatives this again increases the chances of being offered their bank's money. However institutional sources of information dissuade from bank borrowing when starting the business, as does experience of running a business in the same area as the current start. Finally two quite surprising conclusions have emerged. The probability of bankruptcy of the business and the availability of house equity have no impact on the likelihood of ownbank finance. The former arises because of the sample size of branch managers dealing with business startup finance and the latter because of the fixed costs of perfecting loan security.

The most important individual factors determining own-bank debt

\(^{30}\) This leaves open the question of whether total lending is independent of security. Preliminary evidence suggests that overdraft limits for example are increasing in borrower house equity.
finance take up are availability of complementary finance, information sources and legal status of the business.
REFERENCES


Bizer, David S and Peter M DeMarzo, 1992, Sequential Banking, *Journal of Political Economy* 100, 1, 41-61


Chittenden, Francis, Graham Hall and Roger Stanway, 1989, The Legal Structure of Small Firms, Business Development Unit, Manchester Business School


Business School.


<table>
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<th>Standardised Estimate</th>
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**Criteria for Assessing Model Fit**

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<th>Criterion</th>
<th>Intercept</th>
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Notes: * indicates that this variable has no observations in the regression. McFadden's $R^2$ adjusted for df = 0.13

---

31 At least one of the independent variables has a missing value.
DEFINITIONS OF VARIABLES
Variables used in the text are binary with values 0,1 unless otherwise stated. A variable used as the base from which other related dummies are measured as deviations is listed with a star (*).

Type of Startup

NEW = wholly new business
PURCH = purchase of an existing business
UPGRAD = upgrading of an existing business from Part- to Full-time
UPAN* = Upgrading of existing business previously conducted through another account

Time since business first started trading

TRADTIME = time in years business had been trading at time of startup with the present owner:

= 0 if not yet started to trade
= 0.5 if trading for less than 1 year
= 1.5 if trading 1-2 years
= 3.5 if trading for 2-5 years
= 5 if trading for more than 5 years

Legal Status of Business

ST = 1 if the business is a Sole Trader
PTNR = 1 if the business is a Partnership
LTD* = 1 if the business is a Limited Company
COOP = Co-operative [no business in this category in the database]

Franchise

FRAN = 1 if the business is a franchise
Industry Sector
AGRI = 1 if in Agriculture\(^32\)
RETAIL = 1 if in Retail
CATER = 1 if in Catering
PROP = 1 if in Property/Finance/Professional Services
CONST = 1 if in Construction
MOTOR = 1 if in Motor trades
PROD = 1 if in Production/Manufacturing
TRANS = 1 if in Transport/Distribution
WHOLE = 1 if in Wholesale
OTHER* = 1 if the business was not located in any of the industrial categories listed above

Computer Technology
COMP = 1 if the business used computers in any significant way

Direct Sale
DSALE = 1 if the business was significantly involved in direct sale

Import/Export
IMPT = 1 if the business relied for its operations on imported products/raw materials
EXPT = ditto exports

Initial Staff Numbers
FT = number of full-time employees (including proprietors) at startup
PT = ditto part-time

\(^{32}\) The sector definitions used here do not conform exactly to the SIC classification but were used by the Bank because of conformity to marketing definitions.
Initial Premises

HOMEPREM = 1 if the business' initial premises was one of the proprietors' homes

LEASEPREM = 1 if the business' initial premises was leased

OWNPREM = 1 if the business owned its initial premises

OTHPREM* = 1 if the business started from premises other than those listed above (e.g. van, market stall)

Sources of Information on Starting a Business

NWBINFO = 1 if NatWest information used

OTHBKINFO = 1 if other bank

FRNDDINFO = 1 if friends

AGYINFO = 1 if Government agencies

SFSERINF = 1 if Government Small Firms Service

ACNTINFO = 1 if accountant

SOLINFO = 1 if solicitor

OTHINFO = 1 if other sources of information used than those listed above

NOINFO* = 1 if no information was used

Sources of Finance Used to Start

NWBFIN = 1 if NatWest finance was used. This variable is often referred to in the text as "Own-bank finance".

OTHBKFINF = 1 if other bank finance

FRIENDF = 1 if finance from friends and relatives

PERFIN = 1 if personal money/savings

FINHSSFIN = 1 if Finance House finance

GOVFIN = 1 if Government finance (e.g. Enterprise Allowance, Loan Guarantee Scheme)

VENTFIN = 1 if Venture Capital finance
OTHFIN = 1 if finance other than those listed above
NOFIN* = 1 if no finance was used

Gender of Proprietors
F = number of female proprietors
N = total number of proprietors

Age of Proprietors at Start
AVAGE = average age of proprietors

Academic Qualifications of Proprietors
FNOAC* = fraction of proprietors with no academic qualifications
FNOLEV = fraction of proprietors with at most 'O' Level academic qualifications
FNALEV = ditto 'A' Levels
FNDEG = fraction of proprietors with at most a Degree
AVQUAL = average academic qualifications of proprietors

Vocational Qualifications of Proprietors
FTRAD = fraction of proprietors with trade apprenticeships
FPROF = fraction with professional qualifications
FHND = fraction with Higher National Diploma
FOTHQUAL = fraction with other vocational qualifications
FNOVOC* = fraction with no vocational qualifications

The scale is taken as:

0 = no academic qualifications
1 = at most 'O' Levels
2 = at most 'A' Levels
3 = at most Degree
Prior Employment Status of Proprietors
FUNEMP = fraction of proprietors unemployed before startup
FFTWK = ditto in full-time work before startup
FPTWK* = ditto in part-time work before startup

Most Recent Type of Occupation
FRECDIR = fraction of proprietors who were previously employed as directors of businesses
FRECMAN = ditto manual workers
FRECLE = ditto clerical workers
FRECSUP = ditto supervisors
FRECSKIL = ditto skilled workers
FRECUNSK = ditto unskilled workers
FRECNON = ditto no recent occupation

Annual Income Prior to Start
AVINCOME = the average income of proprietors prior to startup

House Ownership of Proprietors
FHSE = fraction of proprietors owning their own houses
AVMOR = the average mortgage of home-owning proprietors
AVVAL = the average house valuation of home-owning proprietors

Proprietor Gave up job to Start
FGIVUP = fraction of the proprietors who gave up their jobs to start the present business
Work/business Experience of Proprietors

FEXSB = fraction of the proprietors who had small business experience

FWKFLD = fraction of the proprietors who had worked in the field of the startup

FMANFLD = fraction who had worked as manual worker
ditto

FSUPFLD = fraction who had worked as supervisor ditto

FOTHFLD = fraction who had worked at another level
ditto

Main Reason for Startup

FRUNEMP = fraction previously unemployed

FRBOSS = fraction of proprietors who entered in order to be their own boss

FRDISSAT = ditto because of dissatisfaction with current job/prospects

FREDUND = ditto made redundant

FRINDER = ditto wanted more independence

FRMONEY = ditto wanted more money

FRFULFIL = ditto wanted more fulfilment

FROther = ditto for other reasons

Probability of Bankruptcy

INSOLVPR = probability that the business becomes bankrupt/insolvent in the first 8 quarters after startup. Insolvency/bankruptcy is defined to have occurred if legal proceedings have been instituted to recover debts owed following default. It does not imply a positive writeoff by the bank.