

Trajectories of Small Business Financial Structure

Gavin C. Reid

ABSTRACT. A dynamic theory of the small firm is expounded, assuming entrepreneurs maximise business value over a finite time horizon. Predicted trajectories for key financial variables are seen to depend on whether debt or equity are cheaper. The predicted trajectories are compared with actual trajectories, using empirical evidence from three years of detailed primary source data on one hundred and fifty new business startups in Scotland. Evidence largely confirms predictions of the model, for the cheap equity case. For this case, as capital and sales rise steadily, debt is retired rapidly, except when interest rates on long-term debt are low. This finding is supported by explicit empirical trajectories of key financial variables.

1. Introduction

This paper expounds and tests a theory of the financial structure of the new small business enterprise. Its approach is evolutionary in that it focuses on how, in theory and practice, the key variables which characterise the small firm's financial structure evolve over several time periods after inception. The variables emphasised are sales, profits, debt, equity, interest rates, and gearing (i.e. debt ÷ equity). Each of these variables is considered to be functionally dependent on time, and therefore is discussed in terms of a time path or *trajectory*.

The characteristic of the theory expounded here is that is dynamic, and conceives small firms as lying in risk classes. It considers a small firm which is run by an owner-manager or entrepreneur

who aims to maximise the firm's value over a finite time horizon. Value is expressed as the present value of the dividend stream plus the present value of the terminal equity. The body of evidence to which this theory is applied is an unbalanced panel of observations on one hundred and fifty entrepreneurial firms. These have been tracked over a four year period (1993–1997), gathering data by intensive face to face interviews using an administered questionnaire.

The starting point of all discussion of capital structure must be Modigliani and Miller (1958, 1963) who initially favoured the view that capital structure was irrelevant, subsequently modifying this to the view that financing by debt alone was optimal. Whilst suggestive, and indeed correct, within the strict theoretical framework adopted, their predictions are considerably at variance with the evidence. Certainly in a small firms context, these views are an unreliable guide to reality. Developments of the literature, since then, have revolved around the issue of the consequences for financial structure of constraints on external finance. The key elements of this literature are the agency, pecking order and signaling views. The agency approach is exemplified by the work of Jensen and Meckling (1976); the pecking order approach by the work of Donaldson (1961) and Myers (1984); and the signaling approach by the work of Myers and Majluf (1984).

According to the agency approach, information asymmetry can lead to inefficient contracting. If this is extended to the principal-agent approach, differing attitudes to risk (e.g. between entrepreneur and venture capitalist) also frustrate optimal contracting. The empirical implications of this have been explored in a small firms contexts by the likes of Binks et al. (1992). According to the pecking order approach, of Donaldson (1961) and Myers (1984), firms self finance first, access

Final version accepted on 26 September 2001

CRIEFF

Department of Economics

University of St Andrews

St Salvator's College

St Andrews

Fife KY16 9AL

Scotland, U.K.

e-mail: gcr@st-andrews.ac.uk

www: http://www.st-and.ac.uk/~www_crieff/CRIEFF.html



borrowing next, and last of all seek equity. At root the motivation for this is cost, but this goes beyond direct cost of finance to considerations of autonomy and control. An example of this approach applied to the small firm is the work of Chittenden et al. (1996), and Hamilton and Fox (1998). Finally, there is the signaling approach of Ross (1977), and Myers and Majluf (1984). According to this approach, which leads to similar conclusions to the pecking order approach, inside equity signals most value, as its extent measures the confidence owner managers have in the firm's prospects.

There follows debt, which signals the desire of the entrepreneur to appropriate the anticipated extra value, rather than to share it with other investors, and finally there follows outside equity, which signals that the inside equity holders are willing to dilute their interest. Recent evidence of this sort of conduct in a small firms context is contained in the work of Lopez-Gracia and Aybar-Arias (2000), and Giudici and Paleari (2000).

The theoretical analysis of this paper differs from the above in that it is explicitly dynamic, and looks at small firms as being in risk classes, which set a limit on the gearing ratio. The treatment below suggests two broad scenarios are important, the one relating to cheap equity and the other to cheap debt. If debt is cheap, then the predicted trajectories for output, capital and debt are always rising until they reach a stationary level. If equity is cheap, then the predicted trajectories for output and capital are initially rising, becoming constant during a period of consolidation, but then start rising again until a final and higher stationary level is reached. During this process, debt is initially acquired, even though equity is cheap, but it is phased out in the consolidation stage before final growth and then stationarity are achieved.

The empirical analysis constructs and examines the trajectories suggested by this theory. This test methodology provides an alternative to procedures that emphasise testing the optimality conditions. Here, optimality is assumed, and it is the implications of optimality which are examined.

It is shown that the theoretical model casts considerable light on small firm financial practice. Debt and equity (and as a corollary, gearing or leverage) are highly time dependent. The fact that, in practice, even if debt is initially acquired, it is

rapidly retired, suggests a cheap equity regime. However, as the interest rate on long-term debt falls over the sample period, a greater willingness to hold debt again is observed. One obvious interpretation is that some small firms are switching from a cheap equity to a cheap debt regime. Another is that a later cohort is experiencing the same effect at a later point in time. The paper proceeds by looking at Evidence, Theory and Results (including the graphing of trajectories).

2. Evidence

There is a relative paucity of empirical work on the financial structure of small firms, compared to large firms. Of the small firms literature, noteworthy are the contributions of Ang (1992), Chittenden et al. (1996), Hamilton and Fox (1998), Winker (1999), Lopez-Gracia and Aybar-Arias (2000), and Giudici and Paleari (2000). Some of this literature has a specialised focus relevant to this paper, such as the analysis of debt ratios by Wijst and Thurik (1993) and of financing constraints by Winker (1999). The earliest papers on credit rationing, by Evans and Jovanovic (1989) and Fazzari et al. (1988) provide an alternative starting point to the kind of approach used in this paper. However, in the former case, the test methodology has been questioned. For example, Cressy (1999, p. 296), argues that we merely "cannot conclude that credit rationing does *not* exist". In the latter case, criticism has focussed on the use of inappropriate proxies for financial constraints in econometric models. Other approaches to financial structure, and in particular its common feature of the low use of debt in the small firms case, include effects like bankruptcy, insolvency or closure (Cressy, 1996a, b) and control aversion (Cressy, 1995). Broadly speaking, the credit rationing approach still has considerable currency amongst expert opinion, although influential contrary views, which seem well founded both theoretically and empirically, have also been expressed e.g. Cressy (1996c).

The alternative approach I use in this paper, appeals to a "limit on risk exposure" argument, rather than a credit rationing argument. My underlying assumption is that a small firm lies in a specific *risk class*. This will determine, for

example, the premium of the interest rate set on debt, by advancers of debt finance (typically clearing banks in this case), over the base rate set by the Central Bank. It will therefore also determine the maximum leverage (i.e. gearing or debt/equity ratio) for a small firm which has been identified as being in a particular risk class.

The data used to test the theory (as expounded in the next section) were all gathered by field work methods. Contacts in the field were obtained through directors of enterprise stimulating units,¹ who provided representative samples of owner-managers from their client lists. Nineteen distinct areas within Scotland were sampled, and the initial sample in the first year contained one hundred and fifty firms. These firms have been re-contacted in successive years and subjected to similar forms of examination.²

Owner-managers were interviewed using an administered questionnaire which covered seven themes: markets, finance, costs, business strategy, human capital, organisation and technical change. This paper largely draws on the finance section, which looked at: profits and sales; debt and equity; loans and interest rates; grants and subsidies; actual and predicted gearing; trade creditors and trade debtors; extended purchase, hire purchase and lease purchase commitments; assets and stocks (inventories); share capital and loan finance.

The firms in the sample are close to financial inception, being just 1½ years old, on average, in the first year's cross section of data. They are therefore particularly suitable for examining the early stage of the life cycle of the small firm. To illustrate, data like this minimise the cohort effect that can emerge if the small firms have very varied start-up points. Business services are the best represented group in the sample, and the overall split between services (SIC codes 50–99) and extractive/manufactures (SIC codes 01–49) is two-thirds and one-third, respectively. Thus the data are those of a modern, largely service-based economy, subject to quite strong competitive forces, and embedded in a commercial and financial culture of long standing.

The database has, in principle, 450 observations, but this number is reduced by missing observations, making the effective maximum about 330 observations. For the subset of data considered

here, the financial variables alone are emphasised, of which there are about thirty-five real variables and four text variables, drawn from a database composed of over six-hundred real variables, and about fifty text variables. The overall statistical characteristics of the financial data for a small firm, in an average sense, are as follows. Gross sales were £273,530 and gross profits were £70,053. Net profits were £15,814 after deductions of all costs, taxes and directors' remunerations. Only about half (52%) of firms had any debt at all (including the business overdraft form) which strongly supports the appropriateness of regarding the general financial background as being other than that of cheap debt. Outside equity (e.g. financial injections from a local "business angel" who had invested money into the business) was uncommon (6%). However, when held, it was usually a significant holding (58%) but one which attracted little or no dividend payment [see footnote 3 below]. Unfortunately, the data do not provide good estimates of dividend payments, because of the simplicity of the financial structure of most small firms in the sample. Clearly, owner-managers derive income from their activities, and in that sense their equity is working for them, but it is difficult to identify a numerical estimate of dividend payment in the general absence of a formal share capital arrangement. Outside equity was rarely used (5%) to launch a business. The most important source of equity was inside equity. At launch, this was given by the owner-manager's personal cash injection. This had an average value of £13,014.

For a significant minority of firms (32%) a bank loan was used to launch the business, and the average size of loan was £29,979. As the panel progresses through time, it is found that survivors are more likely to have used a bank loan at inception than non-survivors. For example, by the third year 51% of the survivors had used a bank loan to launch the business. This suggests that those owner-managers who can attract loan finance at start-up have, on average, better quality businesses than those who do not, but in fact the picture is not at all clear cut when one uses a relatively sophisticated analysis of business performance [*cf.* Reid and Smith (1996)].

When a bank loan was granted, the rate of interest charged was typically well above base

rate. For the sample period as a whole, the average rate of interest on long-term debt was 9.9%, whilst the base rate was between 8.2% (start of period) and 5.9% (end of period). Further, the range on loan interest rates was considerable, being 6–19%; 6–13%; and 6–12% in each of the three successive years. Whilst the spread of interest rates charged on small firm debt fell considerably over the sample period, some firms were clearly paying a large premium over the base rate. Certainly, it seems reasonable to say that the early and middle part of the sample period was *not* characterised by cheap debt, though by the latter part of the period, probably a significant number of small firms were enjoying cheap debt.

A large proportion of firms (78%) had received a grant or subsidy in starting up, with an average of £4,256 being awarded. In subsequent years, the proportion receiving grants or subsidies fell drastically (to 15–20%) although the average level of grant or subsidy awarded went up, to £7,532 and then £12,011 in the second and third years, respectively. There is no evidence that the award of grants enhances business performance, and indeed some little evidence that it does not [*cf.* Reid and Smith (2000)]. This finding is reinforced by the fact that owner-managers of small firms ranked grants as merely “helpful” (43%) as a modal response, on a four point scale of importance from “unimportant”, through “helpful”, “important”, to “crucial”.

Respondents provided figures for the gearing ratio at the launch of the business (i.e. debt divided by equity, typically bank loan divided by personal financial injections). This was done at the time of initial interview, at which time the current gearing ratio was also provided. Owner-managers were also asked “What level do you aim to get your gearing ratio to, in the next three years?”, and were requested to provide a brief explanation for their answers. The launch, current, and future gearing ratios had values of 157%, 169% and 73%, respectively, in the first year of data, and average gearing for the three years as a whole was 107%, just slightly above the level at which debt is fully collateralised. The average expected gearing three years ahead was 47%, and as the fuller analysis of Section 4 on “Evidence” indicates, the general trend of both actual and expected gearing was downwards.

Owner-managers were asked whether they had any trade credit arrangements (this was true in about 80% of cases), and if so, what forms they took. The average current balance on trade creditors over the sample period was £21k and, typically, suppliers allowed about 1½ months to pay. The average current balance on trade debtors was £32k and, typically, customers were given one month to pay. Thus trade credit was a significant repository of working capital, and owner-managers typically negotiated superior terms of payment. These aspects are treated in greater detail in Section 4 below.

Of the various methods of acquiring assets by instalments, only hire purchase was widely used (27%), with extended purchase (6%) and lease purchase (11%) being relatively uncommon. For the sample period as a whole, gross fixed assets stood at an average of £38,456 and net fixed assets at £26,540. The latter represents a 31% depreciation on the former. Owner-managers were asked to estimate the value of their stocks (inventories) in relation to their net assets, in percentage terms. The average value for the sample period was 199%, suggesting a rather high level of stock-holding, given that only a minority of firms were in extractive, agricultural and manufacturing sectors.

The financial structures of the small firms were relatively primitive. Less than a third (29%) had share capital, and only a tiny percentage (2%) used debenture finance. Considered in conjunction with the fact that only a small proportion (5–6%) had any outside equity, this limits the extent to which all aspects of the formal analysis of the following Section 3 can be related to empirical outcomes. Most notably, it makes detailed commentary about dividend policy too speculative to be given credence.³ However, this still leaves much to be discussed, notably output, capital and gearing.

3. The model

This section presents a dynamic financial model of the small, owner-managed enterprise. The emphasis is upon debt and equity relationships, and their modification, as the small firm goes through various stages of growth. The basis of this modelling is the extant literature on the dynamics

of the firm, especially the writings of Feichtinger and Hartl (1986) and Hilten et al. (1993). It has previously been utilised in a small firms context by Reid (1996).

It is assumed that the owner-manager engages in maximising the value of his or her firm according to

$$\max_{D,I,B} \int_0^{\tau} e^{-it} D dt + e^{-i\tau} E(\tau) \quad (1)$$

where $D \geq 0$ is the dividend stream, and i is the owner-manager's rate of time preference. E denotes equity, τ is the planning time horizon, I is gross investment and B is debt. For this model, the state variables are the amount of equity (E) and the capital stock (K); with the control variables being debt (B), investment (I) and dividend (D). It is assumed that the owner-manager pursues the goal of maximisation of value as in (1) by its dividend, investment and debt policy, subject to the following constraint upon policy, and therefore upon the state of the firm and its performance:

$$\dot{E} = \pi - rB - D \quad (2)$$

$$\dot{K} = I - \delta K \quad (3)$$

$$K = E + B \quad (4)$$

$$0 \leq B \leq \gamma E \quad (5)$$

$$B \geq 0, K \geq 0 \quad (6)$$

$$E(0) = e_0; K(0) = k_0 \quad (7)$$

where (2) is the state equation for equity, with π operating profit, r the interest rate on debt, and δ the depreciation rate on capital goods. γ is the maximum gearing ratio permitted for the risk class of debt to which an interest rate r is attached. This approach has become standard since the contribution of Ludwig (1978, p. 51). Notice that what drives this maximum on gearing is a limit on desired risk exposure, *not* a limit on outside finance (which could be expressed as a credit rationing argument). In fact, limits on gearing depend on the debt-equity *ratio* not the *level* to which equity or debt are provided by investors or lenders. It is also notable that small firms often have gearing ratios well in excess of unity, in the early stages of the life cycle, casting doubt on the credit rationing argument, so far as the provision

of debt finance is concerned (the case typically argued).

Like dividends, debt and capital are subject to non-negativity constraints; and the initialising values of equity and capital are e_0 and k_0 , respectively. Operating profit (π) is defined as the difference between sales (S) and production costs, given that capital is the only factor input. It is assumed that the output rate of the firm (Q) is proportionately related to the capital input by the capital productivity parameter κ . Thus operating profit may be written:

$$\begin{aligned} \pi &= P \cdot Q - \delta K \\ &= K(\kappa P - \delta) \end{aligned} \quad (8)$$

assuming a unit price of capital goods. Finally, the firm's sales are defined by the function $S(Q)$ which is monotonically increasing and concave in Q , with sales being positive for positive outputs. Thus:

$$\begin{aligned} S(Q) &= P(Q) \cdot Q \text{ with} \\ S' &> 0, S'' < 0 \text{ and } S > 0 \text{ for } Q > 0. \end{aligned} \quad (9)$$

In effect, this small firm is subject to decreasing returns to scale, the source of which may be an imperfect goods market and/or unspecified non-production costs which raise the marginal costs of organising the production plan of the firm as it grows. The evidence for decreasing returns in small firms has been established by the author Reid (1992, 1993). In some measure, an organisational explanation for it is plausible [*cf.* Richardson (1964), Reid (1995)], especially in a growth context. Parameter restrictions for the model are that:

$$i, r \in (0,1) \quad \text{and} \quad \delta, \gamma, \kappa \geq 0. \quad (10)$$

Further restrictions, which make the model more tractable, are that there are constant unit (and hence marginal) costs of finance, which are denoted c_E , c_D or c_{ED} depending on whether the financial structure of the firm is equity (E) or debt (D) dominated, or some mixture of the two (ED). It is assumed that marginal revenue close to zero output exceeds the greatest of these costs, implying the small firm has a motivation to at least start investing and producing. Finally, it is assumed that operating profit cannot be negative ($\pi \geq 0$) [*cf.* Reid (1991)], that the prices of debt

and equity differ ($r \neq i$) and that equity at time zero is positive ($E(0) > 0$). These last restrictions⁴ follow from the assumptions: (a) that making non-negative profit is a survival criterion; (b) that debt and equity markets are distinct; (c) that holding equity in itself may engender utility (e.g. from owner-management and the control it implies) that makes equity-holders willing to accept less than the return relevant to the investment risk class; and (d) that the owner-manager has at least a certain amount of equity at inception of the business, $e_0 > 0$.

Using the Pontryagin Maximum Principle, optimal dividend, investment and debt policies can be derived, and their dependence on the parameter set (10) displayed. The complete solution to this dynamic optimisation problem is complex and prolix, without necessarily being economically informative, so here the solution will be outlined, with an emphasis on economic interpretation.

The Hamiltonian for the system is

$$H = D + \lambda_1 \dot{E} + \lambda_2 \dot{K} \\ = D + \lambda_1(\pi - rB - D) + \lambda_2(I - \delta K) \quad (11)$$

and the Lagrangian is

$$L = H + \mu_1 D = \mu_2(K - E) + \mu_3\{(1 + \gamma)E - K\} + \mu_4 K \quad (12)$$

For optimality the Maximum Principle requires

$$\frac{\partial L}{\partial I} = \frac{\partial L}{\partial D} = 0 \quad \text{for all } t \quad (13)$$

$$\mu_1 D = 0, \mu_1 \geq 0 \quad (14)$$

and

$$\dot{\lambda}_1 = i\lambda_1 - \frac{\partial L}{\partial K} \quad \text{for all } t \quad (15)$$

$$\dot{\lambda}_2 = i\lambda_2 - \frac{\partial L}{\partial E} \quad \text{for all } t \quad (16)$$

$$\mu_2(K - E) = 0, \quad \mu_3\{(1 + \gamma)E - K\} = 0, \\ \mu_4 K = 0 \quad (17)$$

and

$$\mu_2, \mu_3, \mu_4 \geq 0 \quad (18)$$

where λ_1 is the shadow price of equity and λ_2 the shadow price of capital. For example, λ_1 is the rate of change of the maximand's optimum for a marginal change in equity, and similarly for λ_2 with regard to capital.

The derivation of feasible paths for the above model is omitted, but the implications can be summarised as follows [cf. Reid (1996)]. If debt is cheap ($i > r$) maximum debt finance is used, and no dividend is paid until a stationary state is reached (See Figure 1). Then there is no further growth in output, debt or capital stock, and a positive dividend is paid. Whilst growth occurs, marginal revenue from sales exceeds the marginal cost of debt, that is $S' > c_D$. This implies that the marginal return to equity exceeds the owner manager's time preference, so all earnings will be re-invested. When this inequality ceases, because of decreasing returns, the optimal output (Q_D^*) has been reached.

When equity is cheap ($i < r$) then, assuming (as we do) that the owner-manager has at least some equity at start-up, the firm will increase its borrowing to start with (until t_1) [cf. Figure 2], because the marginal revenue of sales exceeds the marginal cost of debt finance, or $S' > c_{ED}$. Or, each additional unit of capital which is bought with debt finance generates a greater increment in sales than the increment in cost of debt incurred. Once $S' > c_{ED}$ debt will start to be paid back out of retained earnings (during the consolidation phase), until it is completely paid back (t_2), at which stage further growth occurs (after t_2) because $S' > c_E$ where c_E

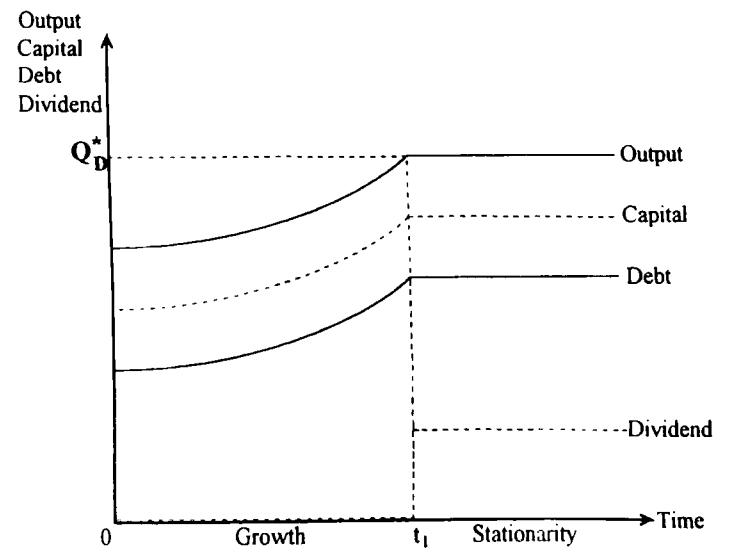


Figure 1. Trajectories if debt is cheap.

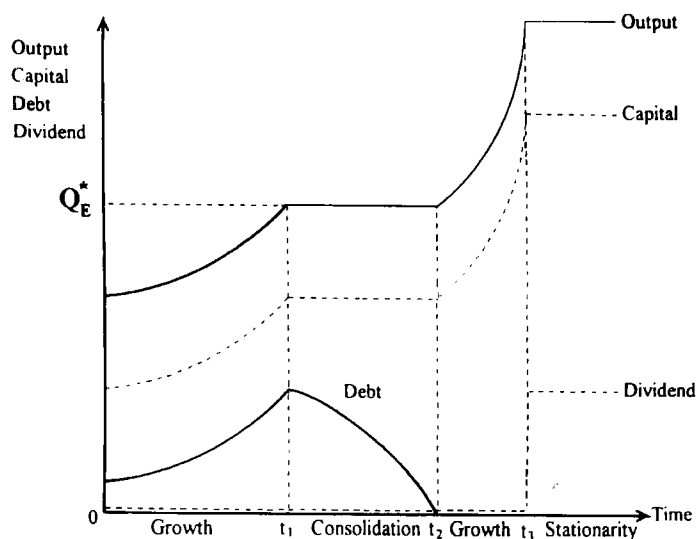


Figure 2. Trajectories if equity is cheap.

is the marginal cost of capital goods which are financed entirely by equity. This will cease (in the stationary phase) once marginal returns from sales fall to i . The optimal output (Q_E^*) will then have been reached, only replacement investment will occur, and the remaining dividend will go to shareholders. This develops the model sufficiently for present purposes, though further extensions are possible [cf. Hilten et al. (1993)].⁵

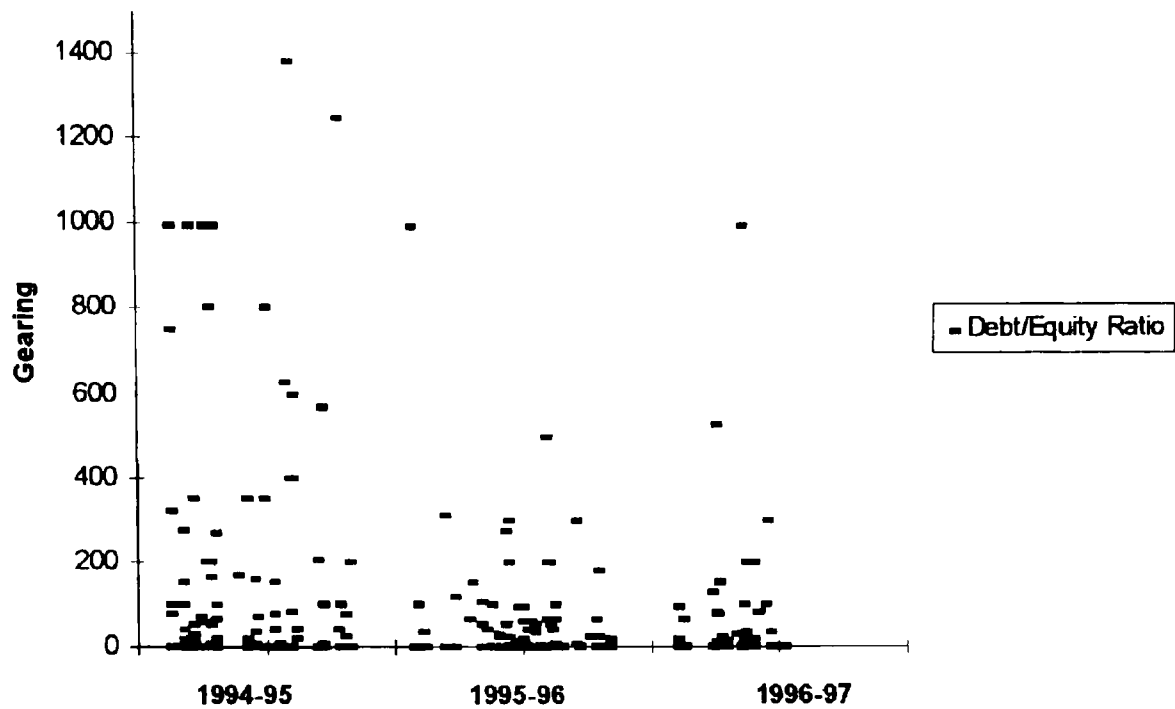
4. Results

An advantage of the theory developed, is that the variables used can be closely related to evidence. It is not necessary, therefore, to adopt a complex test methodology to circumvent shortcomings of the data, or to remedy a lack of correspondence between theoretical constructs and their empirical counterparts. Thus in this article testing is direct, and simply involves examining the empirical trajectories of key variables suggested by the theory, from inception, on through the time periods which pertain to the early life cycle of the small firm. Unlike typical econometric data, which has firms moving in and out of the data-set at any point in time, my sample is more controlled. All firms in it are start-ups and close together at time of launch. This attenuates cohort and age effects in the sample. What I proffer here as evidence is not econometric in form. The data have considerable dispersion, so I use curves fitted through mean values to describe the data in a parsimonious way. In this sense the curve fitting is a descriptive,

rather than statistical device. I then compare the empirical trajectories constructed in this way with the theoretical predictions. Reference is made below to a number of diagrams which, by contrast to Figures 1 and 2, plot real world data through real time.

For clarity, trajectories are mapped using a curve fitting routine which interpolates between average values of three successive years of data after inception, for the time periods 1994–1995, 1995–1996, 1996–1997. These will be referred to as the first, second and third years, respectively. To illustrate the method, Figures 3 and 4 will be compared, and then the method will be used freely thereafter. For the case of the gearing or leverage ratio (i.e. debt/equity ratio) Figure 3 displays several hundred data points for the time interval 1994–1997. Whilst some very high levels of gearing were occasionally observed, the frequency of low gearing was much greater. Indeed, the modal or typical level for the gearing ratio was zero (i.e. no debt held at all). Figure 3 visually understates the frequency of occurrence of this zero gearing because of multiple observations lying one on top of one another. The solid line of Figure 4 displays the gearing trajectory derived by interpolating between group averages of the data in Figure 3. It is readily related to the general profile of data in Figure 3. The diagram also displays, by a dotted line constructed by interpolation between group averages, data provided in response to a question which asked owner-managers what they expected their gearing ratios to be three years ahead of the time of interview. They were also asked to provide brief comments about their forecasts [cf. Section 2 above].

Figure 4 indicates an average gearing at financial inception of 158%, rising to an average of 169% in the first year, falling to 24% in the second year, and rising to 99% in the third year. That is, there was an initial rise in gearing, followed by a rapid fall, and then a rise again. This pattern can be further explored by reference to Figures 5 and 6, which graph the debt and equity trajectories, respectively, along with the trajectories of the base lending rate and the interest rate on long-term debt. Figure 5 shows debt falling from an average level of £30k at the start of the sample period to an average of about £16k in the middle and end of the period. This reduction of debt is a feature



Notes: Three high gearing ratios are omitted for presentational purposes, but were used to compute averages.

Figure 3. Scatter diagram of gearing over time.

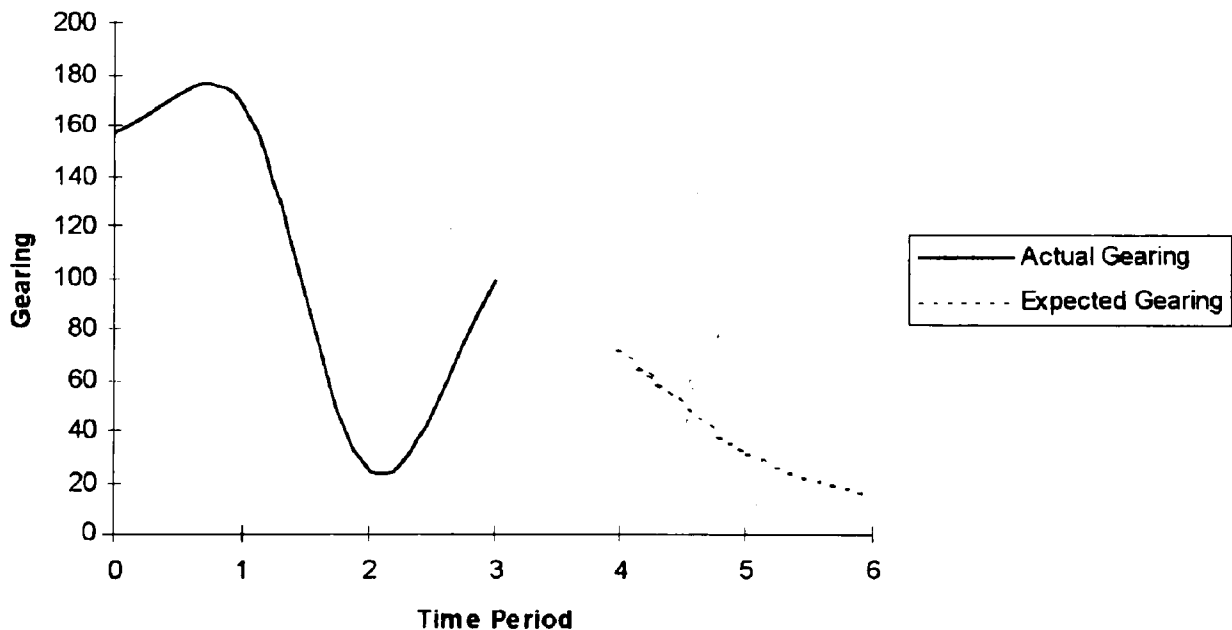


Figure 4. Trajectories of actual and expected gearing.

of the theoretical analysis of Section 3 above. The base rate was generally falling throughout the sample period, as were the interest rates offered on loans to small businesses. So it may be that indebtedness would have been reduced even more than it was, had there not been a downward drift in interest rates. In Figure 6 the trajectory of equity shows a rapid rise from an average value of £17.8k

at the start of the sample period to a mid-period value of £73.8k, falling to £16.2k by the end of the period. Thus owner-managers were typically injecting considerable funds into the business early in the sample period, and taking funds out of the business later in the sample period.

Considering Figures 5 and 6 together, the fall in debt and rise in equity in the first half of the

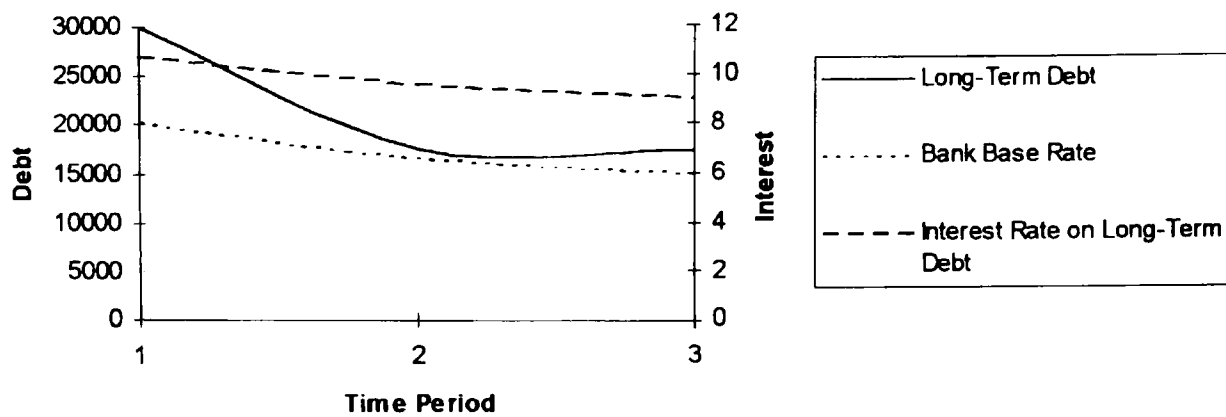


Figure 5. Trajectories of debt and interest rates.

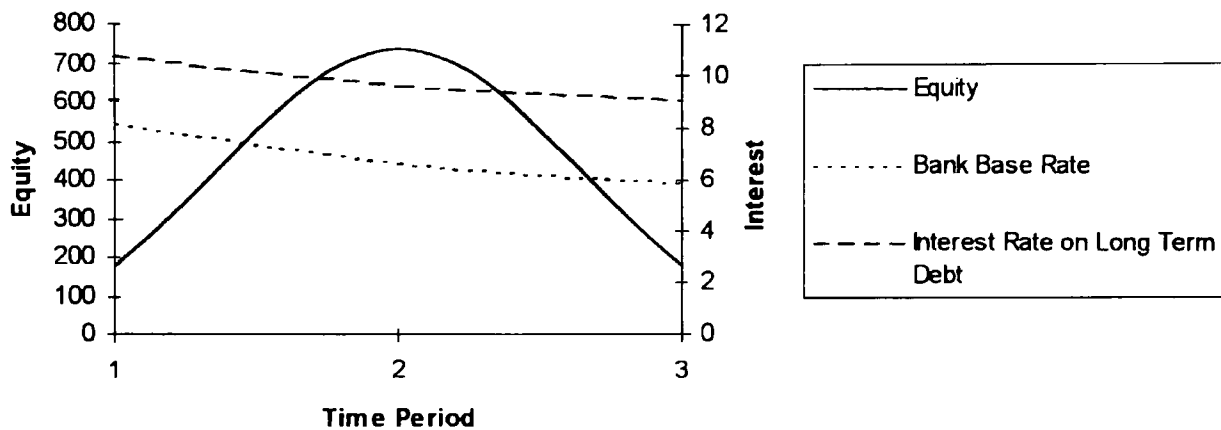


Figure 6. Trajectories of equity and interest rates.

sample period explain the early fall in gearing; and likewise the leveling out of debt, and fall in equity, explain the rise in gearing at the end of the sample period. At a deeper level, the relative costs of debt and equity are playing a role here, as are the optimality calculations of the owner-manager. The presumption has been that a period of cheap equity encourages the owner-manager to acquire debt only early on, so as to take immediate advantage of market opportunity, subsequently reducing debt as rapidly as possible. However, it looks as though the relatively low interest rate regime at the end of the sample period has encouraged owner managers to hold more debt and less equity than their earlier calculations would have led them to expect. The trajectory on expected gearing for the years 4, 5 and 6 in Figure 4 suggest that, given the interest rates prevailing at the start of the sample period, the intention is to reduce gearing significantly. The average three period ahead forecasts of gearing for these three years were 73%, 31% and 19%, respectively. This evidently involves an

intention to implement a major reduction in debt, to judge by the comments made by owner-managers. A frequently expressed view early in the sample period was that debt was too expensive. A sample of the typical views expressed by owner managers is as follows.

- A: "I don't like finance costs";
- B: "Because of interest rates";
- C: "The more we pay back, the less we make ourselves. At $2\frac{1}{2}\%$ above base rate, we could have money in the bank – could be our own bank, in effect";
- D: "I don't want any debt, but if the bank rates drop I might think about it";
- E: "I will probably get venture capital funding, or something. It seems the best way to go";

It has been observed that the retirement of what is here called long-term debt⁶ initially proceeds rapidly. But then it starts to rise as the interest rate on long-term debt continues to fall. However, in the theoretically based trajectory of Figure 2, debt

is retired entirely by the end of the second period, whereas in the practically based trajectories of Figures 4 and 5 there is another rise in debt (and gearing) at the end of the sample period. This outcome should be considered in the light of the above comments, and the observed steady fall in the interest on long-term debt. Depending on how interest elastic is the demand for debt finance, it may be that for at least some small firms a switch from a cheap equity to a cheap debt regime has occurred by the end of the sample period.

A premium of something like $1\frac{1}{2}\%$ is paid, on average,⁷ on the base rate, in determining the interest rate on long-term debt advanced to small firms. The base rate fell from an average value of 8.16% at the start of the sample to 6.60% at the middle, and finally to 5.94% by the end. The actual rate charged to small firms was an average of 10.85% at the start of the sample period, 9.66% by the middle, and 9.07% by the end. These are low levels, historically speaking, which may partly account for the greater enthusiasm for debt. This having been said, the general trend on gearing, taking account of expectations as well as outcomes, is downwards.

Whilst the relative prices of debt and equity clearly have paid a part in explaining the shape of the trajectories for key variables of the small firm, the dominant role of value maximizing behavior should not be ignored. The general

import of Section 3 above has been that the small firm takes steps to gain what it can from the market opportunity with which it is presented. This involves output and capital growth under both cheap debt and cheap equity scenarios. From Figure 7 it will be seen that average sales were steady at about £250k for the start and middle of the sample period, and rose considerably to £373k by its end. The behavior of profit was somewhat similar, with net profit remaining steady at an average figure of around £14k for the early and middle parts of the sample period, rising to an average of £20k by the end of it. This growth in the output and profit of the small firm was accompanied by growth in both working and fixed capital.

Finally, the trajectory of fixed capital over time needs to be considered. The general theoretical finding is a rising trajectory of capital for both regimes (*cf.* Figures 1 and 2). In Figure 8 fixed assets are seen to rise from an average figure at inception of £24.4k to £44.3k by the middle of the sample period, finishing up at £54.2k by the end of the period. The net book value of fixed assets tracks this trajectory from below with an implied average depreciation rate over the sample of about 30%. Net assets start from an average value of £18.8k at inception, rising to £29.5k by mid-sample, and ending up at a value of £36.1k.

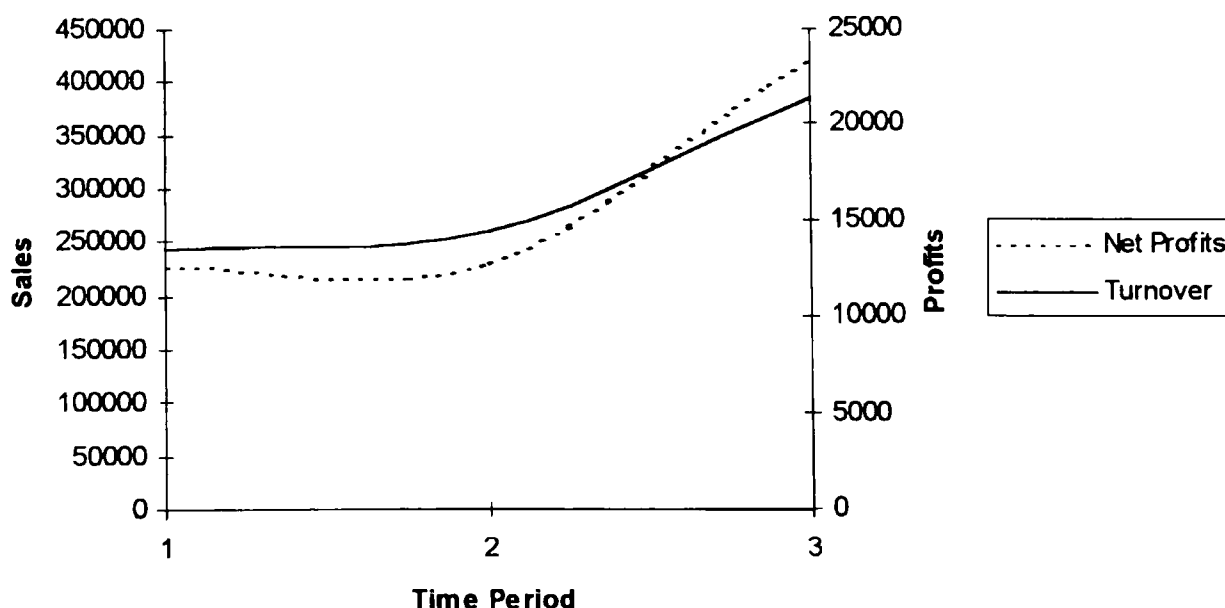


Figure 7. Trajectories of sales and profits.

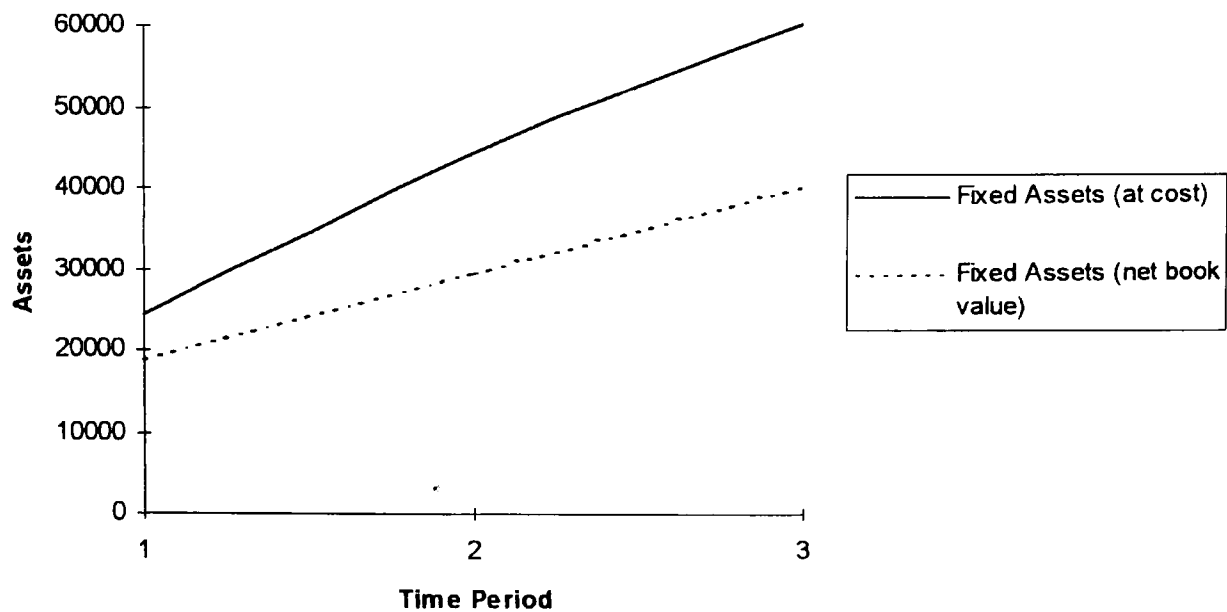


Figure 8. Trajectories of assets.

5. Conclusion

Although the small firms sector is quantitatively important, with some three million firms accounting for about a third of UK employment [Daly and McCann (1992)] the state of our scientific knowledge of what makes individual firms function is still limited. This paper has attempted to remedy this deficiency by using a dynamic theory of the value-maximising small firm to confront a body of new evidence in panel form.

This theory generates clear qualitative predictions about key financial features of the small firm. If debt is relatively cheap, it will be used comprehensively, and the trajectories of debt, capital and output will rise over time after financial inception until a stationarity level is achieved. Only then will dividend be paid. If equity is relatively cheap, debt will still be acquired in the early stage after financial inception, and output and capital will also grow rapidly. Then a consolidation phase is reached when capital and output level out, and debt is rapidly retired. A further phase of growth in output and capital then occurs until a stationary level is achieved. Again, it is only at this stage that any dividend will be paid.

The evidence illuminated by this theory is based on observations of thirty-five key financial variables for one hundred and fifty new small business starts over a three year period after inception. It has been found that predictions of the

theory enjoy some support in terms of the shape of average trajectories of key financial variables. Results are necessarily tentative, as they are not econometrically based. With that caveat in mind we note that we have evidence for:

- (a) Steady growth of output (sales), including some phases of consolidation.
- (b) Steady growth of capital, as measured by fixed assets.
- (c) Sensitivity of debt (observable also through gearing) to the interest rate on long-term debt.
- (d) Absence or deferral of dividend payments.
- (e) Retiral of debt when sales are consolidated. This could be attributed to a cheap equity regime.
- (f) Increase in debt when sales are rising. This could be attributed to a cheap debt regime.
- (g) Arguably a sensitivity of equity (observable also through gearing) to the relative costs of debt and equity.

The methods used to obtain these results are not yet widely adopted in the small firms literature. Unfortunately the extant literature lacks a dynamic financial theory of the small firm. The testing of financial hypotheses has therefore typically lacked an analytical underpinning. Further, financial hypotheses have been expressed in general terms, lacking the fine detail which has been used here. The aim of this paper has been to attempt to

redress some of these weaknesses and to take a first step in testing detailed hypotheses about the financial structure of small firms.

Acknowledgement

The author is Professor of Economics and Director of the Centre for Research into Industry, Enterprise, Finance and the Firm (CRIEFF). He gratefully acknowledges that this research has been supported by a major grant from the Leverhulme Trust on life cycle effects in new small firms. He also expresses thanks to Dr Julia A Smith now of Cardiff University Business School for research support during her period in CRIEFF. This work was completed by the author during the tenure of a Nuffield Foundation Social Science Research Fellowship. The author expresses his appreciation for this generous support. The final drafting of this paper has benefited from the comments of the referees. Any errors of omission or commission that may remain in the paper are entirely his responsibility.

Notes

¹ Called Enterprise Trusts in Scotland. See Reid and Jacobsen (1988, Ch. 5) for further details on this type of institution.

² Failure rates are low, with 81% remaining in business by the second year, and 78% by the third year.

³ Seven firms had the capacity to pay dividends in the first year, but no payment was made; five could in the second year, and paid an average of 1.6% (with a range of 0–8%); and just three could in the third year, and paid an average of 0.8% (with a range of 0–2.5%). In effect, dividend payment was largely in abeyance, a feature typical of the model's prediction about the growth phase.

⁴ Note that the restriction $\pi \geq 0$ is, as Reid (1991) points out, a survival criterion for "staying in business". This criterion must be met by firms which remain in the panel. Further, note that only seven out of 150 firms lacked cash to put into the business at start-up, the average sum committed being £13,014. Of those who did not put in their own cash, most will have had outside financial support, possibly of equity form.

⁵ For example, if adjustment costs are present, arising from reorganisation and training as the firm grows, with its consequential strains on managerial and administrative capabilities [cf. Richardson (1964), Slater (1980) and Reid (1995)], the above framework can be appropriately extended. In the simplest scenario, shorn of financial considerations, the investment rate is constant and there is no stationary value for capital stock. If employment is explicitly considered, basic trajectories similar to the above, for (i) cheap debt and (ii) cheap

equity, occur, with: (i) growth then stationarity; and (ii) growth, consolidation, then stationarity. Employment tracks output and capital in each case. If business cycle effects are incorporated, the analysis hinges on the severity of the recession. Optimal conditions again resemble those displayed in Figures 1 and 2 of the main text. Zero investment may occur not just during, but both before and after the recession. An important new feature of this extended model is that a severe recession may induce an accounting cash-flow problem which the firm deals with by borrowing – but this may lead to bankruptcy, even after the recession has ended. See Hilten et al. (1993).

⁶ Essentially bank loans, which may be contrasted with shorter term indebtedness arising from trade credit arrangements.

⁷ However, some firms paid substantially more than this for debt finance. For the sample period as a whole, the rate was 9.93% on average, with a standard deviation of 2.56% and a range of 6%–19%. To illustrate, owner-manager C of the main text reported paying 2 1/2% on base rate.

References

- Ang, J. S., 1992, 'On the Theory of Finance for Privately Held Firms', *Journal of Small Business Finance* 1(3), 185–203.
- Binks, M., C. Ennew and C. Reed, 1992, 'Information Asymmetries and the Provision of Finance to Small Firms', *International Small Business Journal* 11(1), 35–46.
- Chittenden, F., G. Hall, and P. Hutchinson, 1996, 'Small Firm Growth, Access to Capital Markets and Financial Structure: Review of Issues and an Empirical Investigation', *Small Business Economics* 8, 59–67.
- Cressy, Robert C., 1995, 'Borrowing and Control: A Theory of Business Types', *Small Business Economics* 7, 1–10.
- Cressy, Robert C., 1996a, 'Commitment Lending under Asymmetric Information: Theory and Tests on UK Startup Data', *Small Business Economics* 8, 1–12.
- Cressy, Robert C., 1996b, 'Pre-entrepreneurial Income, Cash-flow Growth and Survival of Startup Businesses: Model and Tests on UK Startup Data', *Small Business Economics* 8.
- Cressy, Robert C., 1996c, 'Are Startups Debt-rationed?', *The Economic Journal* 106, 1253–1270.
- Daly, M. and A. McCann, 1992, 'How Many Small Firms?' *Employment Gazette* 100, 47–51.
- Evans, David and Boyan Jovanovic, 1989, 'An Estimated Model of Entrepreneurial Choice Under Liquidity Constraints', *Journal of Political Economy* 97, 808–827.
- Fazzari, Steven M., R. Glen Hubbard and Bruce Peterson, 1998, 'Financing Constraints and Corporate Investment', *Brookings Papers on Economic Activity* 1, 141–195.
- Feichtinger, G. and R.F. Hartl, 1986, *Optimale Kontrolle Ökonomischer Prozesse*, Berlin; De Gruyter.
- Guidici, G. and S. Paleari, 2000, 'The Provision of Finance to Innovation: A Survey Conducted Among Italian Technology-based Small Firms', *Small Business Economics* 14, 37–53.
- Hamilton, P. T. and M. A. Fox, 1998, 'The Financing

- Preferences of Small Firms Owners', *International Journal of Entrepreneurial Behaviour and Research* 4, 239–248.
- Hilten, O. V. van, P. M. Kort and P. J. J. M. van Loon, 1993, *Dynamic Policies of the Firm: An Optimal Control Approach*, Berlin: Springer-Verlag.
- Jensen, M. and W. Meckling, 1976, 'Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure', *Journal of Financial Economics* 3, 305–360.
- Lopez-Gracia, Jose, and Christina Aybar-Arias, 2000, 'An Empirical Approach to the Financial Behaviour of Small and Medium Sized Companies', *Small Business Economics* 14, 55–63.
- Modigliani, F. and M. Miller, 1958, 'The Cost of Capital, Corporate Finance and the Theory of Investment', *American Economic Review* 48(3), 291–297.
- Modigliani, F. and M. Miller, 1963, 'Taxes and the Cost of Capital: A Correction', *American Economic Review* 53(3), 433–443.
- Myers, S. C., 1984, 'The Capital Structure Puzzle', *Journal of Finance* 34, 575–592.
- Myers, S. And N. Majluf, 1984, 'Corporate Financing and Investment Decisions when Firms have Information that Investors do not Have', *Journal of Financial Economics* 13, 187–222.
- Reid, G. C., 1991, 'Staying in Business', *International Journal of Industrial Organization* 9, 545–556.
- Reid, G. C., 1992, 'Scale Economies in Small Entrepreneurial Firms', *Scottish Journal of Political Economy* 39, 39–51.
- Reid, G. C., 1993, *Small Business Enterprise: An Economic Analysis*, London: Routledge.
- Reid, G. C., 1995, 'Early Life-Cycle Behaviour of Micro-Firms in Scotland', *Small Business Economics* 7, 89–95.
- Reid, G. C., 1996, 'Financial Structure and the Growing Small Firm: Theoretical Underpinning and Current Evidence', *Small Business Economics* 8, 1–7.
- Reid, G. C. and L. R. Jacobsen, 1988, *The Small Entrepreneurial Firm*, Aberdeen: Aberdeen University Press.
- Reid, G. C. and J. A. Smith, 2000, 'What Makes a New Business Start-Up Successful?', *Small Business Economics* 14, 165–182.
- Richardson, G. B., 1964, 'The Limits to a Firm's Rate of Growth', *Oxford Economic Papers* 16, 9–23.
- Ross, S. A., 1977, 'The Determination of Financial Structure: the Incentive Signaling Approach', *Bell Journal of Economics and Management Science* (Spring), 23–40.
- Slater, M., 1980, 'The Managerial Limitation to the Growth of Firms', *Economic Journal* 90, 520–528.
- Wijst, D. van der, 1989, *Financial Structure in Small Business: Theory, Tests and Applications*, Berlin: Springer-Verlag.
- Wijst, Nico van der and Roy Thurik, 1993, 'Determinants of Small Firm Debt Ratios: An Analysis of Retail Panel Data', *Small Business Economics* 5, 55–66.
- Winker, P., 1999, 'Causes and Effects of Financing Constraints at the Firm Level', *Small Business Economics* 12, 169–181.

Copyright of Small Business Economics is the property of Springer Science & Business Media B.V.. The copyright in an individual article may be maintained by the author in certain cases. Content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.