

Financial Structure and the Growing Small Firm: Theoretical Underpinning and Current Evidence

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ABSTRACT. This paper introduces a special issue of *Small Business Economics* on 'Financing and Small Firm Dynamics'. It establishes a general underpinning for the analysis of small firm financing over time. This appeals to the control theoretic literature, and permits the specification of 'master trajectories' of key variables over time like output, debt, dividend and capital. Two trajectories (for cheap debt, and cheap equity, respectively) illustrate this type of analysis, showing how financial structure can vary over time, involving phases of growth, consolidation and stationarity. From this perspective, six papers on small firm dynamics and finance are reviewed. Issues addressed include: credit constraints (funding shortages), wealth as collateral, financial structure, target income modelling of start-up, and bank lending during financial liberalisation.

1. Introduction

The main themes of this special issue are growth and finance within the small business enterprise (SBE). My intention was to create a first-rate collection of papers that would withstand critical scrutiny in an international arena in precisely those areas in which I felt the lack of rigour, both in theoretical and empirical dimensions, in current small firms research was particularly acute. To make it even more challenging for authors, I did not want growth and finance treated separately, but rather together. Thus two of the most difficult areas of the economics of the firm were combined.

Within the terms set by the commissioning

editor, Professor Zoltan Acs, which involved accepting certain 'market sharing' agreements concerning academics being canvassed – because of other forthcoming special issues – it was apparent that I could not depend only on tried and trusted authorities, but would have to seek out new talents. I am pleased to say that this proved possible, and I am sure some readers of this special issue will welcome the appearance in it of new as well as familiar faces. The issue was constructed under quite strict rules of offer, review, draft and re-draft and in that process the sixth paper of what was always to be a six paper issue has changed identity twice. In the first instance, an empirical paper on small firm financing and underdevelopment foundered on a variety of unanticipated data problems, exacerbated by the author moving between continents. Then a potential back-up conceptual paper on small firm growth and informal venture capital financing also foundered, this time because of pressure of time on the authors in the draft phase. Either of these would have been excellent papers for this issue, as they would have nicely complemented other papers. I hope that in due course both these papers will appear in print, possibly in the pages of this journal itself, which I regard as the premier international vehicle for small firms research. In the event I have offered a paper of my own, on mature micro-firms and funding shortages, as the sixth paper, to keep faith with the production schedule I had promised to the other authors. I am grateful to Professor Zoltan Acs as commissioning editor, for arranging that this paper be independently refereed.

This special issue as it now stands is characterised by the use of rigorous methods. In all cases, appropriate theory underpins the work. It

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may be the centre piece, as in Schütte, or it may be the back-drop to empirical work, as in Chittenden, Hall and Hutchinson, but whether the one or the other, the theoretical foundations are taken seriously. When theory leads to empirical analysis, again the approach taken is rigorous. The papers in this issue, when using empirical methods, proceed very much in an applied econometric way. When standard techniques of regression analysis are used, they are deployed skilfully, as in Binks and Ennew. In appropriate contexts, more advanced econometric methods are used, as with the bivariate probits estimated by FIML in my paper, and the careful testing for sample selection bias in Cressy's paper. Together, it is hoped that these papers represent the state of the art in the rigorous theoretical and empirical analysis of problems of small firm growth and financing.

2. Analytical underpinning

Vickers (1970) was the first writer to integrate the production aspect of the firm with the financial. An extended and general treatment of this approach, in book form, is contained in Vickers (1987). The firm needs financial capital to hire inputs and to produce and to sell outputs. It acquires outside financial capital either in the form of debt, for which it pays a rate of interest, or in the form of equity, which has a required rate of return, to be interpreted as the cost of equity. The value maximisation problem which the firm solves involves both the production function constraint, and also the financial capital constraint. Thus the solution of this problem not only determines what will be sold and how much will be hired of various factors, but also how much financial capital will be used, and in what ways.

Leland (1972) first combined production and finance in a dynamic theory of the firm. In his case, the theory of the firm adopted was based on so-called 'managerial' principles. Therefore the goal of his firm was to maximise the total discounted value of *sales* (over a finite planning horizon) plus the final value of the equity. However, though this model started an important new line of enquiry, in itself it contained several flaws and inconsistencies.¹

It remained for writers like Ludwig (1978) and

Lesourne and Leban (1982) to provide rigorous and general treatments of the dynamics of a theory of the firm which combined production and financial aspects. A synthesis of these approaches is provided by Hilten, Kort and Loon (1993), to whom I refer throughout this section. The type of firm being considered is a familiar one to small firms specialists. It has no access to the stock exchange, has limited access to debt finance, and its technology is subject to decreasing returns. It is assumed that production is a proportional function of capital, and sales are a concave function of output. In terms of its balance sheet, the value of capital assets is equal to the sum of debt and equity.² Equity can be raised by the retention of earnings, and there is assumed to be a maximum debt to equity (i.e. gearing) ratio determined by the risk class of the enterprise. It is assumed that there is a linear depreciation rate on capital.

It is now possible to set up a dynamic maximisation problem, with the maximand being the shareholders' value of the firm, under the assumption of a finite time horizon on the dividend-stream integral. The constraints of this maximisation problem have been largely covered in the previous paragraph. To them must be added the initialising values of variables, and non-negativity constraints on capital and dividends (i.e. a zero dividend policy is possible). This problem can be solved by the Pontryagin Maximum Principle. The state variables, representing the state of the firm at a point in time, are equity and capital. The control variables are debt, investment and dividend. The derivation of the optimal solution is a distinctively non-trivial matter, as the cases considered by Schütte in this special issue indicate.

However, without explicit reference to the mathematics, the nature of this solution is readily sketched. A number of master trajectories can be identified. In the most obvious case, illustrated by Figure 1, debt finance is relatively cheap.³ The firm will expand output provided marginal revenue exceeds marginal cost, and will eventually cease to grow (beyond time t_1), that is, will achieve stationarity, once diminishing returns eliminate this inequality (at t_1). Until time t_1 , growth proceeds at a maximal rate, with no dividend being paid, as all earnings are used for

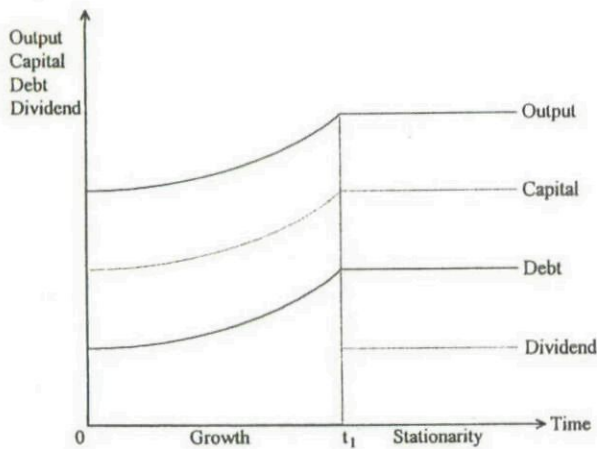


Fig. 1. Trajectories if debt is cheap.

expansion. This is because, during the growth phase, the marginal return on equity exceeds shareholders' time preference. They therefore desire to convert all earnings into equity by reinvestment in the firm. Once stationarity is achieved at time t_1 (because of diminishing returns), all variables achieve their optimal levels. Maximum profit is earned, and the dividend pay-out is maximised by allocating retentions only to maintaining the capital stock at its optimal level (i.e. only investment to cover depreciation is undertaken). This picture of maximum borrowing in the early stages of growth is not unfamiliar in a small firms context. However, the convexity of the growth trajectory is controversial, as much empirical literature suggests it should be concave (i.e. smaller SBEs grow faster than larger SBEs).

Turning now to the case of cheap equity,⁴ the picture becomes more complex, as illustrated in Figure 2. The optimal financial structure changes between phases of the growth trajectory. This sort of trajectory is encouraged by small initial amounts of equity: a common feature of the small business start-up. In the first growth phase the firm again starts with maximum borrowing, as in Figure 1. This occurs, despite debt being more expensive than equity, because marginal revenue exceeds the marginal cost of debt finance: thus debt finance which is used to augment capital stock generates increases in income and raises the growth rate. At the same time, shareholders will be willing to forgo all dividend pay-outs and will want all earnings reinvested in the firm, as equity

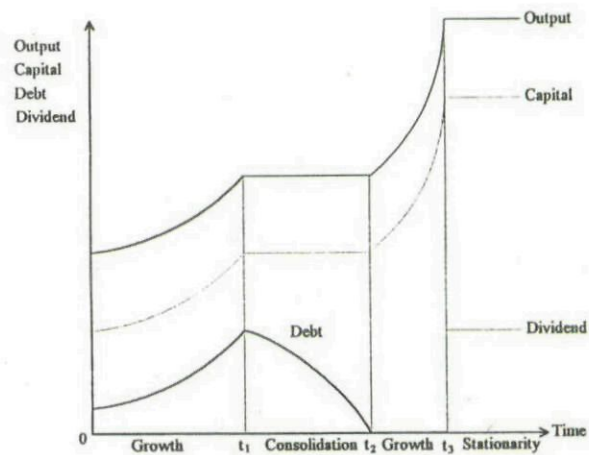


Fig. 2. Trajectories if equity is cheap.

is cheaper than debt. In the consolidation phase that follows (after t_1) earnings are used to pay back debt. The debt servicing rent therefore falls, raising earnings and hence accelerating the rate at which debt is repaid. This consolidation phase is completed at time t_2 . Once consolidation has been completed, the firm faces a lower cost of capital and it is then profitable to engage in a further phase of maximal growth, this time with no debt and fully financed by retentions. This growth rate is initially faster than that experienced at the end of the first growth phase, and continues to rise until stationarity is achieved at t_3 . Again, diminishing returns put an end to this growth phase, as in Figure 1, and profit is maximised, with just enough earnings diverted to keep capital stock at its optimal level, but all remaining earnings being distributed as dividends to the shareholders.

This type of analysis, as developed by Hilten, Kort and Loon (1993) can be extended in a number of further directions, to embrace adjustment costs, active tax and subsidy regimes, intensive investment, business cycles, and uncertainty, to illustrate with just a few examples how powerful this approach can be. However, rather than pursue these extensions, the aim here has been to provide a non-technical account of a complex literature that provides the theoretical back-drop to all considerations of dynamics and financing. It may help readers approach this issue with a common, general frame of reference.

3. The special issue

The paper in this issue that most closely follows the methodology of the previous section is that of Schütte. In it, he uses methods of dynamic optimisation to investigate the relationship between a bank and a firm, both of which function in an economic system undergoing financial liberalisation. Recent examples of such transition have occurred in Hungary, Poland and Czechoslovakia. Schütte asks what a bank should do when faced with a non-performing part of its portfolio that is attributable to SBEs with profitability prospects that may not be good. The key conclusion is that the banks should support SBEs willing to undergo credit restructuring, but should initiate bankruptcy proceedings against those that are not. Here, it is assumed that SBEs truthfully reveal information about themselves in seeking loans. In free market contexts, that would generally not seem appropriate because of the problems of adverse selection highlighted by Binks and Ennew in their paper. In Schütte's context, of an economy in transition, the assumption of accurate information being in the hands of banks is more acceptable, as under the previous planning regime banks had worked closely with SBEs.

Binks and Ennew summarise theoretical arguments which explain how it is that, in those financial markets to which SBEs have access, impediments to their efficient functioning can arise. These are the classical problems of adverse selection and moral hazard which arise when firms and banks each have access to private information. Binks and Ennew suggest that the problems of information asymmetry that thereby arise are particularly acute for SBEs, compared to larger firms, especially if the SBEs are growing. Whilst the availability of collateral can attenuate adverse selection, growing SBEs may be prone to inadequate collateral positions, and hence vulnerable to constraints on credit. Binks and Ennew use a perceived credit constraint variable derived from a large body of data provided by the Forum of Private Business. They explain the perceived credit constraint by financing arrangements, banking relationships and firm specific effects, like age, size and profitability. In an ordered probit model it was found that the greater the growth, the greater the probability of a perceived credit con-

straint. The interest rate premium on loans, the use of overdrafts, experience of financial difficulties, and the requirement of full information provision were also all positively associated with the probability of perceiving a credit constraint. Age, profitability and indices of trust and bank approachability were all negatively associated with the probability of perceiving a credit constraint. Thus experience (proxied by age), performance (proxied by profitability) and devices for reducing information asymmetry (to ameliorate moral hazard and adverse selection) like trust and approachability all reduced perceived credit constraints. But overdrafts, interest burdens and increased monitoring all increased perceived credit constraints. These all support the view that financial markets are imperfect from the standpoint of SBEs. Surprisingly, in view of its potential importance as a signalling and bonding device, the collateral ratio (measured in relation to overdraft limits) had no significant effect on perception of a credit constraint, whereas specifically *personal* collateral had a positive effect. The latter is explained by the greater risk associated with personal guarantees.

Reid and Robson examine related issues in two further empirical papers. In Reid, a model of the profit maximising neoclassical micro-firm (i.e. very small SBE) is set up in a production/finance framework of the sort discussed in Section 2 above. The key point is that if the financial capital intensity of part-time workers is less than for full-time workers, then the micro-firm has a tendency to hire more of the less money capital intensive factor input (*viz.* part-time labour) if it is finance capital constrained. To attempt to get at the stationary phase of small firm development, a cross-section of long-lived micro-firms was used. Data were obtained from them by telephone interviews using the membership list of the Federation of Small Businesses to create a sampling frame. Using a binary probit model it was found that a ten per cent increase in part-time employees reduced the probability of experiencing funding shortages by two and a half per cent. This refutes the neoclassical prediction and suggests a flexibility advantage of part-time employees in averting funding shortages. As in the Binks and Ennew study, several attitudinal variables were also used in the modelling. They indicated that

owner managers who had experienced funding shortages tended to think that their plights could be improved by more financial support from friends and family, and by a more permissive bank lending policy, but that they would only be worsened by an extension of trade credit.

Robson's paper is another applied econometric work, and takes as its starting point the study by Black, De Meza and Jeffreys (1992), suggesting that the real value of net housing wealth is a significant determinant of the rate of small firm formation. Housing assets are thought to be an important source of collateral to individuals contemplating the 'entrepreneurial event' of starting up a business. In earlier work Robson (1993) had apparently discovered, confirming evidence of Black, de Meza and Jeffreys (1992), that real net housing wealth had a significant positive effect on the rate of new VAT registrations in the U.K. However, the current work by him reported in this special issue, which takes a more sophisticated look at the dynamics of SBE creation, casts doubt on the validity of earlier results. It is, rather, that established businesses can gain access to additional lines of credit to an extent determined by housing wealth, rather than that new SBE founders can overcome the capital barrier to entrepreneurship because of their housing wealth.

The core of this work is a re-appraisal of the detailed statistical procedures of Black, De Meza and Jeffreys (1992). Concerning variables, Robson criticises the dependent variable they use for neglect of variations between regions of the incubator population from which new SBEs emerge. Also, their measure of housing wealth is unsatisfactory in that it neglects outstanding mortgage debt. Turning to equation specification, Robson notes neglected dynamics, which would bias standard errors. Correcting the variables in the way suggested, and using an 'error correction' specification to deal with autocorrelation, Robson finds no evidence of a positive relationship between housing wealth and new SBE formation at the regional level. Apart from regional and time-specific fixed effects, only population density and the ratio of unemployment to vacancies appear to have significant effects on regional rates of new SBE formation. If housing wealth is included as an explanatory variable, it has a perverse (negative) sign. The only evident support for the

hypothesis that housing wealth acts as collateral comes from the association of higher housing wealth regionally with lower rates of VAT deregistration. Robson's results are consistent with the view that housing wealth is associated with greater longevity of SBEs rather than greater inception rates of SBEs. However, the main purpose of his paper is the classical pursuit of positive economics, by seeking to falsify hypotheses; and, in this pursuit, Robson has shown we know less than we thought we did about housing as collateral.

Cressy's paper has a similar concern with start-up and its determinants, and also is important as an exercise in falsification, in that it refutes the famed Jovanovic (1982) model in its original form (*viz.* because pre-entrepreneurial income and growth rates are found to be positively correlated, rather than uncorrelated, as in Jovanovic). Cressy seeks to develop a new model that preserves the important insight of Jovanovic's model, that entrepreneurs learn as they run SBEs, but adds new features: differential start-up sizes and outside opportunities; satisficing by the entrepreneur (in terms of seeking a 'target income'); stochastic income; and human capital (proxied by the entrepreneur's age at start-up). The model developed does not have a thorough-going temporal analysis behind it, as in Hilten, Kort and Loon (1993), for example, but Cressy's 'no-fat' modelling allows him to develop crisp predictive results in the form of hypotheses that are capable of falsification by real-world data. Thus growth of business cash flow is predicted to be increasing in pre-entrepreneurial income and entrepreneurial age. Cressy uses a random sample of SBEs who opened accounts with one of the big U.K. clearing banks in 1988: nearly 80% of these were new starts. Cressy uses debt turnover as his cash-flow growth variable in a quadratic approximation to his non-linear growth rate equation. He finds that the more viable new SBEs are, the larger start-ups *per se*, and also the larger are start-ups which are run by more mature owner-managers. The estimation procedure is careful, and involves tests for sample selection bias along lines made familiar by Heckman, though Cressy finds no evidence of its existence. Surprisingly, in view of organisational theories of the firm, Cressy finds that limited companies do not grow any faster or slower than sole traders or partnerships. However, differences

between this finding and that of Reid (1993) may be accounted for by the very different concept of growth used by Cressy (i.e. cash-flow growth, as distinct from employment, sales or asset growth). His satisficing model, in which the entrepreneur aims to create an income for himself ('target income') to replace that obtained in previous employment, has intuitive appeal and presents a unified, sharp hypothesis to be confronted with the evidence.

On turning to evidence, Cressy confirms that SBEs run by owner-managers with higher pre-entrepreneurial incomes grow faster than other start-ups, but that they have no better survival prospects. However, a paradox remains: SBEs run by older owner-managers have greater longevity than those run by younger owner-managers, and whilst this in itself explains survival well, the addition of pre-start income does not help further to explain survival. This is surprising, as pre-start income and age of owner-manager are positively correlated, both with each other and with growth. I suggest that this is a model that others will wish to return to with new data sets, to tease out the characteristics of this paradox.

Finally, I turn to the paper of Chittenden, Hall and Hutchinson. Again the focus is on growth and finance, but no unique hypothesis, along lines adopted by Cressy, for example, is adopted. Rather, a whole range of theories in the extant literature is appealed to: a common procedure with applied econometricians, but a slightly methodologically dangerous one, as it is sometimes difficult to determine which sub-hypotheses are joint and which are rivalrous, or alternative. The broad concern of the paper is to examine factors which affect the financial structure of SBEs using five years of data on about 3,500 companies chosen from the "U.K. Private +" database. Economic (neo-classical), pecking order, and agency theories are the sub-hypotheses explored for the light they cast on the stage of the SBE's development and its financial structure. The account given by Chittenden, Hall and Hutchinson, of various theories of the SBE's growth and finance, can be related to the more general framework of Section 2 above. For example, in their analysis of the life-cycle approach we find the SBE being described as growing rapidly at a pace determined by debt finance and volume of undistributed earnings.

Particularly interesting is their reference to the 'pecking order' theory of Myers (1984), which has been thought to be largely of relevance to large corporations, but is also of obvious applicability to SBEs.

The third theoretical approach explored, agency theory, takes them into similar territory to that explored by Binks and Ennew. It may be that this theory is not independent of the pecking order theory, and in itself it is difficult to test by econometric (as opposed to case study) methods. The authors explain components of financial structure (debt, liquidity) by variables suggested by the three theories being explored (profitability, sales growth, asset ratio, size, age, stock market access etc.). The empirical methods are robust and exploratory: the purpose of this paper is to initiate a new agenda, not to close an old one. It is concluded that the Modigliani Miller (MM) view of financial structure is irrelevant to SBEs. Access to capital markets is not frictionless and influences capital structure. The empirics provide strong support for a pecking order view of financial structure, explaining well the tendency of SBEs to rely heavily on internal funds. Aspects of agency theory that could be tested (e.g. the use of collateral) were supported. My only caution, inspired by the analysis of Section 2 above, would be that the authors too readily assume non-optimality if relatively unbalanced financial structures arise. As the analysis of Section 2 indicates, it may be optimal to have quite different financial structures at different phases of the growth trajectory of the SBE.

4. Conclusion

This special issue is intended to be a show case for modern methods of analysing small firm financing and growth. Whilst it is clear that no consensus has emerged, the papers have in common the use of rigorous theoretical and empirical methods. The importance of collateral, human capital and financial structure for early growth of the SBE have also been underlined. But probably most important, this issue generates a whole range of novel perspectives (and sometimes paradoxes) which should provide the starting point for a rich vein of new research explorations into small firm financing and growth.

Notes

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¹ For example, it required that the discount rate be equal to the borrowing rate, but yet that there was a decreasing efficiency of debt compared to a constant efficiency of retained earnings.

² Hence, also, the rate of change of capital assets equals the rate of change of equity plus the rate of change of debt.

³ That is, cost of equity (i) exceeds the rate of interest on debt (r) net of corporation tax (c): $i > (1 - c)r$. Note that in this figure, and also in Figure 2 below, only capital and debt are measured in the same units (money). Dividend and output are measured in different units, being money per unit of time and units of output per unit of time, respectively. Thus only debt and capital are directly comparable in this figure. However, if one thinks of the vertical axis being re-scaled to illustrate the trajectories of output and dividend as well, the time-phasing of behaviour of these variables is worth noting on a combined graph, even though the *relative* position of the curves is arbitrary.

⁴ That is, $i < (1 - c)r$ where i is cost of equity, c is the corporation tax rate and r is the rate of interest on debt.

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