Small Firms' Actions and their Survival Probabilities

Gavin C Reid*

Abstract

In this paper, the entrepreneur within the new small firm is regarded as taking complex rather than simple actions, which determine whether he or she will remain in business. Thus instead of simply choosing output, as in the standard analysis of the competitive firm, the entrepreneur may take actions which involve choices about markets, finance, organisation, innovation, and much else besides. To explore this approach, very detailed information on actions within small firms is required. It is shown how this was obtained by a fieldwork study of new business starts. Using data from this fieldwork, a rich statistical picture was created of actions within the new small firm. In turn this permitted econometric analysis of actions that help a new small firm to stay in business over a three year period. This indicates that the crucial actions which enable a small firm to stay in business are: the rapid retiral of debt; and the willingness to sacrifice short-run profit for growth. There is also evidence that staying in business is fostered by tight control of the wage bill, especially by substituting other labour inputs for full time employees.

JEL Classifications: D21, D43, G21, J31, L2, M2, M13, P12

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1. Introduction

When Alfred Lord Tennyson wrote[1] "It surely was my profit had I known", he was describing in poetry what the market achieves quite naturally. Whether or not entrepreneurs are conscious of it, by their actions within competitive firms they participate in a selection process which favours the survival of those firms which achieve superior performance. Conventionally, economists have tended to think of such entrepreneurs as having few actions at their disposal to achieve good competitive performance. In fact, the competitive firm faces many action possibilities, extending well beyond output, location, advertising etc. For example, it has many possible actions it can take as regards both financial structure, and the composition of its work force.

This paper examines a random sample of one hundred and fifty new business start-ups for evidence on the complex set of actions which entrepreneurs may undertake. These complex actions are classified under the headings of markets, costs, strategy, finance, organisation, human capital and innovation. The outcome of these complex actions is simple; the new start-up either folds or remains in business. An econometric analysis of the probability of staying in business over a three year period, depending on the actions of entrepreneurs, was undertaken. This produced three results of particular note. First, using a bank loan or overdraft was detrimental to staying in business. This accords with theoretical views of small firm financial structure which emphasise the importance of rapid debt retiral, Hilten *et al* (1993), and

low gearing, Reid (1991), for staying in business. Second, the attitudes adopted towards running the business are important. If the entrepreneur treats the business as simply an alternative to unemployment, or uses it to fulfil personal dreams, like getting rich quick, being one's own boss etc, survival prospects are diminished. However, if the entrepreneur is willing to sacrifice profit initially in order to 'grow on' the firm, it is much more likely to stay in business. Third, the structure of employment within the new small firm is important. On a headcount basis, larger small firms have better survival prospects than smaller small firms, which is associated with a reduction in full-time employees and tighter control of the wage bill. There is also a hint that early innovation is generally not important in the inception stage of the life-cycle of the new small firm. Perhaps starting the firm is itself 'the innovative event'; and precipitate further innovation reduces prospects for staying in business.

2. Background

Small, competitive enterprises are the life-blood of any economy with a significant market mediated sector. According to the latest figures supplied by the DTI, 99% of businesses in the UK economy (barring the sector for electricity, gas and water) were SMEs, defined as businesses which employed two hundred and fifty or fewer employees. Of these, many are very small. Indeed, in the UK today, of the 3.7 million active businesses, over 2.5 million were sole traders or partners without employees.. As well as being the embodiment of competitiveness - through their lack of market power and exposure to rivalry - these firms are important as vectors of change and innovation, according to the 'new learning' of industrial organisation, Acs and Audretsch (1993). Yet knowledge of their functioning, especially at the bottom or

'micro-firm' end of the size distribution of firms, is rather scant, particularly if a broad theoretical perspective is taken of their *modus operandi*.

I refer here to the notion that the entrepreneur within the small firm, in general, can be taken to engage in a variety of *activities* which generate private benefits and costs. In analysing the literature which distinguishes the entrepreneur from a mere small business manager, Rispas (1998, p.113) concludes that the key question is: "What kinds of activities does the entrepreneur perform?" Unfortunately, if such activity were viewed only in the most traditional framework, it would involve no more than the selection of outputs. But, departing from this traditional perspective and viewing the small firm more generally, the activities of entrepreneurs involve a complex of choices: of location (in both physical and characteristics space), production, inventory, hiring, advertising, business strategy, innovation, financial structure, and so on. If actions a_i define a vector of actions $\mathbf{a}$ which are chosen from a wide action set $\mathbf{A}$, and the corresponding revenues and costs are R($\mathbf{a}$) and C($\mathbf{a}$), then in a static setting the small firm can be thought of as maximising the concave function $\pi(\mathbf{a}) = R(\mathbf{a}) - C(\mathbf{a})$ over $\mathbf{a} \in \mathbf{A}$, Varian (1992). This defines a set of Kuhn-Tucker conditions $R'(\mathbf{a}) - C'(\mathbf{a}) \leq 0$ for all $a_i \geq 0$ which have both familiar and less familiar interpretations. Familiar conditions include setting the marginal cost of a positive output equal to its corresponding marginal revenue; and less familiar conditions, extending our purview to a financial theory of the firm, include setting the marginal value productivity of money capital equal to the capitalised value of the full marginal cost of borrowing, Vickers (1987, Ch.4). This approach can be extended to a dynamic framework for which the maximand is an integral over an intertemporal profit function, subject to side constraints. This defines best *trajectories* of actions rather

than best *points* of action, as in Hilten, Kort and Loon (1993). Despite the scope for thus creating an increasingly general view of the small competitive enterprise, an abiding consideration for long-term survival is that $\pi(\mathbf{a}^*) \geq 0$ i.e. the non-negativity of profits, generated by whatever set of actions $\mathbf{a}^*$, no matter how complex their form.

This paper combines a view of the complex of actions that an entrepreneur within a small firm can take, embracing markets, costs, finance, strategy, human capital, organisation and technical change, with this simple criterion of long-run survival, $\pi \geq 0$. This complex view of the small firm's operations is possible because detailed analyses were undertaken of one hundred and fifty new businesses using fieldwork methods. These firms were then tracked over a period of three years, and their withdrawal from the market was noted as a violation of the simple condition $\pi \geq 0$. In this way, mapping from profit to the binary outcome of survival or non-survival, an econometric model of the consequences of a complex of actions on survival probability can be estimated.

In 1994-95 a random sample of new business starts, stratified on a regional basis, was selected from the client lists of Enterprise Trusts in Scotland. The latter are so-called business incubators, playing the role of catalysts or business facilitators for start-up activity. Nineteen such Enterprise Trusts were used, covering the main population centres in Scotland; and sub-samples were drawn in proportion to client lists to achieve the target full sample size of one hundred and fifty new business starts. Data were gathered under the headings of markets, finance, costs, business strategy, human capital, internal organisation and technical change. Each firm had an identifiable start-up date, and was within three years of inception. The typical firm in this sample refers to average values, if real variables are used, or modal values if

binary or categorical variables are used. It had sales of £233k, created from selling nearly fifty products, in four product groups, in local markets. It employed three full-time and two part-time workers. It had eleven major rivals and twenty-four minor rivals, and was subject to most fierce competition by price, followed by advertising and salesmanship. Overall, competition was perceived to be strong, involving competition against rivals who were largely other small firms producing a similar product. Most markets had a dominant supplier or group of suppliers, and there were typically no collusive or conjectural aspects to competition. Thus four-fifths of firms said rivals' actions were irrelevant to their own actions.

About two-fifths of the sample produced products that were, broadly speaking, services (SIC 50-99), with retail distribution and business services (the modal group) being well represented. Of the one-third of firms in manufactures (SIC 01-49), those in electrical and electronic engineering, textiles, paper products, and footwear and clothing were particularly well represented.

By business types, proportions in the sample were as follows: sole trader (54%), partnership (19%), private company (27%). These compare with the similar percentages of 50%, 23% and 27%, respectively, computed for figures for 1995 provided by Scottish Enterprise (1996), which relate to about twenty-one thousand new firms.

[Table I near here]

Table 1 provides additional summary statistics on the sample, the variables represented being those that figure prominently in the econometric analysis of this paper. Variables are defined in the Appendix, but are often self-explanatory. To illustrate what the table is conveying by reference to financial data, it is to be noted that only third of the firms had used bank loans to launch the business, and the typical

owner-manager had put in as much as £13k at launch. These figures tend to suggest a good quality of business start, in that typically owner-managers are sufficiently confident in their project qualities to allocate considerable personal resources to their success, and do not wish to increase risk exposure, or to incur debt servicing costs, by taking on loans too early in the life-cycle of the small firm. Most owner-managers (89%) were willing to foster growth (*Smlprof*) at the expense of short-run profit. There were twice as many owner-managers (17%) who just aimed to survive (*MainaimA*), rather than to maximise their rate of return (*MainaimG*) (9%). That is, the achieving of the condition $\pi \geq 0$ was more important than the maximisation of π/K, where the latter is equivalent to maximising π if K, capital, is constant in the short run. The preference for the former motive is also emphasised by the willingness of owner-managers to sacrifice some profits for the sake of growth. However, none of this is inconsistent with long-run profit maximisation. Indeed, long-run profit (*MainaimC*), not shown in Table 1, was the most commonly nominated business aim (30%), though it did not prove significant in the econometric analysis.

In terms of technical change, firms had typically not adopted new technologies since start-up (*NewtechA* = 53%), though a significant minority had done so successfully (*NewtechD* = 37%). Product and process innovation (*Prodinn*, *Procinn*) were not undertaken to a great extent. This should not be taken to suggest that innovation is unimportant to small firms, for this would fly in the face of evidence previously cited, like Acs and Audretsch (1993). Rather, it suggests that the innovation, if such it be, occurred *at or in the launch* of the business itself; and that, for these very young firms, with an average age in business of 21 months, no further scope for innovation was subsequently perceived to exist in the period shortly after inception. In this sense, the

so-called 'entrepreneurial event' of business inception should also be regarded as a cardinal 'innovative event'.

In terms of human capital, both as regards its quality and application, Table 1 provides some insight into its role in small firm activity. Most owner-managers (75%) had college, or university qualifications (*College*); and the average number of years of high school education was nearly five (*School*). However, the hours worked were long, at 58 hours per week. Furthermore, much of this time (41 hours) was devoted to the product (*Timprod*) rather than to management (*Timman*) (just 16 hours). Thus the owner-managers, whilst being relatively well educated, displayed attributes of what are sometimes called 'artisan entrepreneurs'. Such entrepreneurs, by their actions, tend to give primacy to supply of the commodity rather than to its fitness to fulfil a customer need. They tend to spend long days at the workplace, and devote more attention to process than to purpose. One would expect learning in the market place to modify this aspect of entrepreneurial behaviour, along lines suggested by Jovanovic (1982), Frank (1988) and others.

3. Determinants of Survival

Previous analysis [Reid (1997)] has shown how many features of small businesses are subject to change, even marked change, over short periods like three years. However, the interpretation of such features as part of the complex of actions which entrepreneurs may undertake, and the consideration of their consequences for staying in business, have yet to be considered. This section aims to remedy this deficiency by giving more formal expression to the relationship between the complex of actions an entrepreneur may take in a new small business and its probability of staying in business over a period of three years. The data on actions open to the entrepreneur

relate to 1994-95, and were acquired in the first year of the study. The data on survival relate to the period 1996-97, the third year of the study.

For estimation purposes, a probit model is used, of the form $I = \mathbf{X}\boldsymbol{\beta}$, where I is an index of survival, equal to unity if the firm stays in business and to zero if the firm goes out of business. Statistically, the set of actions which entrepreneurs may take, $\mathbf{X}$, is a set of control variables, and $\boldsymbol{\beta}$ a set of estimated parameters. Estimation is by maximum likelihood and was performed using *Shazam* software. For the estimation method, which makes use of the Newton-Raphson iterative method, see Greene (1993, pp.643-647). The coding used in the *Shazam* routine is due to John Cragg. For a tolerance limit of 0.001, convergence usually occurs in five or so iterations. The estimates are reported in a form which provides summary statistics, estimated coefficients, asymptotic t-ratios and weighted aggregate elasticities. For the computation of weighted elasticities, see Hencher and Johnson (1981, pp.59-63). The latter, rather than the estimated coefficients, or even elasticities at the mean, give the appropriate measure of the responsiveness of the survival probability to exogenous variation in any of the control variables. For example, if the headcount of the workforce (*Employ*) had a significant positive effect on the probability of survival of small business over a three year period, and the associated weighted aggregate elasticity were +0.2, this would mean that a 10% increase in headcount, *ceteris paribus*, would increase the survival probability by 2%.

[Table II near here]

Table 2 reports on a probit model for a wide set of control variables, thirty-one in number, including those concerned with financial structure, wages and employment, markets, motivation, business form and innovation. The overall fit of the probit is satisfactory, as judged by the Cragg-Uhler R^2 of 0.51, which is high for cross section

models of this sort. A likelihood ratio test of the null hypothesis that all the elements of the $\boldsymbol{\beta}$ vector are zero produces a test statistic of 54.8, which exceeds the $\chi^2_{0.01}(31)$ critical value of 50.9, thus rejecting the null hypothesis. It is therefore appropriate to proceed to discuss the estimated coefficients.

A number of the variables in **X** have been examined in an earlier consideration, Reid (1997), of how attributes of the sample of small firms have varied over a three year time period. Of note in the estimates reported in Table 2 are the following. Having had a bank loan (*Bankloan*) has a significant negative effect upon the probability of survival. This is a result which Storey's (1994) notable analysis of new firm growth and bank financing was unable to derive from such data as were at his disposal. The reasons for this new result appear to be that, on the one hand, a bank loan requires debt servicing, which entails both cost and risk; and on the other hand relatively inferior projects which fail to attract equity (e.g. from an informal investor or 'business angel'), because they lack promise as investment propositions, may end up being financed by a bank loan. However, the effect, whilst significant, has a relatively small elasticity (of -0.09). Considering other financial variables, neither the use of debt finance (*Debt*) nor the level of the owner manager's personal financial injection into the business (*Owncash*) have significant effects upon survival.

The number of months a firm has been in business (*Inbus*) has a positive and significant effect upon survival [*cf.* Evans (1987)], and a relatively high elasticity (0.13). The time a firm is in business provides a measure of the opportunity afforded to the entrepreneur for market place learning [*cf.* Jovanovic (1982), Frank (1988)]. The best way to learn about business is to run a business, and in the process of learning in this practical fashion, the entrepreneur's human capital is enhanced. The mean age of the business at first interview was 21 months. These features of the age

variable, *Inbus*, indicate varied experience of entrepreneurial learning and also help to estimate the coefficient of this variable with some precision.

The ratio of part-time to full-time workers (*PtFt*) is measured as (*Ptime* + 1) ÷ (*Ftime* +1) where *Ptime* and *Ftime* refer to numbers of part-time and full-time workers, respectively. This ratio apparently has an insignificant effect upon survival probability. This variable is a measure of the casualisation of the small business work force, it being the larger the more predominantly is the workforce of a part-time form, with a smaller body of 'core' full-time workers. Longer-term evidence [*cf.* Reid (1996)] suggests casualisation of the workforce raises the probability of survival, through lowering unit labour costs[2] and increasing task flexibility within the enterprise. However, over the relatively short period considered here, the *PtFt* variable does not pick up this effect, though further evidence, reported upon below, suggests the structure of the workforce already has at least some bearing on survival probability, even at the early stage of the young firm's life cycle.

Three widely mentioned reasons for getting involved in running a small business - to provide an alternative to unemployment (*InvolveA*); to be one's own boss (*InvolveE*); and to satisfy the need for achievement (*InvolveF*) - are considered, and all have significant negative effects upon the probability of survival. Using a broader based measure of performance than mere survival, Reid and Smith (1996) show that only the most economically driven reasons for business involvement tend to convert into good performance. However, if they are vaguely specified (e.g. 'to get rich', as for *InvolveB*) they tend to have no bearing on survival [*Cf.* Results in Table 4 of Reid and Smith (1996)]. Note the coefficient of this variable is insignificant in Table 2.

Aims of the business can be important for performance, but are not of measurable importance here for mere survival. *MainaimA* (survival) and *MainaimG* (high rate of return) have insignificant coefficients. From evidence elsewhere [*cf.* Reid and Smith (1996)], aiming to make a high rate of return certainly fosters small business performance, measured by weighting profitability, productivity and growth. But here it does not seem to influence brute survival. Even running a firm with the limited aim of survival in mind (*MainaimA*) does not prove effective. As is common in the early stages of the small firm's life cycle, entrepreneurs are still learning what best to do for their businesses.

If they are willing to sacrifice some short-run profit to promote growth (*Smlprof*), this has a positive and significant effect upon survival, and also a high elasticity (0.23). In commenting further on this variable, we observe that if an entrepreneur seeks only short-run profit and then an early exit, her business will by design be short-lived. But beyond this, the avoidance of a short-run view (e.g. looking relatively far ahead in terms of business planning) has been shown to enhance business performance [See the *Impact* variable in Table 4 of Reid and Smith (1996)]. Here, however, it has no measurable effect on mere survival, as the coefficient on the *Impact* variable is insignificant, this being a measure of how many months ahead an entrepreneur looks when evaluating the impact of her decisions. Merely having formulated a business plan (*Busplan*) does not promote survival, emphasising that a formulaic approach to business planning is ineffectual as compared to a strategic approach.

Earlier work [Reid, Jacobsen and Anderson (1993)] has suggested that the wage bill is often a principal 'cost driver'[3] of small firms, and that tight control of the wage bill is a prerequisite to survival, and indeed, more broadly, to performance. In the probit

of Table 2, the variable *Wages* measures the percentage of total costs that are attributable to wages, salaries and directors' remuneration. We have seen earlier that the average for this variable is 25%, with the figure being below a quarter for survivors and approaching a third for non-survivors. Not surprisingly the coefficient on *Wages* is negative and highly statistically significant. A 10% reduction in the proportion of costs allocated to labour will raise the survival probability by nearly 1½%. The related variables, headcount employment[4] (*Employg*) and full-time employment (*Ftime*) are of marginal significance in this 'encompassing' probit probably because of some collinearity with the *Wages* variable. However, their interpretation is important, and more detailed consideration will be given to them in Section 4 below, when reporting upon a more parsimonious probit equation (*cf.* Table 2 below).

Previous work [Reid (1991)] with older firms has shown that especially the number of product groups (*Prodgrp*) and even the number of products (*Product*) produced by the small firm have a bearing on survival. The product range enables a small firm to exploit economies of scope and to attenuate risk by adopting a portfolio balance approach to product placement across different market segments [*cf.* Ungern-Sternberg (1990)]. However, here these variables have coefficients which are insignificant, suggesting that such considerations are unimportant with our very young small firms. They may be too busy trying to find and exploit niches in the first place, before even coming to consider finer matters like risk spreading.

Human capital aspects are thought to be important in any productive process, of which running a small entrepreneurial firm is an example [*cf.* Bates (1990); Townroe and Mallalieu (1993)]. However, two of the human capital variables, years of secondary schooling (*School*) and having done a college or university degree (*College*)

prove to be insignificant determinants of survival. The marketplace experience, and the learning it implies over time, appear to be more important than academic credentials for survival through the early stages after business inception.

Other aspects of the production function of a small firm are inputs like hours of effort, and hours devoted to various tasks [*cf.* Oi (1983)]. In fact, both hours per week spent in the business (*Hrswk*) and the proportion of effort allocated to production (*TimProd*) or management (*TimMan*) have insignificant effects upon the probability of survival. Our evidence elsewhere [Reid (1997)] is that of the various allocations of effort by the owner-manager only time spent planning has a significant positive effect upon survival.

Although a more detailed analysis of business structure, for example based on transactions costs consideration, suggests certain business types have superior properties to others, both in terms of survival, and of more general measures of performance (e.g. profitability, growth), the basic legal structure of a small firm appears unimportant for survival, at least in the short term.[5] Thus the coefficients are all insignificant for the variables for the business forms of: sole proprietorship working from home (*LegBusA*); sole proprietorship working from business premises (*LegBusB*); and partnership (*LegBusC*).

An important characteristic of SMEs is their capacity to be innovative [*cf.* Acs and Audretsch (1993)]. However, for the micro-firms under examination here, once the innovation of launch itself had passed, process innovation (*ProcInn*) had an insignificant effect on survival, and indeed the consequence of product innovation (*ProdInn*) was generally to lower survival probability, presumably because of premature introduction of new products. Either not using new technology at all (*NewTechA*) or even perceiving one's capability to implement new technology to be

good (*NewTechD*) had significant and negative effects upon new business survival. Indeed, the elasticities of these last two control variables were the highest of the set, at -0.34 and -0.26 respectively. However, the results may be indicating that the performance of small firms that innovate early are more variable than those that do not. As a consequence, from the pool of early innovators there may be a higher exit rate. The ex ante profit on early innovation may even be positive. Further hypotheses should be explored in this area, but this would require use of data on profits. Very often, the launch of the firm is itself the major technological leap, either in terms of production, or of organisation. There is evidence that it is not just specific technological advances that are important for survival and performance, but rather the assemblage of collective new technical capabilities [*cf.* Smith (1997)]. For example, in the use of new information technology (*IT*) it is not so much whether or not you use a fax, phone, or PC on an individual basis, but rather whether you use *clusters* of fax, phone and PC together. These clusters effectively coordinate IT functions, and positively influence performance and survival.

4. A Parsimonious Model of Survival

We turn now from the encompassing model of Table 2 to a more parsimonious model in Table 3. The reported Cragg-Uhler R^2 of 0.25 is satisfactory, and a likelihood ratio test that all elements of the β vector are zero rejects this hypothesis at the 1% level. This model has advantage over that of Table 2 in terms of both economy, in a methodological sense, and of better displaying how employment structure influences survival.

[Table III near here]

We note, first of all, that the signs and significance of the coefficients of the variables *Bankloan*, *Inbus* and *Involve(A,E,F)* are as before, and the interpretations above are sustained. The stability of the behaviour of these variables between both sets of estimates is also a measure of the robustness of the empirical regularities they represent. The benefits to survival of sacrificing some short term profit for growth (*SmlProf*) are again indicated.

This parsimonious model now displays more sharply what is happening in the area of employment within the small firm. Larger small firms, as measured by headcount (*Employ*), have superior survival prospects to smaller firms, and the associated elasticity is relatively large (0.28). Thus a 10% increase in headcount will raise survival probability by nearly 3%. However, the composition of the headcount is important. Particularly in the larger small firms, where they are the typical employee type, full-time employees (*Ftime*), sometimes called the 'core employment' of the business, can create pressure on the wage bill. Indeed, as before, the *Wages* variable, which represents the proportion of costs accounted for by wage and salary payments, has a coefficient which is highly significant and negative. That the number of full-time employees is strongly negatively associated with survival (*Ftime*) should therefore come as no surprise. The elasticity is relatively large, and suggests a 10% shedding of full-time employees would raise the probability of survival over three years by nearly 2%. Though this in itself does not prove that casualisation of the work force, even in this early stage of the life cycle[6], enhances survival, as once again the coefficient of the *PtFt* variable (the ratio of part-time to full-time workers) is insignificant, it hints at such a possibility. This possibility is further strengthened by the already known fact that the more are senior, skilled personnel deployed within the

nascent business early on, the better are its survival prospects [*cf.* Atkinson and Meager (1994)]. This suggests that most modification of employment structure to promote survival will occur further down the hierarchy of the small firm. Employment structure within the firm can be characterised as follows. Suppose w_i is the wage rate at the i'th hierarchical level; and l_i is the headcount at this level. Then total headcount is $L = \sum l_i$ and the wage bill is $W = \sum w_i l_i$. If employees can be moved between hierarchical level, the question to be posed is: Can headcount (L) rise at the same time as the wage bill (W) falls?

To approach this point by illustration, consider average figures for both wages & salaries and employment, at different hierarchical levels within the firm. These figures are based on Reid (1997a, Table 7). Average employment levels from the top down are: 1.9, 1.8, 3.3 and 2.0. The levels can be thought of as: owner-managers, senior full-timers, junior full-timers and casual or part-time workers. The evidence is that the last category of worker provides an effort which is a considerable proportion (certainly much greater than 50%) of the effort of full-timers. This is reflected in remuneration. If the bottom level of worker has a remuneration which is standardised at unity (1), then the remunerations as you go up the hierarchical level are, on average, 1.4, 2.1 and 3.6 [the data source is again Reid (1997a, Table 7)]. This average firm has a headcount (*Employ*) of $(1.9 + 1.8 + 3.3 + 2.0) = 9$ and a wage bill of $(1.9 \times 3.6) + (1.8 \times 2.1) + (3.3 \times 1.4) + (2.0 \times 1.1) = 17.44$. At the top level of the hierarchy are the owner-managers, who are effectively fixed, and presumably earning what is just sufficient to retain them in the entrepreneurial role.

Suppose they restructure employment to control the wage bill, casualising all junior employees and one senior employee, and hiring a further casual employee to boost

labour effort. Then the average headcount becomes (1.9 + 0.8 + 0.0 + 7.3) = 10.0 which has gone up, but the wage bill becomes (1.9 × 3.6) + (0.8 × 2.1) + (7.3 ×1.1) = 16.55 which has gone down. These figures are illustrative, but certainly they make a point: casualising the work force can powerfully control the wage bill without reducing employment in terms of headcount. Indeed, it *is* true that surviving firms have higher levels of employment at the bottom level of the hierarchy than non-surviving firms. Further, the numerical example presented illustrates how the headcount can even rise, and yet the wage bill fall, by selective restructuring of the composition of employment within the small firm. It may be that re-structuring of the work force more readily allocates workers according to marginal productivity. That is, at inception workers may not be optimally allocated, for example, because their productivity levels have not yet been observed. However, in the early phase of the life cycle, such evidence emerges, and the profit maximising allocation is then better approached.

These findings are consistent with large sample findings elsewhere, suggesting an increase in part-time employment as a proportion of total employment, especially in the small firm sector. The global observation that there is more rapid job creation amongst small firms, based on headcounts, may in part reflect an increase in part-time employment. This appears to be associated with an increased wage gap between large and small firms, see the study of Picot and Dupuy (1998), which explores these effects in detail for the Canadian economy.

Finally, one needs to compare the probit models of Table 2 and Table 3 from a statistical point of view. Although the first model, in Table 2, is of interest in many of its features, a large number of its coefficients are not significantly different from zero. A likelihood ratio test of the extra restrictions imposed in the second model produces

a χ^2 statistic of 34.158, which is less than the critical value of $\chi^2_{0.01}(21) = 37.57$, so we just accept the hypothesis that the restrictions imposed by the second model are valid at the 1% level, and thus the parsimonious probit of Table 3 is the preferred specification. This model has 77% of predictions correct, which is somewhat less than the 82% of the first model, but acceptable, given its relative simplicity, as an explanation of the survival probability of small firms.[7]

[Table IV near here]

An additional matter which needs to be considered concerns possible effects on the model of industrial sector. Table 4 presents results for the parsimonious model, with the addition of dummy variables for nine industrial sectors. The model is of marginal significance overall at the 1% level in terms of a likelihood ratio test of the model with a constant term only, against the model with all variables, including sectoral dummies. Thus the dummy variables appear to add little to the statistical picture. More precisely, if a likelihood ratio test of the model of Table 3 against the model of Table 4 is performed, a test statistic of just 10.66 is obtained , which is considerably less than the $\chi^2_{0.01}(9)$ value of 21.7. The model of Table 3 is therefore much preferred using this test methodology. Turning now to individual SIC dummies, it will be observed that not one is significant at the 1% level. Although there are marginally significant effects for sector 1 (Heavy Manufactures: metals, minerals, chemicals etc) and sector 4 (Light manufactures: food, textiles, footwear, furniture etc), these effects are not robust under alternative specifications, when non-significance is usually observed. Further, the effect of sectoral dummies in this model is slight, as judged by the low absolute values of the weighted elasticities, which are typically smaller by a factor of ten or more than the weighted elasticities for the other included variables. It is therefore concluded that sectoral effects upon staying in business are slight.

5. Conclusion

This paper starts from a view of the new small firm that emphasises the wide variety of actions open to the entrepreneur (e.g. in terms of financing, business strategy, organisation etc), *cf*. Rispas (1998). This is by contrast to a traditional view, which emphasises merely control of output by a passive manager. The proposed approach was used to construct and test a model showing how entrepreneurial actions affected the probability of new small firms remaining in business over a three year time horizon. The data used were based on a fieldwork study of new business starts in Scotland for the period 1994-97.

Using a probit model to estimate the effects of entrepreneurial actions on new small business survival, it was found that many actions do indeed influence future business viability. It was also found that certain actions and situations did not favourably influence business viability, even though there might be a *prima facie* case that they should (e.g. innovation, sector). These cases are worthy of attention first. Thus it was found that especially product and, in some measure, process innovation soon after business birth has negative consequences for staying in business. It is known that small firms are often 'early adopters' of product innovations, see Karlsson and Olsson (1998), which may suggest that adoption is best done at inception itself, rather than shortly afterwards. It is also possible that early innovators have a higher performance variability, with better performance on average, but relatively higher exit rates.

Turning now to industrial sector, an emerging trend in small firms economic policy is towards an explicitly sectoral view. This is no doubt partly the result of more successful sectorally based small business lobby groups e.g. those operating through trade associations. However, if the entrepreneur is a profit seeking businessman,

rather than an artisan, and is not therefore wedded to one sector, and key factors like finance capital and unskilled labour are mobile across sectors, one would not expect sectoral effects to be significant. It must also be borne in mind that even very small firms can, and frequently do, produce products across several industrial sectors.[8] Despite the policy penchant for a sector specific view, it should therefore come as no surprise that the econometric evidence did not support the view that sectoral effects were important.

The literature on financial structure of small competitive firms suggests that even if debt finance is useful for launching a business, and might fuel the initial growth burst after inception, it is generally desirable to retire debt as the firm's position is consolidated, *cf.* Hilten *et al* (1993). It is also known that for firms which are three or more years old, high gearing (i.e. high debt in relation to equity) tends to reduce the chances of staying in business, partly because debt is costly in itself, but also because uncertainty about interest rates increases risk *cf.* Reid (1993). These insights are reflected in the econometric evidence which indicated that a bank loan or overdraft in the previous year typically reduced the probability of survival.

Whilst economists have sometimes been reluctant to use attitudinal variables in their empirical work, an emerging literature, like that of Rispas (1998) in the small firms area, suggests they can play an important role. Here, this was indeed the case and it was found that 'life-style' based attitudes to running a business (e.g. control-driven motives) were inimical to survival. On the other hand, a willingness to sacrifice profit for growth (arguably a willingness to subordinate short-run profit seeking to long-run profit seeking) was significantly linked to staying in business.

Finally, it was suggested that the organisational structure of the small firm was important. Casualising the work force can sharpen incentives across hierarchical

levels, and offers opportunities for controlling, and even lowering, the wage bill. Whilst the headcount of total employment, *Employ*, was found to have the strongest positive consequences for survival, with a 10% increase in headcount raising survival probability by 3%, it was also found that a 10% decrease in full-time employees raised the survival probability by nearly 2%. Given that the members of the firm who typically have highest human capital, and enjoy the greatest remuneration, the entrepreneurs, are effectively fixed specialised factors of production, these findings suggest that a casualisation of the work force within these new small firms helps them to stay in business. This may reflect the better approximation to the marginal productivity conditions necessary for profit maximisation achieved by small firms after inception, having started with an initial workforce of relatively unknown productivity. This process essentially involves broadening the base of the employment pyramid, especially at the bottom, where non-core labour is employed.

Thus it is felt that this attention to a more realistic view of the complex actions that an entrepreneur may take in a small firm, has been rewarding in producing insights that are both theoretically compelling, and empirically well founded.

Appendix

Variable Name	Definition
Bankloan	=1 firm has used bank loan or overdraft in previous year, =0 otherwise
Busplan	=1 firm has a business plan, =0 otherwise
College	=1 respondent went to college or university, =0 otherwise
Debt	=1 firm has debt, =0 otherwise
Employ	total headcount (directors + managers + full-time & part-time employees + trainees)
Ftime	no. of full-time employees
Hrswk	no. of hours a week spent by the owner-manager in the business
Impact	planning horizon of the firm (months)
Inbus	time since business inception at first interview (months)
InvolveA	=1 respondent became involved in the business as an alternative to unemployment, =0 otherwise
InvolveB	=1 respondent became involved in the business 'to get rich', =0 otherwise
InvolveE	=1 respondent became involved in the business to be own boss, =0 otherwise
InvolveF	=1 respondent became involved in the business to satisfy the need for achievement, =0 otherwise
LegbusA	=1 firm is sole trader (operating from home),=0 otherwise
LegbusB	=1 firm is sole trader (operating from business premises), =0 otherwise
LegbusC	=1 firm is partnership, =0 otherwise
MainaimA	=1 main aim of business is survival, =0 otherwise
MainaimG	=1 main aim of business is high rate of return, =0 otherwise
NewtechA	=1 firm has not used new production technologies, =0 otherwise
NewtechD	=1 firm has generally been successful in implementing new production technologies, =0 otherwise
Owncash	cash injection by owner-manager at business inception (£)
ProcInn	level of process innovation undertaken by firm (=0 none, =1 a little, =2 a lot)
Prodgrp	number of product groups or categories firm offers
ProdInn	number of new products introduced by firm (=0 none, =1 '1-5', =2 '6-10', =3 '11-20', =4 'more than twenty')
Product	number of products firm offers
PtFt	=(part-time employees+1)÷(full-time employees+1)
School	time respondent spent at secondary school (years)
Smlprof	=1 respondent is willing to accept smaller profits for a while to facilitate growth, =0 otherwise
TimMan	percentage of respondent's time spent on management
TimProd	percentage of respondent's time spent on production
Wages	percentage of total costs attributable to wages, salaries and directors' remuneration

Notes

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[1] Guinevere 1,652.

[2] In a variety of forms: lower wages, lower pension and insurance costs, lower costs of hiring and firing *etc*.

[3] A term due to Porter (1985) meaning a grouping of costs which dominate cost trends.

[4] Headcount of all in business, managers, directors, full-time, part-time workers and trainees.

[5] In the longer term, this is unlikely to be true. Both theoretical and empirical analysis suggest the organisational form of a firm has a significant bearing on growth and profitability [*cf.* Reid (1997); Dobson and Gerrard (1989); Atkinson and Meager (1994)]. Further, the work of Storey (1994) suggests that limited companies are more likely to acquire debt, and to start up with more employees, than sole proprietorships.

[6] Though this may well be so in the late stage [*cf.* Reid (1996)] for mature firms - in this case on average 14 years old.

[7] The parsimonious model predicts survival in 82% of cases which did survive and 34% of failures. The encompassing model had corresponding figures of 87% and 50%. The latter is therefore a better predictor of failure than the former. However, as our focus is on factors determining success, the parsimonious model seems to perform comparatively well.

[8] When this occurs, the relevant sector used for labelling the firm is that in which most sales are generated by a product group.

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