

The Behaviour and Performance of Young Micro Firms: Evidence from Businesses in Scotland

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ABSTRACT. This paper is an empirical study, making appeal to firsthand evidence gathered by face-to-face interviews with the owner-managers of 150 small firms in Scotland. It investigates the performance of the micro firm in the early years of its life cycle, by reference to four key behavioural characteristics: (i) strengths, weaknesses, opportunities and threats (SWOT) analysis; (ii) the gathering of trade intelligence on the firm's rivals; (iii) the use of information technology (IT) in the business; and (iv) financial form and the owner-manager's preferences as regards the form of their equity stake holding. Seven propositions, based on the evidence accumulated, are formulated, and tested. These are illustrated by boxplots and cross-tabulations, and supported with chi-square statistics for testing measures of association. Taken together, the data provide an illuminating picture of the strategic behaviour of the young micro firm, and the subsequent effect that actions can have on firm performance. In particular, it is found that the use of IT in clusters of devices has a highly significant positive association with performance.

Background

This paper explores the possibility that, far from being well-informed economic agents,¹ the owner-managers of young small firms are naïve in their approach to running their businesses, and initially see the world through "rose-tinted spectacles". Set against this, it is suggested that the owner-manager who is adaptable, quick to learn from mistakes and realistic about threats from rivals, is better able to protect his firm, and to identify and attack new market niches. The work is an empirical study, and

makes appeal to evidence gathered by face-to-face interviews with the owner-managers of 150 small firms throughout Scotland over the period 1994–96. These firms are typically young (< 3 years old at time of first interview), and small (mean headcount 6; mean turnover £233,510), and are commonly known as "micro firms".²

Two fieldwork instruments were developed and used to gather the data. The first, an administered questionnaire, was designed to gather primarily quantitative evidence, by examining the firms in terms of markets, costs, finances, human capital, business strategy, organisation and technical change. The second was a semi-structured questionnaire, designed to focus specifically on the firm's business strategy and to provide qualitative support for the statistical results.³ The paper identifies four key areas which are of interest in an investigation of behaviour and firm performance. These are: the owner-manager's awareness of his firm's strengths, weaknesses, opportunities and threats; the extent of information gathering carried out by the firm; the use of information technology in the business; and financial aspects and preferences as regards the form of equity stake holding. It defines, and then creates, a new index of net strengths of a business. It then tests seven propositions based on the above, using chi-square statistics to support the results, which are also illustrated by the use of "boxplots" and cross-tabulations.

In considering the conduct of an entrepreneur, we appeal to theories of entrepreneurship such as, for example, those explored by Jovanovic (1982) and Frank (1988), which suggest that the learning which comes through discovery, and from being more informed generally about the environment, and specifically about the business itself, can lead

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the entrepreneur to modify his behaviour.⁴ The inexperienced and less skilled entrepreneur is more likely to exaggerate the strengths of himself and his firm, while at the same time underestimating his own firm's weaknesses and the threats posed by the business environment to its continued survival. At the other end of the spectrum is the owner-manager who learns from experience, and takes a realistic and business-like approach to running the firm. He is more likely to anticipate threats and to act in such a way as to avoid them, taking preventative, even protectionist, courses of action, and in this way always remaining "one step ahead of the game".

Assuming the latter to be a more successful course of action, we then advocate Porter's (1980, 1985) preference for a formal approach to business planning, which argues that organisations may be considered to be striving actively to contend with, and to overcome, what he calls *The Five Forces of Competition*.⁵ The advantage of doing so is that the firm is then better able to position itself in the market *vis-à-vis* its rivals, and thereby to capitalise on its competitive advantage over others. Madu and Kuei (1993) suggest similarly that the owner-manager of the small firm who is aware of the strengths and weaknesses of his firm has the advantage of knowing those areas in which his business should be protected against competitors.

It is possible, therefore, that the seeking of trade intelligence on the activities of rival firms may be associated with enhanced performance, if that information is used effectively. Recent advances in information technology have facilitated information gathering of this sort, in that sophisticated methods of data transfer, storage and retrieval have become more readily accessible to a greater number of potential users [cf. Porter and Millar (1991)].⁶ It is reasonable to assume that those firms which are adaptive and willing to accept change might also be those which are most willing to take on board new technologies, and in turn, to be those who perform better because of their flexible attitudes.⁷

A significant motivation of the owner-manager of a small firm in deliberately concealing the riskier aspects of his business (as opposed to simply being ignorant of such weaknesses) might be to attract funding from external sources, such as banks or venture capital investors. The will-

ingness of an owner-manager to share his stakeholding in the business, in return for equity investment, cannot necessarily be considered as a positive indicator of potentially high performance.⁸ Instead, it might suggest a desperate search for funding. On the other hand, a reluctance to dilute equity could be regarded as an indicator of the owner-manager's wish to retain control of a highly profitable business. However, organisations that deal frequently with small firms, and provide sources of funding to them, are certainly not naïve, and prove to be adept at protecting their investment funds [cf. Reid, Terry and Smith (1997)].

To summarise, therefore [see Figure 1], we first examine the behaviour of entrepreneurs, to determine whether the "learning effect" identified by Jovanovic (1982) and Frank (1988) has empirical support. We then attempt to identify formal approaches to business planning, along the lines of writers such as Porter⁹ and, to some extent, also Mintzberg,¹⁰ and to confirm or refute the theory that formal planning in the new small firm leads to higher performance. We do so by reference to three criteria: the analysis of strengths, weaknesses, opportunities and threats; the use of information and information technology; and the owner-managers preferences as regards financial form and funding.

Empirical evidence

The 150 firms that composed the sample were segmented into groups of low, medium and high performers using a cluster analysis technique which was predicated on three measures of performance.¹¹ The measures used were growth (growth in employment from year 1 to year 2), profitability (return on the owner-manager's initial investment) and productivity (turnover attributable to each member of staff). The technique of cluster analysis groups together those firms with the most similar characteristics.¹² For this sample, it provided a breakdown of all the small firms into three groups: 91 low performers (61%); 49 medium performers (33%); and 10 high performers (7%).¹³ The dynamic element of this performance analysis, which includes a measure of growth and return on capital, enables us to examine behavioural characteristics in the early

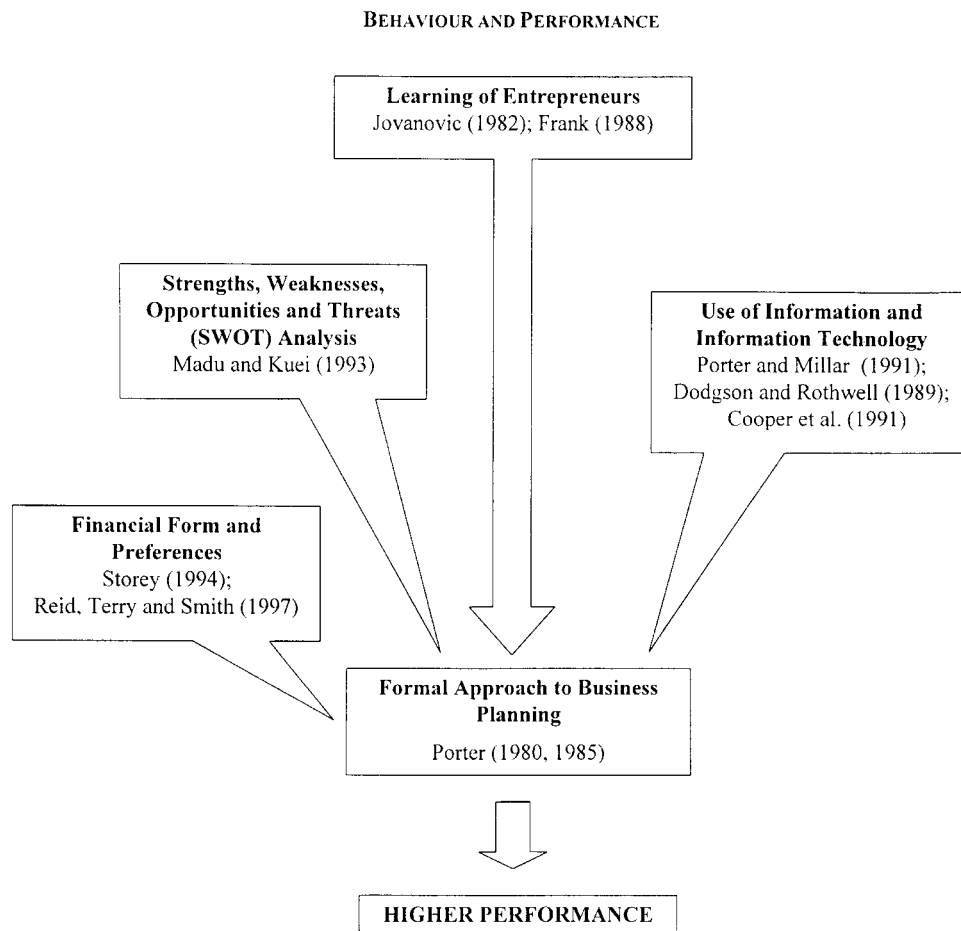


Figure 1. Behaviour and performance.

stages, and to determine which of these characteristics lead to higher performance in subsequent years.

Given the small percentage of firms that fall into the high performance group, and the youth of the firms in general, it might reasonably be asked whether those firms closer to the three year imposed cut-off point would automatically be higher performers than those closer to inception. In order to investigate whether or not age had a significant effect on performance, we therefore performed a one-way ANOVA¹⁴ test. The null hypothesis to be tested was that the mean value of *Age* (age of the firm, in months from inception) was the same for each performance level, low, medium or high. If the hypothesis were true, the F-statistic generated would be close to one. In this

case, the test statistic was 1.2535 (which falls outside the critical region), having too high a probability value of 0.2885. We cannot, therefore, reject the null hypothesis that firms in each cluster have the same mean age¹⁵ or, expressed another way, we cannot establish that the age of the firm has a statistically significant effect upon its performance. Thus we are encouraged to look elsewhere for behavioural factors which may be responsible for the observed differences in performance.¹⁶ This is the focus of the paper.

Having thus established the basis for analysing performance, the empirical evidence available for the firms in question will now be investigated. The first issue to be addressed will appeal to the data available on the respondent's appraisal of his firm's strengths, weaknesses, opportunities and

threats (SWOT analysis). Later sections will look at trade intelligence, information technology (IT) and finance, and their empirical implications for small firm performance.

Strengths versus weaknesses

From the administered questionnaire which was used to gather the data, fifteen variables¹⁷ were utilised to generate the net strength variable, *Strweak*. This measure constructs a plausible combination of the respondent's perceived strengths and weaknesses. Strengths (α) were valued on the scale of 0, 1, 2 and 3, with 0 being the weakest, and 3 being the strongest. Similarly, weaknesses or threats (β) were scaled as 0, 1, 2 and 3, with 0 representing no threat, and 3 a very strong threat. Then *Strweak* is a measure of the sum of net strengths, as perceived by the respondent, of his firm *vis-à-vis* those rivals, or even those external threats. Net strengths are therefore measured as $\alpha - \beta$.

So, for example, if a respondent were to rate his adaptability as "3" (i.e. a very strong threat), and his rivals' level of adaptability as "1" (i.e. a weak threat), then the net value of the variable *Adapt*, for this firm, would be $3 - 1 = 2$. In other words, the respondent believes his adaptability is relatively stronger than that of his rivals. Conversely, if he were to rate his own image as "1" (i.e. relatively poor), and his rivals' image as "3" (i.e. a very strong threat), then the net value for this firm, of the variable *Image*, would be $1 - 3 = -2$. In other words, this owner-manager believes his image to be relatively poor compared to that of his rivals.

Thus *Strweak* is calculated as follows:

$$Strweak_j \equiv I_j = \sum_{i=1}^{15} (\alpha_{ij} - \beta_{ij})$$

where:

i is the variable being measured = 1, 2, 3 . . . 15

j is the firm's identity number = 1, 2, 3 . . . 150

α is a measure of the firm's own strengths = 0, 1, 2, 3

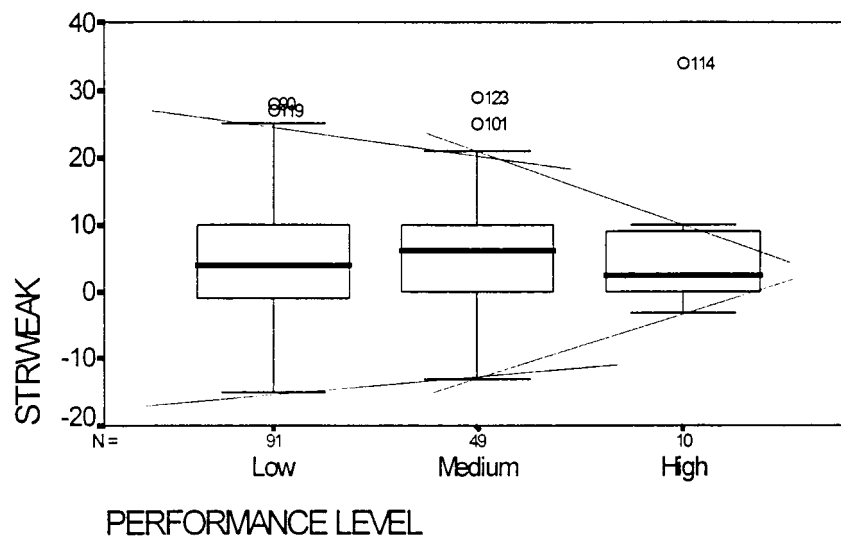
β is a measure of rivals' relative strengths = 0, 1, 2, 3

Strweak takes fifteen variables which are concerned with making comparisons (i) and sums the resulting net figures to give an index value (I), for each firm (j), of the net effect of strengths over threats. For cases where $I_j > 0$, the owner-manager is said to believe, on balance, that his firm is relatively stronger than its rivals; for $I_j = 0$, he believes, on balance, that his firm is on a par with its rivals; and for $I_j < 0$, he believes, on balance, that his rivals are relatively stronger than his firm. The first proposition to be tested, prompted by the discussion above, is as follows:

P₁: Most firms in the early stage of their life-cycle are prone to exaggerate their own strengths, and to under-estimate the threats from rivals and other factors external to the firm.

Having calculated the *Strweak* index for each of the 150 firms in the study, the boxplots of Figure 2 were generated. Boxplots, sometimes called box-and-whiskers plots, display summary statistics for the data. The box contains the values for 50% of cases, from the 25th to the 75th percentile, and the length of the box corresponds to the interquartile range. The line through the box is the median value (i.e. the value of the middle item when the items are arranged in an increasing or decreasing order of magnitude [cf. Freund and Williams (1970)]), and its position within the box determines the skewness of the distribution *viz.* the line cuts through the centre of the box when the mean equals the median and the distribution is perfectly symmetrical; the line is to the top of the box when the mean is less than the median and the distribution is negatively skewed; and the line is to the bottom of the box when the mean is greater than the median and the distribution is positively skewed. The "whiskers" extend above and below the box to the largest observed value that is not an outlier. Outliers and extreme values are denoted by "O" and "*", respectively.¹⁸

The plots of Figure 2 show the dispersion of results for the net strength index I_j , grouped by the firms' performance levels of "low", "medium" and "high", where the latter were previously determined using cluster analysis. First, we observe that the boxes look very similar across performance levels, with the spread of results ranging from



Note: *Strweak* measures respondents' perceived strengths compared to weaknesses: the more positive is this figure, the stronger he believes is his firm; the more negative is this figure, the stronger he believes are rivals. Where *strweak* = 0, the respondent believes his firm to be equally as good (or as bad) as rivals. We might consider respondents with a *strweak* index greater than zero to be relatively optimistic, equal to zero, relatively realistic, and less than zero, relatively pessimistic.

Figure 2. Variability of perceived net strengths by performance group.

roughly zero to a maximum of roughly 10. Next, the 'whiskers' of the boxplots become shorter, the higher the performance level. This suggests that the high performers are better able to estimate their own true ability in the early stages of the firm's life-cycle (reflected in their subsequently higher performance), and to more accurately appraise their relative strengths, than the lower performers, who range from being highly optimistic to highly pessimistic close to their business inception. These diagrams therefore provide descriptive support for theories of entrepreneurship mentioned above [cf. Jovanovic (1982); Frank (1988)] that emphasise the relatively rapid learning of *skilled* entrepreneurs in the early stage of the life cycle of small firms.

By direct inspection of these boxplots, one observes that around three-quarters of all firms rated themselves as being as good as, or better than, their rivals. This is reflected in the fact that the majority of the firm-level *Strweak* indices were greater than zero. The observations which related to high performers had I_j indices which clustered closer to zero¹⁹ than did those of both the medium and low performers. This evidence suggests that high performers neither underestimated the threats

posed by rivals, nor exaggerated their own strengths, as did the medium and low performers. The medium performers produced *Strweak* indices of up to 20, and the low performers, of up to about 25. This suggests that poor performers might both exaggerate or overestimate their own strengths, as well as underestimate rivals' threats. On the other hand, at least some of the medium and low performers produced indices as low as -13 or -15. This suggests that they sometimes overestimated, or were extremely fearful of, threats while, at the same time, they understated their own capabilities. In other words, their self-appraisals and analyses of competitors were somewhat erratic, to say the least. The evidence is therefore in favour of Proposition 1.

From the conspectus of the data provided by the boxplots, a further proposition is suggested, as follows:

- P₂: Those firms that are most likely to perform relatively well are also those most likely to make the more realistic appraisals of their strengths, weaknesses, opportunities and threats.

Whilst the descriptive evidence in support of Propositions P_1 and P_2 is suggestive, leading to the interpretation that high performers have a more realistic appraisal of their strengths, weaknesses, opportunities and threats, than do low performers, an appeal to a more inferential procedure is desirable. If higher performing firms do indeed have a better appraisal of net strength than do lower performing firms, one would expect a lower variance of the net strength index the higher the performance. This would require that we reject the null hypothesis that the performance groups have the same variances for the net strength index.

An SPSS routine was used to compute the Levene statistic for homogeneity of variance, to test the hypothesis described above. In fact, the Levene test implies that we cannot reject the null hypothesis,²⁰ so we do not have enough evidence to suggest that the variances are unequal, and in particular that higher performers have a lower net strength variance.²¹ This is not to confirm that the variances *are* equal; as possibly the propositions suggested above would find better support from a larger sample size. Thus, as they stand, the data are at least suggestive, in a descriptive sense, of more realistic appraisals of net strengths being a feature of high performing small firms.

Trade intelligence

The variable, *Intellig*, was calculated to test further the hypothesis that a greater knowledge and

awareness of rivals' activities would in turn be reflected in superior performance of small firms. The *Intellig* variable takes on integer values which represent the sum of values of seven possible variables,²² each of which represents a class of information that may be learned about rivals (e.g. market share, product quality). These are coded as unity, if the firm does know such information, and zero, if it does not. The maximum possible value for the variable *Intellig* is, therefore, "7", representing full information, and the minimum value is "0". The proposition to be explored is as follows:

- P_3 : The more information that is gathered on rivals, the better will be the firm's performance.

Figure 3 shows the boxplots generated by plotting the quantity of trade intelligence gathered against performance level. Although it appears that each performance group shows a similar dispersion in the intensity of information gathered, ranging from very little (value "zero") to very much (value "6" or higher), there is a clear increase in the median value as one moves from low, through medium to high performers. For low performers, the median number of items of information gathered on rivals is 3, for the medium performers, it is 4, and for the high performers, it is 5. The data become increasingly negatively skewed, the higher the performance level, which

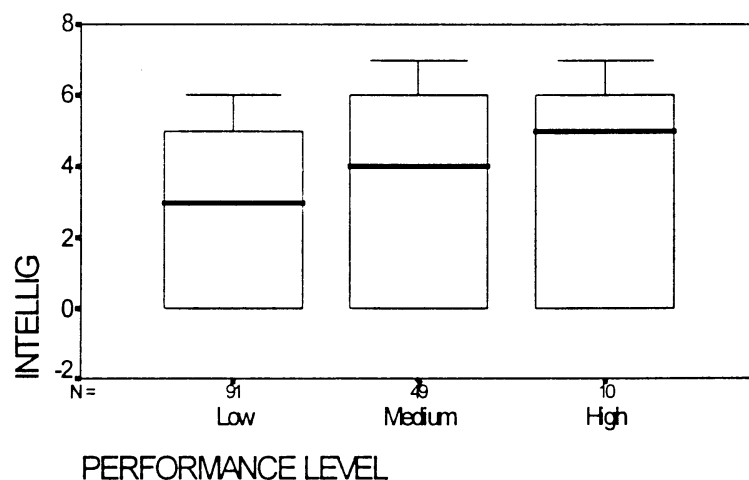


Figure 3. Quantity of trade intelligence gathered by performance group.

suggests that the amount of trade intelligence which is gathered, as measured by levels of information, tends towards a more intensive use of outside information, the better performing are the firms.

A cross-tabulation of the *Intellig* variable with the performance variable confirms the inferences suggested by a visual inspection of Figure 3 viz. that those firms who know more about their rivals also tend to be those who perform better. Put another way, an owner-manager who has a greater awareness of the potential threats posed by rivals is better able to position himself and his firm in the market in such a way that he is able both to exploit opportunities and to defend himself against attacks from competitors.

Although the descriptive evidence is quite persuasive, the inferential evidence is equivocal. Pearson and Likelihood Ratio tests for this array produce statistics which just fail to fall in the critical region.²³ The Mantel Haenszel (M-H) test for linear association provides a χ^2 statistic of 0.05923, which is certainly significant at the 10% level, and marginally significant at the 5% level. One therefore has modest inferential evidence for rejecting the hypothesis of no association between the pursuit of trade intelligence and small firm performance. Given the strong association between performance and trade intelligence suggested by the boxplots in Figure 3, it seems reasonable to argue that greater knowledge of the environment in which the firm operates will enable the owner-

manager to make more informed, and therefore better, decisions, leading in turn to enhanced performance [cf. Madu and Kuei (1993)].

Information technology (IT)

Let us now investigate a further proposition:

- P₄: Mere *belief* in the importance of information technology is not directly related to small firm performance.

The variable *Infotech* is a measure of the respondent's belief in the importance of information technology to his firm. It is coded as "0" for scarcely, "1" for moderately and "2" for very important. The results for this variable are cross-tabulated against performance group, and are presented in both boxplot (Figure 4) and tabular (Table I) format. From the boxplots, it can clearly be seen that the low and medium performers have very similar beliefs about the importance of information technology to their business. The responses range from scarcely, through moderately to very important, with the majority believing it to be of at least some use. The high performers, however, all appear to think IT is important, with the majority saying that it is very important.

The cross-tabulated results break down this information into more detail. 17.8% of the low performers believe IT is scarcely important to their business, compared to 14.3% of medium, but 0%

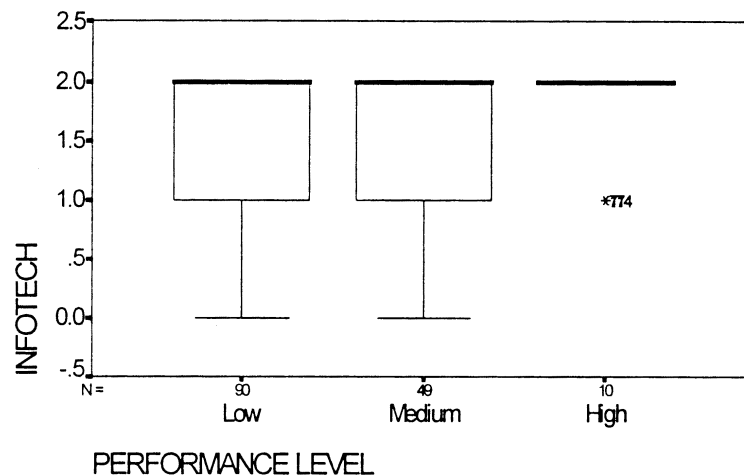


Figure 4. Belief of importance of information technology by performance group.

TABLE I
Importance of information technology cross-tabulated by performance group

INFOTECH	Count Exp Val Row Pct Col Pct Tot Pct	PERFORM			Row Total
		Low	Medium	High	
.00	16	7	0	23	15.4%
	13.9	7.6	1.5		
	69.6%	30.4%	.0%		
	17.8%	14.3%	.0%		
	10.7%	4.7%	.0%		
1.00	18	10	2	30	20.1%
	18.1	9.9	2.0		
	60.0%	33.3%	6.7%		
	20.0%	20.4%	20.0%		
	12.1%	6.7%	1.3%		
2.00	56	32	8	96	64.4%
	58.0	31.6	6.4		
	58.3%	33.3%	8.3%		
	62.2%	65.3%	80.0%		
	37.6%	21.5%	5.4%		
Column	90	49	10	149	
Total	60.4%	32.9%	6.7%	100.0%	
Chi-Square		Value		DF	Significance
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Pearson		2.35822		4	.67019
Likelihood Ratio		3.86154		4	.42507
Mantel-Haenszel test for linear association		1.61339		1	.20402
Minimum Expected Frequency -		1.544			
Cells with Expected Frequency < 5 -		2 OF		9 (22.2%)	

of the high performers. One-fifth of each performance group believes it to be moderately important. Further, 62.2% of low performers, 65.6% of medium performers and 80% of high performers believe IT to be very important to their business. These results are interesting in that the descriptive statistics suggest a high perceived importance of IT for each performance group, with this effect especially strong amongst the better performers. However, given the sample size, any formal statistical inferences that may be made on the basis of this evidence are non-robust. For the Pearson and the Likelihood Ratio tests, the relatively high

probability values computed indicate an unacceptably high probability that the results obtained may be due to chance (67% and 43%).

However, the M-H test for linear association indicates there is only a 20% probability that the pattern is obtained due to chance. We therefore tentatively conclude that a respondent's *belief* in the importance of IT to the firm does not necessarily translate into performance. An additional proposition may now be formulated:

P₅: *Actual* use of information technology is directly related to small firm performance.

This is now investigated by creating and examining a new variable for the actual use of IT, called *Ituse*. This variable measures the actual use of IT by the firm, by taking the sum of the responses for twelve kinds of uses²⁴ of IT (e.g. fax, personal computers), where an affirmative response to a specific IT use is coded as unity, and as zero otherwise. The maximum value of *Ituse* is therefore twelve, and the minimum, zero, where higher values indicate the more intensive use of information technology.

This “count” variable is used as an integer-valued index of IT use which can be graphed against performance to generate new boxplots, as shown in Figure 5. It suggests that the actual use of IT is greater, the higher performing are the firms. The median value for both low and medium performers is 4, compared to 5 for the high performers. What is more, the spread or dispersion of values is greater for the low and medium performers, compared to the high performers. The boxplot displays particularly well the considerably lower dispersal of the *Ituse* variable for high, compared to low performers. The firm which is a high performer appears to favour a level of IT use that makes the most of its potential within the firm, whereas the one that is a lower performer may fail to agree on an appropriate, let alone optimum, strategy for IT implementation.

For expository purposes, IT has been divided into the three groups of low, medium and high intensity of use, with “low” containing values of

0 to 2, inclusive, “medium”, containing values of 3 to 6, inclusive, and “high”, containing values of 7 to 10, inclusive, with 10 being the maximum observed. This creates a new variable, *Itusage*, which may assume just three integer values, dependent on the above grouping. Table II shows the cross-tabulation of what is now called *Itusage* (rather than *Ituse*) against performance. The low users of IT are also most likely to be low performers, with 33% of them falling into this category, compared to 20.4% of medium and no high performers. In the medium category of IT use fall 63.7% of low, 63.3% of medium and 80% of high performers. And finally, only 3.3% of low performers fall into the category representing the highest use of IT, compared to 16.3% of medium and 20% of high performers. In this case, the Pearson test's χ^2 value has a probability value of just 0.01148, and the Likelihood Ratio test's χ^2 value has a probability value of 0.00391. The M-H test for linear association gives a highly significant (0.0008) test statistic. In other words, the probability of obtaining these results simply by chance is extremely small. Taking full account of the forms of evidence presented, we conclude that the greater the level of IT use in the firm, the better it is likely to perform. Thus Proposition 5 is supported, leading to the conclusion that operationally using IT is what counts for performance [cf. Dodgson and Rothwell (1989)], as distinct from merely a belief that IT is useful [cf. Proposition 4].

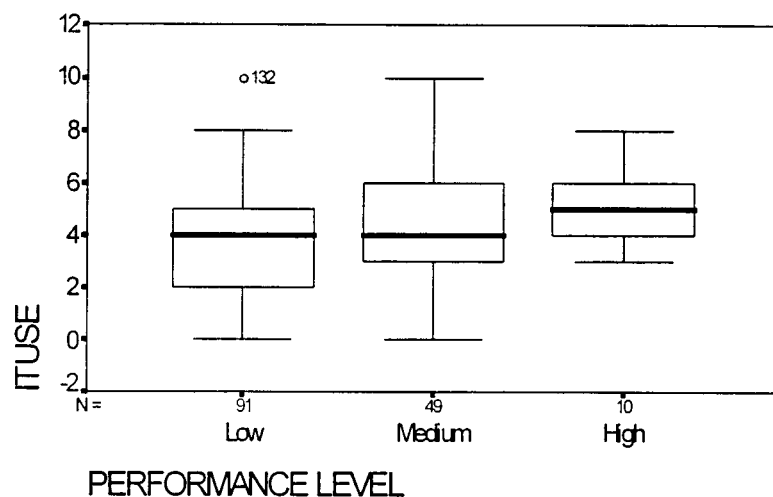


Figure 5. Actual use of information technology by performance group.

TABLE II
Actual use of information technology cross-tabulated by performance group

ITUSAGE	Count Exp Val Row Pct Col Pct Tot Pct	PERFORM			Row Total		
		Low	Medium	High			
		Low	30 24.3 75.0% 33.0% 20.0%	10 13.1 25.0% 20.4% 6.7%		0 2.7 .0% .0% .0%	40 26.7%
		Medium	58 58.8 59.8% 63.7% 38.7%	31 31.7 32.0% 63.3% 20.7%		8 6.5 8.2% 80.0% 5.3%	97 64.7%
		High	3 7.9 23.1% 3.3% 2.0%	8 4.2 61.5% 16.3% 5.3%		2 .9 15.4% 20.0% 1.3%	13 8.7%
Column Total	91 60.7%	49 32.7%	10 6.7%	150 100.0%			
Chi-Square		Value		DF	Significance		
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Pearson		12.95880		4	.01148		
Likelihood Ratio		15.41963		4	.00391		
Mantel-Haenszel test for linear association		11.23982		1	.00080		
Minimum Expected Frequency - .867							
Cells with Expected Frequency < 5 - 3 OF 9 (33.3%)							

To summarise, we saw that the majority of firms believe that IT is very important to their business, but that this *belief* is not significantly related to performance. However, we also found that *actual* use of IT is related to performance; and the more it is used, the higher is performance, to an extent which is highly statistically significant. The relative inability of owner-managers to relate their belief in the importance of IT to their firms' actual importance is consistent with the findings above that lower performers also have a lower awareness of their capabilities and opportunities than do higher performers. The latter are more

focused, with more similar strategies within their group, than firms at the other two levels of performance, who vary widely in their capacities for self-analysis and evaluation.

Finance

In a similar way to that described above for *Intellig* and *Ituse*, an integer index variable, *Funding*, was generated to measure the total number of sources of funding open to the firm. This variable is the sum of responses to a question about six possible sources of funding,²⁵ where "1"

represents use of that source, and “0” no use of that source. The maximum possible value for *Funding* is, therefore, “6”, and the minimum, a possible “zero”, though more typically, “1”; as few firms can exist with no financial injection at all. The proposition to be considered is as follows:

- P₆: Those firms with access to a greater variety of sources of funding will perform better than those who have fewer sources upon which they may draw.

Figure 6 shows the boxplots resulting from splitting up *Funding* by performance group. From visual inspection of the boxes, it is clear that the data suggest that each group is very similar. Half of all the small firms had access to between two and three sources of funding, with a mean value of “2” for the low and medium performers, and “3” for the high performers. Some low and medium performers had access to four different sources, whilst there are firms in each group that had used only one source from which to fund their business (most likely, their own cash injections). The cross-tabulated results give some further detail (Table III). A high proportion of the low (46%) and medium (59%) performers had used two sources of funding, compared to 40% of high performers; and 37.4% of the low performers, compared to 30.6% of the medium and half of the high performers, had used three sources. Very few had access to any more funding, and indeed the

high performers had used no more than three sources in total.

On average, therefore, the high performers appear to have had access to slightly more sources of funding than the lower performers. However, the Pearson and Likelihood Ratio tests, and the M-H test for linear association, produce statistics that do not fall in the critical region, so the results are inconclusive, and we cannot accept Proposition 6. Interpreting this result, we see that greater access to different sources of funding does not necessarily lead to higher performance. Indeed, it is shown that the higher performers can often use fewer sources of finance than the lower-performing groups. Of course, in an analysis of this kind, one would ideally be interested in the extent of funding provided from each source, but these data are not currently available from firms in a suitable form for addressing this question.

Let us now develop and examine a final proposition, in an attempt to probe the extent of empirical support for the findings of Storey (1994) and others. It reads as follows:

- P₆: The greater the dilution of equity that the owner-manager is willing to accept, the better will be his firm’s performance.

The evidence on willingness to dilute equity suggests that 40% of high performers would consider sacrificing a proportion of their stake in the business, or their equity holding, in order to

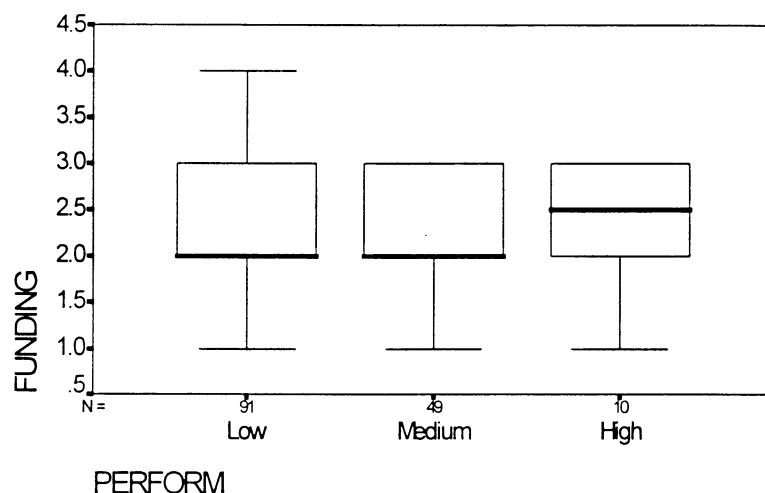


Figure 6. Number of sources of funding to which firm has access by performance group.

TABLE III
Number of sources of funding to which firm has access cross-tabulated by performance group

		PERFORM			Page 1 of 1
FUNDING	Count				Row Total
	Exp Val Row Pct Col Pct Tot Pct	1.00	2.00	3.00	
1.00	9	5	1	15	10.0%
	9.1	4.9	1.0		
	60.0%	33.3%	6.7%		
	9.9%	10.2%	10.0%		
2.00	6.0%	3.3%	.7%		50.0%
	42	29	4	75	
	45.5	24.5	5.0		
	56.0%	38.7%	5.3%		
3.00	46.2%	59.2%	40.0%		36.0%
	28.0%	19.3%	2.7%		
	34	15	5	54	
	32.8	17.6	3.6		
4.00	63.0%	27.8%	9.3%		4.0%
	37.4%	30.6%	50.0%		
	22.7%	10.0%	3.3%		
	6	0	0	6	
Column	3.6	2.0	.4		100.0%
	100.0%	.0%	.0%		
	6.6%	.0%	.0%		
	4.0%	.0%	.0%		
Total	91	49	10	150	
	60.7%	32.7%	6.7%	100.0%	
Chi-Square		Value		DF	Significance
-----		-----		----	-----
Pearson		6.17549		6	.40382
Likelihood Ratio		8.21965		6	.22245
Mantel-Haenszel test for linear association		1.02531		1	.31126
Minimum Expected Frequency -		.400			
Cells with Expected Frequency < 5 -		6 OF		12 (50.0%)	

promote growth. Slightly more of the medium and low performers (49% each) would act similarly. This figure is probably higher because the latter are more likely to be in need of extra funding than the high performers. The percentage of equity that each group wants to retain is between 49% and 53%, on average, with most nominating a desire to retain a controlling share [cf. Storey (1994)].

The variable *Stakhold* measures the minimum percentage of equity that the owner-manager would wish to retain, having first admitted a

willingness to at least consider equity dilution. This initial screening question meant that there were only 73 responses to *Stakhold* out of a possible 150. It is clear, therefore, that over 50% of respondents were unwilling to give up any share at all of their equity holding in the business.

For those who *would* sell off a share in the business, in return for equity investment, the result of *Stakhold* by performance group is shown in the boxplot of Figure 7. Considering the data, the first point to note is that most firms wish to retain at

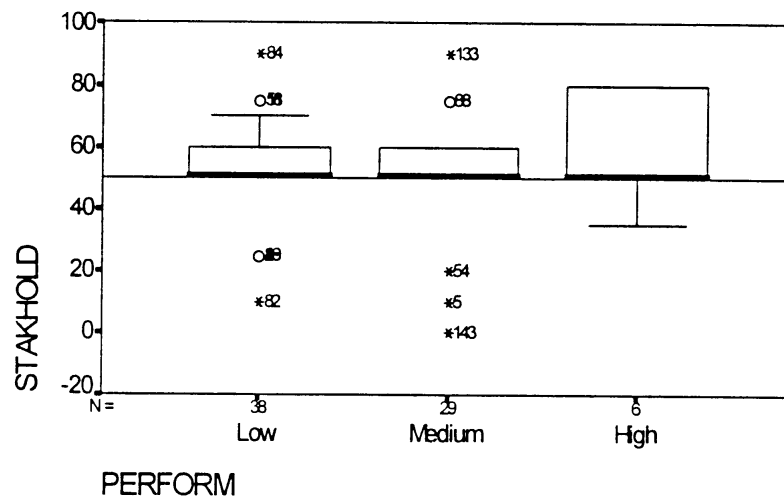


Figure 7. Minimum stake respondent would wish to retain in the business by performance group.

least a controlling share of the business (i.e. > 50%). For all three performance groups, the median value is just over 50%. The spread of results is similar for low and medium performers, and both have outliers or extreme values ranging from zero to around 90%. Fifty per cent of high performers fall in the range from 50% to about 80%, with the whisker of the boxplot extending down to just under 40%.

Apart from the fact that the high performers' responses are dispersed over a smaller range, in total, there seems to be little clear pattern emerging between performance groups. The M-H test statistic applied to the cross-tabulation of *Stakehold* by performance is insignificant,²⁶ and suggests *no* linear association. By contrast, the Pearson test is significant at the 5% level, and the Likelihood Ratio test is significant at the 10% level. This suggests that, for the first year of data, at least, there is an association which is non-linear and significant between the level of equity dilution an owner-manager would accept, and the subsequent performance of his firm. However, what this relationship might be is not quite clear.²⁷ Considering all the test evidence presented so far, there is very little, if any, support for an hypothesis which suggests an association between the owner-manager's willingness to dilute equity, and the small firm's performance.²⁸ As the data do not support such an association, we must therefore reject Proposition 7, and surmise that a willing-

ness to dilute equity will not necessarily enhance the firm's performance.

Conclusions

This paper uses a novel tripartite method for analysing business performance, and then attempts to explain the differences in performance by reference to the owner-manager's and firm's behaviour in the early stages of its life-cycle. Seven propositions or hypotheses were formulated, relating performance of the new small firm to SWOT analysis, trade intelligence, information technology (IT) and finance. These were explored descriptively with box plots, and inferentially with chi-square statistics, to provide an explanation for the new small firm's level of performance. Using several criteria, it finds support for the theory that faster learners, who learn to approach the business in a more formal, structured and planned manner, will experience subsequently higher performance.

Evidence was found to support the view that a higher awareness by the entrepreneur of (a) threats to the firm from its environment, and (b) its own internal strengths, would lead to better performance. Similarly, the owner-manager who actively gathers trade intelligence is shown to have a greater awareness of potential threats posed by rivals, and is therefore better able to position his business in the market, thereby exploiting opportunities and defending against competitors. The

entrepreneur's belief in the importance of IT to his business was not reflected in its performance. By contrast, the more intensive *actual* use of IT was found to have a relationship with performance which was positive and highly statistically significant. Finally, the number of sources of finance to which a firm had access was not found to be a reliable predictor of performance; nor was the willingness of the owner-manager to dilute his equity stake by taking on further outside investment.

This paper aims to extend the scope of analysis of small business strategy, itself an underdeveloped (though increasingly important) area, by consideration of factors like awareness and belief, as well as the more tangible areas like IT use and access to finance. It suggests that both types of factors would have an impact on performance. Future work, which might appeal to an extended version of this same database, would need to seek an explanation of how these effects might combine to explain small business performance.

Appendix: Definitions of variables used in the text

<i>Age</i>	Age of the firm, in months, from financial inception
<i>Funding</i>	Number of sources of funding that firm had used, measured 0 to 6
<i>Strweak</i>	Measure of respondent's perceived net strength of the firm
<i>Infotech</i>	Respondent's belief in the importance of IT to his firm, measured 0 to 2
<i>Intellig</i>	Quantity of trade intelligence gathered on rivals, measured 0 to 7
<i>Itusage</i>	Actual use of individual IT by the firm, = 0 to 2 (low), = 3 to 6 (medium), = 7 to 10 (high)
<i>Ituse</i>	Cumulative actual use of IT by the firm, measured 0 to 12
<i>Perform</i>	Performance category of firm, = 1 (low), = 2 (medium), = 3 (high)
<i>Stakhold</i>	Percentage of equity owner-manager would want to retain in the business

Notes

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¹ See, for example, Kreps (1990, Ch. 8) for a discussion of "The competitive firm and perfect competition", where economic agents operate under the assumption of full information. See also Reid's (1987, Ch. 9) discussion, by reference to applied principal-agent analysis, of the use of information in developing contracts between parties.

² Further descriptive evidence on the sample is contained in Reid (1996).

³ Smith (1998) provides more detail on the methodologies deployed.

⁴ For example, Jovanovic (1982, p. 649) suggests that "efficient firms grow and survive: inefficient firms decline and fail, [and that] firms differ in size not because of the fixity of capital, but because some discover that they are more efficient than others". Frank (1988, p. 336) states that "the difficulty facing the entrepreneur is that he does not truly know his own talent for running the firm", and finds (p. 335) that for "each period that the firm survives, it acquires more information concerning true productivity. Using this new information, the entrepreneur revises his beliefs concerning expected future profits". Thus he concludes (p. 343) that "the gradual dissipation of uncertainty . . . [is] a basis on which a number of features of entrepreneurial performance may be understood". In this paper we find that the entrepreneur adapts his behaviour in the light of experience, and that those who are quicker to learn and adapt will be those who experience better performance. For further discussion on "How organizations build knowledge bases", see Dosi (1988).

⁵ Viz. The bargaining power of *suppliers*; the bargaining power of *buyers*; the threat of potential new *entrants* to the market; the threat of new *substitute* products; and the rivalry that exists already amongst *competitors* in the market.

⁶ It may also be that information technology is used to assist in the differentiation of products, or to attack new niches [cf. Dodgson and Rothwell (1989); Cooper et al. (1991)].

⁷ See, for example, Storey (1994, p. 146) who suggests that "it may . . . be the case that more technologically sophisticated businesses, even in conventional sectors, are likely to grow more rapidly than those with lower levels of technical sophistication".

⁸ Compare Storey's (1994, p. 146) assessment that "in all the studies of fast-growth businesses, those which indicated that they had shared, or were willing to share, equity, were more likely to grow or have grown than the businesses which indicated a reluctance to share equity [and] it is clearly the case

that growth can be constrained by an unwillingness to share equity”.

⁹ Porter (1991, p. 9) suggests that “once having assessed the forces affecting competition in an industry and their underlying causes, the corporate strategist can identify the company’s strengths and weaknesses. The crucial strengths and weaknesses from a strategic standpoint are the company’s posture *vis-à-vis* the underlying causes of each force. [Thus] the strategist can devise a plan of action that may include (1) positioning the company so that its capabilities provide the best defense against the competitive force; and/or (2) influencing the balance of the forces through strategic moves, thereby improving the company’s position; and/or (3) anticipating shifts in the factors underlying the forces and responding to them, with the hope of exploiting change by choosing a strategy appropriate for the new competitive balance before opponents recognize it”. See also Porter (1980, 1985).

¹⁰ For example, Mintzberg (1994, p. 107) suggests that the strategy-making process should involve “capturing what the manager learns from all sources (both the soft insights from his or her personal experiences and the experiences of others throughout the organization and the hard data from market research and the like) and then synthesizing that learning into a vision of the direction that the business should pursue”.

¹¹ See Reid and Smith (1996) and Smith (1997) for detailed explanation and justification of using this method, and the results it produced for this sample of firms, using SPSS software.

¹² See, for example, Everitt’s (1980) useful text on the subject.

¹³ Which accords well with findings of the likes of, for example, Storey (1994) that only a small percentage of firms (< 10%) are “high flyers”; and Birch who, at the Jönköping International Business School Conference on “Entrepreneurship, SMEs and the Macro Economy”, 13–14 June 1996, reported similar findings based on a very large U.S. database.

¹⁴ ANalysis Of VAriance. See, for example, Wonnacott and Wonnacott (1969) *Introductory Statistics*. This, and all other computations mentioned below, was undertaken using SPSS software.

¹⁵ The validity of the assumption underlying this (*viz.* equal variances) may be subjected to the Levene Test for the homogeneity of variances. The test statistic is computed as 1.0424, which is less than the critical value for $F(2, 147)$, which is approximated by $F(2, \infty) = 3.00$. Thus we cannot reject the null hypothesis of homogeneity of variances.

¹⁶ It should also be mentioned here that various tests using sectoral dummies, and a simple binary variable comparing manufactures with services, were shown to have no significant effect on performance.

¹⁷ Adaptability, forward planning, plant and resources, managers, employees, product quality, product range, organisation’s structure/systems, customers, suppliers, market share, technological or specialist know-how, innovativeness/new ideas, image, breakdown of barriers to trade in the EC.

¹⁸ See, for example, Norusis (1993, p. 186) *SPSS Base System Users Guide* for further explanation on how Boxplots are constructed.

¹⁹ Nearly all observations for this group fell below the value of “10”.

²⁰ The test statistic of 0.1011 with (2, 147) d.f. is very low, and has a 0.904 prob. value.

²¹ In addition, the chi-square test statistics for *Strweak* cross-tabulated by performance [*viz.* Pearson (0.37218), Likelihood Ratio (0.25894) and Mantel-Haenszel test for linear association (0.43087)] imply that we cannot reject the hypothesis of no association.

²² Market share, new products, product quality, financial performance, customer relations, personnel, marketing methods.

²³ Pearson $\chi^2 = 0.30553$; Likelihood Ratio $\chi^2 = 0.15994$.

²⁴ Telephone, fax, answering machine, electronic mail, telephone conferencing, video conferencing, mobile phone, satellite link, radio communication, microfiche, personal computers, electronic databases.

²⁵ Personal financial injection, loan from family or friend, family or friend taking “share” in the business, bank loan, venture capital equity stake, “business angel” equity stake.

²⁶ Chi-square test statistics for year 1 *Stakhold* by performance are: Mantel-Haenszel test for linear association (0.77298); Pearson (0.0028); and Likelihood Ratio (0.07671).

²⁷ Similar tests for the subsequent year show no association between *Stakhold* and Performance: M-H test for linear association = 0.95489; Pearson = 0.83635; and Likelihood Ratio = 0.83635. Thus, there may well be a life cycle aspect to this association, or its absence.

²⁸ Compare this with Reid, Terry and Smith (1997) who investigate risk management in the venture capital industry. They show that mere willingness by the entrepreneur to share the equity of his business, in return for a share of the downside risk associated with running the business, does not necessarily suggest a good project. Venture capitalists only invest in a very small percentage of those firms who are *willing* to dilute equity, having first screened out very effectively those they believe will not succeed.

References

- Cooper, A. C., G. E. Willard and C. Y. Woo, 1991, ‘A Reexamination of the Niche Concept’, in H. Mintzberg and J. B. Quinn (eds.), *The Strategy Process: Concepts, Contexts, Cases*, 2nd edn., Englewood Cliffs, NJ: Prentice-Hall International.
- Dodgson, M. and R. Rothwell, 1989, ‘Technology Strategies in Small and Medium-sized Firms’, in M. Dodgson (ed.), *Technology Strategy and the Firm: Management and Public Policy*, Harlow, Essex: Longman.
- Dosi, G., 1988, ‘Sources, Procedures, and Microeconomic Effects of Innovation’, *Journal of Economic Literature* **16**, 1120–1171.
- Everitt, B., 1980, *Cluster Analysis*, 2nd edn., London: Heinemann Educational Books Ltd.
- Frank, M. Z., 1988, ‘An Intertemporal Model of Industrial Exit’, *Quarterly Journal of Economics* **103**, 333–344.
- Freund, J. E. and F. J. Williams, 1970, *Modern Business Statistics*, 2nd edn., London: Pitman.
- Jovanovic, B., 1982, ‘Selection and Evolution of Industry’, *Econometrica* **50**, 649–670.

- Kreps, D. M., 1990, *A Course in Microeconomic Theory*, Hertfordshire, U.K.: Harvester Wheatsheaf.
- Madu, C. N. and C.-H. Kuei, 1993, 'Introducing Strategic Quality Management', *Long Range Planning* **26**(6), 121–131.
- Mintzberg, H., 1979, *The Structuring of Organizations*, New Jersey: Prentice-Hall.
- Mintzberg, H., 1994, 'The Fall and Rise of Strategic Planning', *Harvard Business Review* **72**(1), 107–114.
- Norusis, M. J., 1993, *SPSS Base System User's Guide 6.0*, Chicago, IL: SPSS Inc.
- Porter, M. E., 1980, *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, New York: Free Press.
- Porter, M. E., 1985, *Competitive Advantage: Creating and Sustaining Superior Performance*, New York: Free Press.
- Porter, M. E., 1991, 'How Competitive Forces Shape Strategy', in M. E. Porter (ed.), *On Competition and Strategy*, Harvard Business Review Paperback No. 90079.
- Porter, M. E. and V. E. Millar, 1991, 'How Information Gives You Competitive Advantage', in M. E. Porter (ed.), *On Competition and Strategy*, Harvard Business Review Paperback No. 90079.
- Reid, G. C., 1987, *Theories of Industrial Organization*, Oxford: Basil Blackwell.
- Reid, G. C., 1996, 'Capital Structure at Inception and the Short-run Performance of Micro-firms', CRIEFF Discussion paper No. 9607, Department of Economics, University of St Andrews.
- Reid, G. C. and J.A. Smith, 1996, 'What Makes a New Business Start-up Successful?', CRIEFF Discussion Paper No. 9618, Department of Economics, University of St. Andrews.
- Reid, G. C., N.G. Terry and J. A. Smith, 1997, 'Risk Management in Venture Capital Investor-Investee Relations', *The European Journal of Finance* **3**(1), 27–47.
- Smith, J. A., 1997, *Small Business Strategy: An Empirical Analysis of the Experience of New Scottish Firms*, University of Abertay Dundee Ph.D. thesis.
- Smith, J. A., 1998, 'Strategies for Start-Ups', *Long Range Planning* **31**(6), 854–869.
- Storey, D. J., 1994, *Understanding the Small Business Sector*, London: Routledge.
- Wonnacott, T. H. and R. J. Wonnacott, 1969, *Introductory Statistics*, New York: Wiley.

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