

Modelling Small Business Growth and Profitability

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ABSTRACT. This paper develops a simple structural model relating small business performance to firms' market position and the characteristics of their owner-managers. Attention focuses on two questions: What determines firms' choice of business strategy? And, how does strategy choice change subsequent business performance? Taking into account both relationships, the paper examines the links between the performance of a large group of Irish small businesses over the 1993–94 period and their market and owner-managers' characteristics in 1991.

The analysis suggests three main empirical results. First, firms' turnover growth and return on assets are only weakly related in the short-term; above average growth rates are therefore no guarantor of high profitability. Moreover, a number of characteristics of firms' market position and their owner-managers are found to have the opposite effects on profitability and growth rates. Secondly, our data provides no evidence of the persistence of turnover growth rates above or below the average. Above average profit rates were also found to persist only in the very short term. Thirdly, small firm performance is shown to depend strongly on strategy choice, with turnover growth being particularly strategy dependent. This highlights the importance for small firms of making the correct strategy choices, a point emphasised by the negative profitability and growth effects of some strategy choices. One strategy choice that had positive effects on both profitability and growth was the development of new export markets.

1. Introduction

An owner-manager, a group of partners or the members of a family dynasty dominate most small businesses.¹ To explain the performance of this type of firm is therefore to account simultaneously for the idiosyncrasies, background and aspirations

of the controlling individual or group as well as the capabilities and market situation of the organisation. Because of the complexity of this network of issues, most previous studies have focused on specific marginal relationships studying, for example, firms with common organisational (Westhead and Cowling, 1996), ethnic (Deakins et al., 1996), locational (Smallbone et al., 1996) or industrial (Dickson et al., 1996) characteristics. Other studies have chosen to adopt a partial perspective, focusing, for example, on the relationship between training and business growth (Vyakarnam et al., 1996), the performance effect of innovation (Keogh et al., 1996; Roper, 1997) or the specific impact of owner-managers' characteristics (Brockhaus, 1994).

Underlying each group of studies, however, is the implicit assertion that there exist common linkages between business characteristics, market position and performance.² This assertion, implicit in qualitative studies, is made explicit in formal, and causal, analyses of small business performance. For example, Barkham et al. (1996), based on information on small firms from four U.K. regions, used multivariate techniques to explain turnover growth. The use of such techniques is important in exposing the *relative* importance of the various determinants of business performance and allowing quantitative predictions to be made. The ability of such techniques to expose the mechanisms or business processes by which individual factors influence business performance, however, depends on the modelling approach adopted. In particular, reduced form models tend to obscure mechanisms that can be exposed by adopting a more structural approach. This paper develops a straightforward structural framework for the relationships between the performance of small businesses (defined here as having 10–100 employees) on the one hand, and owner-managers'

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characteristics, firms' operating environment, and their strategic and organisational choices on the other. The argument identifies two separate relationships relating firstly to the determinants of firms' strategic choices, and secondly to the link between firms' strategic choices and subsequent business performance. The framework used to explain firms' strategic choices is similar to that used in previous analyses of technological innovation (e.g. Geroski, 1990; Harris and Trainor, 1995; Love et al., 1996). These models are extended, however, to allow for the potential catalytic role of the owner-manager. Firms' strategic choices in any period are therefore related to the market position of the business at the start of the period, the characteristics of the owner-manager, the aspirations of the company and the anticipated operating environment.

The second relationship considered is that between firms' strategic choices and business performance. The formulation adopted here follows relatively closely the argument developed in a number of studies associated with the PIMS (Profit Impact of Market Strategy) project (e.g. Carroll, 1985; Buzzell and Gale, 1987). In the context of larger business units, this suggests that firm performance can be explained in terms of firms' current market position – thought of as representing the outcome of past strategy – and their current strategic choices. In the PIMS models, however, firm performance is measured purely in terms of return on sales and return on investment. A broader conception of "performance" is implicit in the framework outlined here embodying both growth and profitability measures along with other indicators of firms' market position.

The remainder of the paper is organised as follows. Section 2 outlines the main conceptual framework and discusses the estimation process. Section 3 describes the data, drawn from the Competitive Analysis Model Project (CAM) database, which is used for the analysis. Section 4 presents the main empirical results relating to the strategic choice and strategy-performance relationships. Section 5 summarises the main findings and draws out some policy implications.

2. Model specification

The model of the links between the characteristics of the owner-manager, firms' strategic choices and small business performance developed in this section provides the basis for the subsequent estimation. It also provides a framework within which to encompass and interpret the findings of a number of recent studies of small firm performance (see Roper, 1998). As a starting point, consider the factors that determine a small firm's strategic choices, which we assume are made at the start of each period. Four groups of determinants may be identified. First, the firm's strategic legacy or market position at the *end* of the previous period (Buzzell and Gale, 1987). This would include any variables for which the firm might have targets (e.g. sales growth, profitability) and other indicators of the initial market position of the firm (e.g. above average product quality or market share). To indicate the partition between these aspects of the firm's market position we might consider a vector $S_t = (\Pi_t, L_t)$. Where S_t represents all aspects of the market position of the firm at the end of period t , Π_t is a vector of market position indicators for which the firm also has business targets (i.e. sales growth, profitability and asset utilisation), and L_t is a vector of other indicators of firms' market position.³

The second group of factors determining the firm's strategic choices might be said to be the characteristics, resources, motivation and attitudes of the owner-manager at the start of period t , denoted E_t . Thirdly, firms' strategic choices will depend on the specific business targets or objectives of the owner-manager over period t . These are assumed to be specified at the start of the period and to relate to each element of the market position vector S_t . These targets can be written: $S_t^* = (\Pi_t^*, L_t^*)$, where Π_t^* is a vector of business targets relating to sales growth, profitability and asset utilisation and L_t^* are targets relating to other aspects of the firm's market position (e.g. market share). The final group of influences on the firm's strategic choices will be the anticipated operating environment (O_t^e). This will include the anticipated reaction of competitors to any strategic initiatives but would also embrace all other aspects of business conditions such as capital requirements or the possibility of new entrants. As such, these

factors may either act to constrain firms' strategic activity or create new market opportunities.

Combining these four elements suggests that the set of strategic choices made by the firm at the start of period t , I_t , may be written:⁴

$$I_t = k(S_{t-1}, E_t, S_t^*, O_t^e) \quad (1)$$

The other main link in the model relates to the determinants of the firm's market position at the end of the period, i.e. S_t . Here three groups of factors may be distinguished. First, the firm's market position at the end of the previous period, i.e. S_{t-1} (Buzzell and Gale, 1987). Secondly, the strategic choices or innovations made by the firm (at the start of) period t , i.e. I_t . Thirdly, the actual operating environment that emerges during the course of period t , i.e. O_t . Taken together this suggests:

$$S_t = g(S_{t-1}, I_t, O_t) \quad (2)$$

The basic structural model linking owner-manager's characteristics, the firm's strategic choices and business performance is then given by equations (1) and (2).⁵ This system has the advantage that it is essentially recursive; strategic choice decisions, governed by equation (1) are made at the start of the period and are therefore predetermined with respect to equation (2) that determines business performance. This structure allows the two equations to be estimated separately although, in the formulation above, equation (1) is non-operational because of the inclusion of the unobserved term relating to the firm's expected operating environment. Assuming that expectations are subject only to random errors, i.e. $O_t^e = O_t + \varepsilon_t$, where ε_t are assumed to be random, equation (1) can be rewritten as:

$$I_t = k(S_{t-1}, E_t, S_t^*, O_t) + \eta_t \quad (1a)$$

That is, the firm's set of strategic choices (I_t) can be explained in terms of its market position at the end of the previous period (S_{t-1}), the characteristics of the owner-manager (E_t), any targets the firm may have (S_t^*) and its operating environment (O_t). The probability of a firm making a particular strategic choice is, however, unobservable. Instead, a dichotomous variable is observed which takes value one if the firm makes some strategic choice and zero otherwise. Logit estimation

techniques are therefore relevant. The second stage of the estimation procedure relating to equation (2), seeks to explain business performance conditional on firms' strategic choices. Attention here focuses on three inter-connected performance measures (turnover growth, return on capital and the asset/turnover ratio) which *a priori* might be expected to be related to similar business, market and strategy influences. This suggests the possibility of non-zero error covariances between equations, and that system estimation methods will be most efficient. The final stage of the estimation procedure combines the results of the Logit and business performance models to identify the direct and indirect marginal effects of the set of characteristics of the owner-manager, operating environment and business targets on performance.

3. The Competitive Analysis Model (CAM) database

The empirical analysis is based on data from the CAM database. This was derived from an interview survey with small firms in Ireland conducted between April and September 1995. The target population for the survey was manufacturing companies with 10 to 100 employees that had been trading for at least four years. The intention of the survey was to collect data from a sample of firms considered to have significant growth potential.⁶ To this end, samples were constructed with the assistance of the appropriate development agencies in Northern Ireland (LEDU – the Local Enterprise Development Unit – and the IDB – Industrial Development Board) and Forbairt in the Republic of Ireland. The final sample consisted of 1853 small companies, of which 785 were in Northern Ireland.

Prior to the main survey a pilot survey of forty face-to-face interviews was undertaken with companies in Northern Ireland. This was used to validate questionnaire design and ensure common response patterns. Subsequent interviews with sample companies were conducted either face-to-face or by telephone. An overall response rate of 37.9 per cent was achieved giving a usable sample of 703 companies (McFerran et al., 1996). Response rates differed significantly, however, between Northern Ireland (51.4 per cent) and the

Republic of Ireland (27.8 per cent) contributing to a sample biased towards Northern Ireland companies.⁷

The focus of the CAM survey was firms' activities over the 1991–94 period and the information collected included accounting information for the business years 1991, 1993, and 1994.⁸ In the interviews, 1991 was also taken as the base year against which strategy changes over the 1991–94 period were assessed. For example, firms were asked whether they had introduced any new or improved products over the 1991–94 period. Attention then focuses on the contribution of these strategy choices and other factors to business performance over the 1993–94 period. The relatively short time period covered by this performance data is, however, a significant limitation of the current study. In particular, it may be that certain strategy choices yield benefits only in the long-term or have perverse short-term effects. This means that caution is necessary in the interpretation of the empirical results. In the estimation, business performance is measured by return on assets, turnover growth and a measure of the efficiency of asset utilisation (the asset to turnover ratio). Detailed variable definitions and descriptive statistics are given in the data appendix, however, two features of the main variables of interest are worthy of note at this point.⁹ First, firms' turnover growth rates in 1993–94 were significantly more variable than either the asset to turnover ratio or return on assets.¹⁰ Second, while there was a strong and significant correlation between the return on assets and asset to turnover ratio neither of these variables had significant correlations with turnover growth.¹¹ *A priori* this would suggest that the degree of simultaneity between turnover growth and the other two target variables is likely to be limited although important residual co-variances may still be expected.

In addition to the three target variables, and information about the owner-manager, firms' market position and operating environment, information was also sought on eleven strategic initiatives that might have been undertaken by firms during the 1991–94 period. Again, variable definitions and descriptive statistics are given in the data appendix but it is useful to divide the strategic initiatives into three groups reflecting external (products and markets) and internal

(systems, management and control) aspects of firms' strategic activity:

- (a) *Products and markets* – three strategic initiatives were considered relating to the introduction of new and improved products, the introduction of a new group of products (differentiated by technology, product type or market), and entry into any new export market. The most common of these initiatives, taken by 89 per cent of firms included in the analysis, was the introduction of new/improved products. Smaller proportions of firms had introduced new product groups over the 1991–94 period (28 per cent) or entered new export markets (39 per cent).
- (b) *Systems initiatives* – two systems initiatives were considered: the achievement of ISO 9000 certification, and the introduction of computer-based management accounting systems capable of comparing actual performance to budgets and generating variances. Just over a third of firms in the sample had introduced this type of management accounting systems during the 1991 to 1994 period, with a similar proportion obtaining ISO 9000 quality certification for the first time.
- (c) *Management and control* – two indicators were included relating to whether the owner-manager had taken steps to increase his or her ownership and control over the enterprise from 1991 to 1994. In around a third of firms in the sample, power had been centralised over the period with around a fifth centralising ownership. Three further indicators were included relating to changes in managerial techniques. Around half of the sample firms indicated that from 1991–94 they had moved towards more non-hierarchic managerial approaches, increasing the importance of reasoning, feedback and agreement (RFA). The remainder of the sample firms indicated a move towards more structured managerial techniques involving increased direction, and standardised recruitment (SRT).¹²

4. Empirical analysis

The empirical analysis is divided into three sections. The first deals with the modelling of

firms' strategic choices; the second focuses on the modelling of business growth and profitability; and the third describes the derivation of marginal effects. At the latter stage we are able to distinguish between the direct effect of each factor on business performance and their indirect effect through the choice of business strategy.

4.1. *Making strategic choices*

The framework outlined earlier suggested that firms' strategic initiatives or choices are a function of their market position and aspirations, the characteristics and background of the owner-manager and their anticipated operating environment. Studies reviewed by Storey (1994) highlight a number of variables in each group which have been linked to small business growth. Less evidence exists on the determinants of firms' strategic choices (although see Barkham et al., 1996). A broadly based exploratory analysis was therefore conducted which identified a group of fifteen explanatory variables that were significant in a number of strategic choice decisions.¹³ Table I gives the results of Logit regressions of each strategic choice indicator on the set of firm and owner-manager characteristics in 1991 (i.e. equation 1a). Each of these models was significant at the 1 per cent level using a Chi-square test, and the signs and significance of individual variables proved robust to changes in specification. Looking at the percentage of correct predictions, however, suggests marked differences in the power of the individual models to discriminate between those firms taking ("adopters") and not taking ("non-adopters") the various strategic initiatives. In six cases the equations evidenced a reasonable ability to predict correctly. In four other cases, however (new product groups, new quality certification and the centralisation of ownership and control), the models identified less than a third of those firms taking each strategic initiative. In these cases it is clear that the set of explanatory variables considered was insufficient to discriminate between those taking and not taking the various initiatives.¹⁴

The equations do suggest, however, that firms' propensity to take strategic initiatives related to products, markets or managerial systems was reduced where a firm had a strong focus on a

single market, product or had above average product quality. There was little evidence of any significant relationship between firms' market position and strategic initiatives related to the management and control of the business. Essentially similar results were obtained in respect of the sales and employment targets of the businesses (Table I). Firms' strategic targets had little discernible impact on their propensity to take strategic initiatives relating to management or control but stronger links were evident between firms' strategic targets and their product, markets and systems choices. For example, firms with more ambitious turnover growth targets were more likely to undertake strategic initiatives related to products, markets and/or system development. In terms of the impact of owner-managers' characteristics on firms' strategic choices, the most consistent result in terms of sign related to the positive – albeit often insignificant – impact of owner-managers' educational background (Table I). Older owner-managers were also significantly less likely to take strategic initiatives related to changing the pattern of management and control within their business.

4.2. *Sales growth and profitability*

Equation (2) suggests that sales growth, return on assets and the asset to turnover ratio in 1993–94 were determined by firms' strategic choices, their market position in 1991 and their operating environment over the 1991 to 1994 period. Following earlier studies (e.g. Steer and Cable, 1978; Cubbin and Leech, 1986), initial estimation was undertaken using instrumental variables (i.e. 3SLS) for the system of three equations relating to sales growth, return on assets and the asset to turnover ratio. The results obtained, however, in terms of equation standard errors, were inferior to those obtained from modelling turnover growth by OLS (an approach also adopted by Barkham et al., 1996) and adopting a simultaneous approach (i.e. 3SLS) to the return on assets and the asset to turnover ratio.¹⁵ It is these results which are reported in Table II which also gives system coefficients allowing for the simultaneity between the estimated equations.¹⁶

The first group of variables included in the regressions were the values of the target variables

TABLE I
Strategic choice logit models

	Products and markets			Systems		Management and control				
	New product groups	Product changes	New export markets	New quality certific.	New M'ment accs sys.	Centralised control	Centralised ownership	Increased RFA	Increased direction	Increased SRT
Constant	-1.124	3.016**	2.215	-0.023	0.472	0.357	-0.794	-0.891	-1.850	-0.860
<i>Market position</i>										
Strong product focus	-0.022**	-0.028**		-0.008**	-0.648**	-0.005	-0.007	0.004	0.004	
Strong market focus		-0.005	-0.013*						0.011	
Quality above average	-0.742**		-0.517	-0.058				-0.361*		
<i>Owner-manager (OM) characteristics</i>										
OM is owner				-0.377*	0.621**		1.634**			
OM education (years)	0.048		0.031	0.042*		0.029	0.036	0.053**		0.045
OM shares power	-0.202		-0.120	-0.170	-0.376	0.278	0.368	0.246		
OM age (years)	0.028*	-0.003				-0.031**	-0.026**	-0.021**	-0.049**	-0.022
OM large firm experience		-0.442		0.325	-0.530*	0.285	0.397	0.381*		0.104
OM years in industry		-0.033**	-0.022		-0.029**				0.020	
<i>Targets</i>										
Employment growth aim	-0.016**			-0.006	0.009			0.006	0.011	
Sales target indicator	0.712		-1.720**	0.884	-1.711**					
Sales target intensity	0.019**	0.005	0.023**		0.021**				0.006	0.006
<i>Market conditions</i>										
Customer power			-0.021**							0.006
Shortages of labour			0.013**	-0.006*						0.008*
High capital requirements			-0.005		-0.007		-0.007	0.006	-0.005	
Number of firms	293	266	247	623	253	634	543	546	252	294
Log likelihood	-161.2	-161.4	-152.0	-351.1	-159.6	-375.9	-231.0	-364.3	-163.2	-194.4
Chi-square	43.7	40.45	33.3	73.8	31.3	46.1	53.7	28.3	22.9	10.2
<i>Percentages correct predictions</i>										
Overall (%)	68.9	68.8	65.2	72.4	63.2	68.3	82.5	57.7	65.9	59.9
Non-adopters (%)	89.5	59.6	74.8	92.0	66.2	94.9	98.6	52.4	64.8	20.5
Adopters (%)	24.7	75.7	52.8	29.6	60.2	12.7	10.1	62.9	66.9	87.8

Notes:

1. Variable definitions are included in the Data Appendix. See Roper (1998) for a detailed description of the estimation procedure adopted.
2. In addition to the core variables included in the table a number of other variables were significant in only one equation: an investment target indicator in New Product Groups (coefficient = -0.706); group membership and partnership indicators in the New Quality Certification equation (coefficients 0.738 and -1.028 respectively); a market share growth aim in the Centralised Ownership equation (coefficient = -0.018) and a market share target indicator in the Increased Direction equation (coefficient = 1.044); and shortages of finance were significant in the new product groups (coefficient = 0.012) and product changes (coefficient = 0.010) equations.
3. Those variables marked with a double asterisk were significant at the 5 per cent level. Single asterisk indicates significance at the 10 per cent level.

Source: Competitive Analysis Model Product Database.

in 1991. Significant positive coefficients on these variables would suggest persistence of either above or below average profitability and/or growth rates. Conversely, insignificant coefficients would imply no continuity and cast doubt on the value of previous profit and/or growth performance as predictors of current performance. In the estimation the lagged variables proved wholly insignificant in the turnover growth equation but were positive and significant in the equations relating to return on assets and asset utilisation (Table II). That is, there was no evidence of any persistence in turnover growth rates but profitability and asset utilisation were more strongly linked to their previous level. In broad terms this reflects previous studies which provide stronger evidence of profit rate persistence.¹⁷

The other market position variables included in the equations were intended to capture the effect of the firms' initial competitive position. Firm size, for example, was found to have a positive effect on both turnover growth and profitability, while firm age had a significant negative effect (see also CSBRC, 1992; Dunne and Hughes, 1994; Hakim, 1989; Barkham et al., 1996). Other firm characteristics which have been found to be important in previous studies of small firm growth have included the legal status of the company and whether or not it was part of a group of firms (e.g. Hakim, 1989; Storey, 1994; Kallenberg and Leicht, 1991; Reynolds and Miller, 1988). Here, however, variables reflecting group membership and the status of the company as a legal partnership had positive but insignificant coefficients (Table II).

In addition to these organisational characteristics a number of variables were included relating to firms' sales profile and products. A high concentration of sales in a single product group (product focus) had a positive but insignificant effect on turnover growth but a more important positive effect on asset utilisation. Conversely, market focus, a high concentration of sales in a single geographical market, had no growth effect but had a positive impact on profitability. This latter effect is similar to one of the key findings from the PIMS project, which suggests a strong positive relationship between market share and rates of return (Buzzell and Gale, 1987). The PIMS studies also suggest, however, that higher

product quality is linked to higher rates of return (Buzzell and Gale, 1987). In the regression analysis two product quality indicators were used; the firms' subjective assessment of whether its product quality was better, equal to or worse than that of its closest competitors, and a dummy variable for whether the firm had ISO 9000 in 1991. Both variables proved insignificant in both the growth and profitability equations but were positively related to asset utilisation.¹⁸

In the model it was suggested that operating environment may also have potentially important effects on business performance. Powerful customers, suppliers and/or competitors would all be expected to have a negative impact on profitability and growth rates. *A priori* the effects of potential factor shortages are less clear; in the short-term they may lead to rationing and increased unit costs, in the medium to long-term, however, such shortages may have positive effects if factor utilisation is improved. In the CAM dataset firms' operating environment is represented primarily by a set of subjective indicators of the importance of various competitive pressures and factor shortages and these indicators are used in the regression analysis.¹⁹ The most significant effects related to customer power which had its expected negative impact on growth and profitability. Material shortages also had significant performance effects reducing growth but increasing profitability, with capital shortages impacting significantly only on the asset to turnover ratio. Plants' location within Northern Ireland or the Republic of Ireland also proved relatively unimportant despite previous evidence of the impact of differences in accounting practices on profit measures (Hewitt-Dundas et al., 1996).

In addition to their direct effects on business performance, firms' initial market position and (anticipated) market conditions also have an indirect effect through their impact on strategy choice (Table I). Owner-managers' characteristics and business targets also influence performance through this indirect route suggesting the importance of the sign and size of the coefficients on the strategy variables. In the equations, the introduction of new product groups had a significant positive effect on turnover growth although no effect was evident from the introduction of new or improved products (Table II). The development of

TABLE II
Growth and profitability equations and system coefficients ($N = 210$)

	Equation coefficients			System coefficients		
	Turnover growth	Profit to assets	Assets to turnover	Turnover growth	Profit to assets	Assets to turnover
<i>Growth and profitability</i>						
Assets to turnover 1993–94	–0.001**	–0.172**				
Profit to assets 1993–94			–0.181**			
<i>Initial market position (1991)</i>						
Assets to turnover ratio	0.000**		0.304**	0.000	–0.054	0.314
Profit to assets		0.293**		0.000	0.302	–0.055
Turnover growth		13.477**	–21.436**	0.019	17.714	–24.637
Firm size	0.000	0.140**		0.000	0.144	–0.026
Firm age	–0.001*	–0.083*		–0.001	–0.086	0.016
Part of larger group			16.426	–0.013	–2.916	16.953
Product focus	0.001		0.159**	0.000	–0.028	0.164
Market focus		0.125*		0.000	0.129	–0.023
Above average quality			5.472	–0.004	–0.971	5.647
Quality certification			21.060**	–0.017	–3.738	21.736
Number of founders		–1.668		0.000	–1.721	0.311
Partnership		7.032		0.001	7.257	–1.311
<i>Market conditions</i>						
Customer power	–0.001*	–0.270**		–0.001	–0.278	0.050
Materials shortages	–0.001**	0.132**		–0.001	0.136	–0.025
Finance shortages		–0.081	–0.171**	0.000	–0.053	–0.161
Labour shortages	0.000		0.094	0.000	–0.017	0.097
High capital requirements	0.000	–0.078	0.091	0.000	–0.096	0.108
Location			8.645	–0.007	–1.534	8.922
<i>Strategic initiatives</i>						
New product group	0.038*		7.657**	0.032	–1.359	7.902
New/Improved products			–14.919**	0.012	2.648	–15.398
New export markets	0.030*	6.438**		0.031	6.644	–1.201
Quality certification	0.047**		4.738	0.043	–0.841	4.890
New management accs system		–6.101**	–5.309	0.003	–5.355	–4.341
Centralised power		6.333**		0.001	6.536	–1.181
Centralised ownership	0.030	–7.140*	–8.367	0.036	–5.884	–7.304
Increased RFA	0.027	–4.409	7.823**	0.020	–5.939	8.897
Increased direction	–0.055**	–6.033*		–0.055	–6.227	1.125
Increased SRT	0.030	9.494**		0.031	9.799	–1.771
Constant	0.137*	33.513**	20.711**	0.125	30.912	15.125
Standard Error	0.112	18.520	22.3			
Adjusted R^2	0.14	0.46	0.49			
$F(,)$	2.7	9.2	11.8			
Log likelihood	152.54	–898.85	–939.18			
Restricted log likelihood	128.73	–987.80	–1031.40			
Ameniya pr criteria	0.01	380.92	543.30			
Akaike information crit	–1.43	8.78	210.00			

Notes:

1. The dependent variable in the turnover growth equation is defined as the natural log of the ratio of turnover in 1994 to that in 1993 (see Barkham et al., 1996 for a discussion). Other variable definitions are given in the Data Appendix.
2. Those variables marked with a double asterisk were significant at the 5 per cent level. Single asterisk indicates significance at the 10 per cent level.

Source: Competitive Analysis Model Product Database.

new export markets was more positive having significant and positive effects on both growth and profitability (see also Kinsella et al., 1993; Storey et al., 1989; Macrae, 1991). New quality certification also had positive growth effects but no profitability bonus. More surprising was the negative and significant effect of the introduction of management accounting systems a finding which proved relatively robust for a range of alternative specifications. Unlike some other studies (e.g. Cambridge Small Business Research Centre, 1992; Kinsella et al., 1993; Solem and Steiner, 1989; Storey et al., 1989) there was little evidence here that sharing power or ownership with a business had any significant impact on growth. Return on assets, however, was positively influenced by moves to centralise power within the firm but negatively influenced by any concentration of ownership (Table II). In terms of the way power was used within the enterprise the most consistent evidence was of the negative impact on both growth and profitability of an increased emphasis on hierarchic managerial techniques in the form of directly supervised work.

4.3. *Estimating total effects*

The total effect of initial market position, owner-manager's characteristics, business objectives and operating environment are derived as the combination of direct and indirect effects. The direct effects are obtained straightforwardly from the estimated forms of the business performance equations (Table II). The derivation of the indirect effects is more complex, involving first the calculation of the marginal effect of market position, owner-manager's characteristics, targets and market conditions from the Logit models of firms' strategic choices (Table I).²⁰ These marginal effects are then multiplied by the relevant coefficient on each strategy variable in the performance equations (from Table II) to give the indirect effect.²¹ For example, the years of education of the owner-manager increased the probability that a firm would adopt a number of strategic initiatives (Table I). Combining the related marginal coefficients with the regression coefficients on the strategy variables in the turnover growth equation (Table II) gives an (indirect) marginal effect of 0.003 (Table III).²² The coefficients on the strategy

variables in the performance equations therefore determine the potential for owner-manager characteristics and targets to impact on business performance. The performance effect of the determinants of firms' strategic choices also depends, however, on the simultaneity between turnover growth, profit to assets and assets to turnover. For example, the introduction of new or improved products had no direct effect on either turnover growth or the rate of return on assets but had a significantly negative effect on the asset to turnover ratio (Table II). Because of the (negative) simultaneity between the asset to turnover ratio and, say, the rate of return on assets this means that factors which increased firms' propensity to introduce new or improved products had a positive effect (2.648) on the rate of return on assets.

Taking into account the simultaneity between the performance equations, and the determinants of each business strategy allows the combined marginal effects to be identified (Table III).²³ Operating environment and firms' initial market position had both direct and indirect effects (via strategy choice). Above average product quality, for example, was found to have both a negative direct and indirect growth effect. In terms of its effect on the rate of return on assets, however, above average product quality was found to have a negative direct effect but a smaller positive indirect (i.e. strategy choice) effect. That is, having above average quality was stimulating the firm to make strategic choices which themselves impacted positively on profitability. Similar counteracting effects on return on assets were evident for firms which were part of larger groups and those with sales concentrated in single product groups and geographical markets. Other aspects of firms' initial market position (e.g. firm size, age) had no indirect effect on turnover growth or the rate of return on assets.

Comparing the signs of the total effects on growth and profitability enables the explanatory variables to be divided into six groups (Table IV). Variables in group 1, for example, had negative effects on both short-term turnover growth and return on assets. By contrast variables in group 6 were associated with above average growth and profitability at least in the short-term. Intermediate groups reflect the differential impact of some explanatory variables on growth and profitability.

TABLE III
Combined marginal effects from strategic choice and regression models

	Turnover growth			Profit to assets			Assets of turnover		
	Direct effect	Indirect effect	Total effect	Direct effect	Indirect effect	Total effect	Direct effect	Indirect effect	Total effect
<i>Initial market position 1991</i>									
Assets to turnover ratio				-0.054		-0.054	0.314		0.314
Profit to assets				0.302		0.302	-0.055		-0.055
Turnover growth	0.019		0.019	17.714		17.714	-24.637		-24.637
Firm size				0.144		0.144	-0.026		-0.026
Firm age	-0.001		-0.001	-0.086		-0.086	0.016		0.016
Part of larger group	-0.013	0.023	0.010	-2.916	4.906	1.990	16.953	-0.886	16.066
Product focus		-0.001		-0.028	0.032	0.004	0.164	0.092	0.256
Market focus				0.129	-0.047	0.082	-0.023	0.034	0.011
Above average quality	-0.004	-0.014	-0.018	-0.971	0.817	-0.154	5.647	-1.431	4.216
Quality certification	-0.017		-0.017	-3.738		-3.738	21.736		21.736
Number of founders				-1.721	-0.017	-1.739	0.311	-0.014	0.297
Partnership	0.001	-0.031	-0.030	7.257	-6.663	0.594	-1.311	1.204	-0.107
<i>Market conditions</i>									
Customer power	-0.001		-0.001	-0.278	-0.019	-0.298	0.050	0.004	0.054
Materials shortages	-0.001		-0.001	0.136		0.136	-0.025		-0.025
Finance shortages				-0.053	-0.003	-0.056	-0.161	0.020	-0.141
Labour shortages				-0.017	0.045	0.029	0.097	-0.037	0.060
High capital requirements		0.007	0.008	-0.096	0.814	0.718	0.108	-0.120	-0.011
Location	-0.007		-0.007	-1.534		-1.534	8.922		8.922
<i>Targets</i>									
Employment growth aim					0.004	0.004		-0.026	-0.026
Sales target indicator		0.028	0.028		-1.460	-1.460		7.823	7.823
Sales target intensity					0.005	0.005		0.001	0.001
<i>Owner-manager characteristics</i>									
OM education (years)		0.003	0.003		0.042	0.042		0.335	0.335
OM shares power		-0.007	-0.007		0.250	0.250		-0.584	-0.584
OM age (years)					0.011	0.011		0.040	0.040
OM large firm experience		0.017	0.017		-0.070	-0.070		4.172	4.172
OM years in industry		-0.001	-0.001		-0.049	-0.049		0.165	0.165
OM ownership indicator		-0.005	-0.005		-1.262	-1.262		0.965	0.965
Constant	0.125	0.029	0.154	30.912	8.493	39.404	15.125	-15.841	-0.716

Source: Competitive Analysis Model Project Database.

TABLE IV
Summary of marginal effects on turnover growth and profitability effects

	Growth effect	Profitability effect	Explanatory factors
1	Negative	Negative	Above average quality, quality certification, customer power, ownership-manager's ownership stake
2	None	Negative	Firm age, number of founders, finance shortages, years in the industry
3	Negative	Positive	Partnerships, material shortages, owner manager willing to share power
4	None	Positive	Product focus, market focus, labour shortages, employment growth aim, age of the owner-manager
5	Positive	Negative	Sales target indicator, large firm experience
6	Positive	Positive	High capital requirement, educational background of the owner-manager

The suggestion is that for those evaluating a business as a short-term investment prospect (and therefore concerned both with growth and profitability) the key factors are the educational background of the owner-manager and that the business is operating in an industry where capital requirements and therefore barriers to entry are high. For potential investors seeking a high return on assets in the short-term, the range of factors to consider is broader. In either case, firms to avoid are those operating in markets dominated by powerful customers, firms which have above average product quality and those having ISO 9000. It should be stressed, however, that these effects reflect the short-term performance effects of the explanatory variables being considered. It is possible that over time short-term losses (due perhaps to investment or changes in market position) may result in long-term gains.

5. Conclusions

In any period small business growth and profitability will depend on the firm's operating environment, its initial market position and its choice of business strategy. The decision to adopt a particular strategic approach will depend both on the business environment (current and anticipated) and the capabilities, aspirations and background of the owner-manager. Modelling separately the strategic choice decision and the strategy-performance relationship exposes the direct and indirect mechanisms by which firm, market and owner-manager characteristics influence performance. Taking into account both relationships we have

examined the links between business performance over the 1993–94 period and firms' market and owner-managers' characteristics in 1991.

The analysis suggests first, that in the short-term at least there is only a weak link between the turnover growth and return on assets of small firms. This is evident both in the lack of any significant correlation between the variables and in the lack of any simultaneity between the performance equations for turnover growth and return on assets. The implication is that short-term increases in growth will have no profitability effect and vice versa. This is not to say, however, that changes in firm characteristics, which themselves contribute to either growth or profitability, will not have any other performance effects. Indeed, our analysis suggests that a number of firm characteristics had the opposite marginal effects on profitability and growth (e.g. having formal sales targets, the owner-manager's experience of working in a large firm). Positive marginal effects on short-term growth were evident from high capital requirements and the educational attainment of the owner-manager (Table IV). Negative effects were associated with a range of factors including above average product quality and high levels of customer power (although see Hewitt-Dundas and Roper, 1997).

Taken together the lack of any direct link between profitability and sales growth in the short-term, and the opposing effects of many company attributes raises a number of policy and managerial dilemmas.²⁴ In policy terms, measures aimed to increase company profitability are likely to have little short-term sales growth effect. Growth

promotion is also unlikely to raise profit rates, although in cash terms the profit made by the company may increase. In more managerial terms, only two (entering new export markets and increasing the selectivity of recruitment) out of the twelve possible strategic initiatives considered were associated with increased sales growth and return on assets in the short-term. Other strategic initiatives (e.g. obtaining quality certification) had positive growth effects but had no effect on the rate of return on assets. Predominantly negative effects were associated with the introduction of management accounting systems and changes in the firm's approach to management.

Secondly, for our sample of firms there was no evidence of any persistence of turnover growth rates above or below the average. Profit rates were found to persist only in the very short term. Although the difference in persistence between the two measures may, in part, reflect the way they are defined (i.e. sales growth in percentage changes, return on assets in levels), this has potentially significant implications for the operation of policy. In particular, our evidence suggests that in isolation previous sales growth is for most firms only a poor guide to future performance. On this evidence, policies based on backing winners, where the winners are selected on the basis of previous sales growth, seem likely to be inefficient. A better, albeit more complex approach, would be an assessment of the internal capabilities and market positioning of each company.

Annex: Derivation of direct and indirect effects

Following the notation introduced in the text, the estimated form of equation (1) relating to firms' strategic choices may be written:

$$\hat{i} = \hat{\gamma}_0 + \hat{\gamma}_1 s_2 + \hat{\gamma}_2 e_4$$

where i is the probability of a specific strategic choice being made, s_2 is a indicator of firms' initial market position and e_4 is an entrepreneurial characteristic. Similarly, the estimated form of equation (2) for turnover growth (say s_1) may be written:

$$\hat{s}_2 = \hat{\beta}_0 + \hat{\beta}_1 \hat{i}_1 + \hat{\beta}_2 s_2 + \hat{\beta}_3 s_3$$

and s_3 is another indicator of firms' initial market position. By substitution the direct, indirect and total effects of the various factors on turnover growth can be shown to be as follows:

	Direct effects	Indirect effects	Total effects
x	$\frac{\partial s_1}{\partial x} \Big _x$	$\frac{\partial s_1}{\partial x} - \frac{\partial s_1}{\partial x} \Big _x$	$\frac{\partial s_1}{\partial x}$
S_2	β_2	$\beta_1 \gamma_1$	$\beta_2 + \beta_1 \gamma_1$
S_3	β_3	0	β_3
E_4	0	$\beta_1 \gamma_3$	$\beta_1 \gamma_3$

Thirdly, our evidence confirms that small firm performance depends to a very large extent on strategy choice. Turnover growth seems particularly strategy dependent (Table III).²⁵ This highlights the importance for small firms of making the correct strategy choices, a point emphasised by the negative profitability and growth effects of some of the strategic options considered here. In the model, strategic choices are linked in a necessarily mechanistic way to firms' environment and the characteristics of the firm its owner-manager. In practice, development agencies might wish to promote strategy choices that are not "natural" for the firm. Particularly important in this respect was the positive profitability and growth impact of entering new export markets (Table II). Key constraints on the adoption of this type of strategy by firms in our sample were firms' adoption of this strategy were: a strong focus on a single geographical market, and the existence of powerful customers within the firm's existing markets (Table I).

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Data appendix

Description	Definition	Mean (Std. dev.)
1. Profitability and growth		
Real sales growth (% pa) 1993–94	Sales volume is defined as turnover (less any discounts given) deflated by the national rate of producer price growth. For Northern Ireland this implied a price increase of 6.75 per cent from 1991–94 (<i>Source</i> : Economic Trends, Table 3.1). For the Republic the implied price increase was 7.54 per cent (<i>Source</i> : Economic Series, November 1995, p. 15). Variable is defined as the real percentage change between the 1993 and 1994 business years.	0.106 (0.1675)
Return on assets (%) 1993–94	Average net profit as a percentage of net worth over the 1993 and 1994 business years. Net profit was measured before bank interest and tax and excluding all extraordinary items (e.g. the sale of capital items). Figures were converted into 1994 prices using the producer price index, and converted to Sterling using an exchange rate of 1.0233 (<i>Source</i> : Financial Statistics, CSO, December 1995, Table 7.1A).	25.7 (26.8)
Assets to turnover (%) 1993–94	Average net worth as a percentage of sales volume over the 1993–94 business years.	36.1 (33.0)
Real sales growth (% pa) 1991–93	Real percentage change in sales between the 1991 and 1993 business years.	0.13 (0.34)
Return on assets (%) 1991	Net profit as a percentage of net worth in 1991.	31.9 (45.9)
Assets to turnover (%) 1991	Net worth as a percentage of sales volume in 1991.	39.7 (62.6)
2. Initial market position		
Firm age (years)	The age of the firm in years in 1991.	20.9 (27.6)
Firm size (employment)	Number of employees in 1991.	30.4 (23.9)
Quality certification	A 0/1 dummy taking value 1 if the firm had ISO 9000 certification in 1991 and zero otherwise.	0.02 (0.25)
Part of larger group	A 0/1 dummy taking value 1 if the firm was part of a larger group of companies and zero otherwise.	0.02 (0.15)
Partnership	A 0/1 dummy taking value 1 if the firm is a legal partnership and zero otherwise.	0.07 (0.25)
Number of founders	The number of people involved in the foundation of the firm.	2.04 (1.06)
Product focus	The percentage of sales in the firm's most important product group.	78.6 (21.9)
Market focus	The percentage of sales in the firm's most important geographical market.	80.8 (18.4)
Above average quality	A 0/1 dummy variable; 1 if the firm stated its product quality was above that of its closest competitors in 1991, zero otherwise.	0.29 (0.45)

Data appendix (Continued)

Description	Definition	Mean (Std. dev.)
3. Market conditions		
Customer power	An intensity index ranging from 0 if customer power was “unimportant” to 100 if customer power was “very important”.	85.1 (15.9)
Shortages of labour	An intensity index ranging from 0 if labour shortages were “unimportant” to 100 if they were “very important”.	64.7 (25.5)
Shortages of materials	An intensity index ranging from 0 if materials shortages were “unimportant” to 100 if they were “very important”.	58.6 (27.7)
Shortages of capital	An intensity index ranging from 0 if capital shortages were “unimportant” to 100 if they were “very important”.	52.2 (23.4)
High capital requirement	An intensity index ranging from 0 if capital requirements were minimal to 100 if they were in excess of £10 m.	22.4 (23.9)
Location	A 0/1 dummy variable taking value 1 if the firm was in Northern Ireland and 0 if it was in the Republic of Ireland.	0.33 (0.47)
4. Strategic initiatives		
Introduced New Group of products	A 0/1 dummy variable taking value 1 if the firm introduced a new product group during the 1991–94 period, and zero otherwise.	0.28 (0.45)
Introduced new/Improved products	A 0/1 dummy variable taking value 1 if the firm introduced any new or improved products during the 1991–94 period, and zero otherwise.	0.89 (0.32)
Entered new export markets	A 0/1 dummy variable taking value 1 if the firm entered any new export markets during the 1991–94 period, and zero otherwise.	0.39 (0.49)
New ISO 9000 quality certification	A 0/1 dummy variable taking value 1 if the firm obtained ISO 9000 quality certification for the first time during the 1991–94 period, zero otherwise.	0.35 (0.48)
New management accounting system	A 0/1 dummy variable taking value 1 if the firm introduced a management accounting system for the first time during the 1991–94 period, and zero otherwise. To be included the MAS must be capable of comparing performance to budget and generating variances.	0.37 (0.49)
Centralised control	A 0/1 dummy taking value 1 if the firm had taken steps to centralise control over the 1991–94 period, and zero otherwise.	0.34 (0.47)
Centralised ownership	A 0/1 dummy taking value 1 if the firm had taken steps to centralise ownership over the 1991–94 period, and zero otherwise.	0.17 (0.37)
Increased importance of reasoning, feedback and agreement	A 0/1 dummy taking value 1 if reasoning, feedback and agreement had increased in importance over the 1991–94 period, and zero otherwise.	0.51 (0.50)
Increased importance of direction	A 0/1 dummy taking value 1 if direction had increased in importance over the 1991–94 period, and zero otherwise.	0.36 (0.48)
Increased importance of selective recruitment	A 0/1 dummy taking value 1 if selective recruitment had increased in importance over the 1991–94 period, and zero otherwise.	0.50 (0.50)

Data appendix (Continued)

Description	Definition	Mean (Std. dev.)
5. Owner-manager characteristics		
Company ownership	A 0/1 dummy taking value 1 if the owner-manager had a significant equity stake (20 per cent or more) in the business, and zero otherwise.	0.71 (0.45)
Education (years)	Years of education and vocational training of the owner-manager.	13.1 (4.8)
Owner-manager has degree	A 0/1 dummy taking value 1 if the owner-manager had a degree, and zero otherwise.	0.51 (0.50)
Willing to share power	A 0/1 dummy variable; 1 if the owner-manager was willing to share power to achieve an expansion of the business, and zero otherwise.	0.57 (0.49)
Owner-manager's age (years)	Owner-manager's age in years	41.0 (9.8)
Large firm experience	A 0/1 dummy variable; 1 if the owner-manager had previous experience in firms with 500 or more employees, and zero otherwise.	0.29 (0.45)
Industry experience (years)	The owner-manager's number of years in the current industry.	20.6 (11.5)
6. Business objectives		
Employment growth aim	A 0/1 dummy variable; 1 if employment growth was an "important" or "very important" business objective, and zero otherwise.	0.20 (0.40)
Specified sales growth target	A 0/1 dummy variable; 1 if the firm had a formal turnover target specified in its strategic plan, and zero otherwise.	0.48 (0.50)
Sales target intensity	An intensity index ranging from 0 if the firm aimed to reduce turnover through to 100 if its target was for rapid sales growth (i.e. more than 20 per cent pa).	61.2 (18.3)

Notes

¹ For example, in 71 per cent of our sample of Irish small firms the owner-manager of the business held more than 20 per cent of the equity.

² It is clearly possible to reject this assertion and argue that business growth and performance is entirely stochastic. In this case it is well known that a closed industry will steadily become concentrated over time, and that the firm size distribution will approach the log-normal. Despite recent attempts to extend the basic stochastic growth model (see, for example, Lucas, 1978; Jovanovic, 1982), however, the empirical evidence for stochastic growth is unconvincing. In particular, a large number of empirical studies have queried the basic assertion that growth rates are random between firms, suggesting instead that growth rates are consistently faster among small firms (e.g. Dunne and Hughes, 1994; Gallagher, Daly and Thomason, 1991).

³ The distinction made between π_t and L_t is essentially subjective and reflects our view of the importance of different business goals. The empirical analysis focuses on the determinants of sales growth, return on assets and the asset to turnover ratio. This emphasis is consistent with the prioritisation of business objectives by our sample of firms (see McFerran et al., 1996, p. 16).

sation of business objectives by our sample of firms (see McFerran et al., 1996, p. 16).

⁴ A relatively straightforward owner-manager objective function is implicit in this formulation, although not dealt with explicitly. That is, the owner-manager will seek to innovate to minimise the difference between S_t and S_t^* given the firms initial position (S_{t-1}), entrepreneurial resources (E_t) and anticipated business conditions (O_t^e).

⁵ Substituting (1) into (2) gives a reduced-form equation for business performance: $S_t = f(S_{t-1}, S_t, S_t^*, O_t^e, S_t)$. In empirical terms this reduced-form equation has the advantage that all of the explanatory variables are either predetermined or exogenous to the firm. Ordinary Least Squares estimation techniques are therefore appropriate. A less attractive feature of the model, however, is that the ability to recover the underlying structural parameters (i.e. equations (1) and (2)) depends on the assumed functional form. The situation is complicated further in some studies (e.g. Barkham et al., 1996) which do not estimate the pure reduced-form equation but a semi-reduced-form, including some elements of I_t on the right hand side. In statistical terms this presents no difficulty due to the recursive character of the underlying structural relationships (i.e. I_t is predetermined with respect to S_t). In intuitive terms,

however, the interpretation of such an equation is more confused with entrepreneurial characteristics, for example, influencing company performance both directly and indirectly (through their effect on strategic choice).

⁶ The criteria used by the Irish development agencies for assessing whether firms have significant growth potential were informal and have varied through time. This makes it difficult to assess the extent or direction of any selectivity bias introduced by this sampling criterion. Any such bias is likely to be minimised, however, by the size of the initial sample which covered 65 per cent of the total in-scope population of firms in Northern Ireland and 42 per cent in the Republic of Ireland.

⁷ The sample bias towards Northern Ireland firms reflected primarily a greater level of encouragement for firms to participate by the Northern Ireland development agencies. See Barkham et al., (1996) for a survey of the performance characteristics of Northern Ireland firms compared to some other U.K. regions, and Gudgin et al. (1995) for a survey of the relative performance of small businesses in Northern Ireland and the Republic of Ireland.

⁸ Data for 1992 was not sought as part of the 1995 CAM survey to minimise the information required from companies. The intention was to fill in the missing years in subsequent surveys.

⁹ The descriptive statistics given in the Data Appendix relate to the set of (210) firms for which complete information was available and which could therefore be included in the systems estimation. In other analyses of the CAM dataset larger sub-groups of firms have been considered (see, for example, McFerran et al., 1996).

¹⁰ The coefficients of variation were as follows: assets to turnover, 1.00; return on assets, 1.03; turnover growth, 1.52.

¹¹ Correlation coefficients for the whole sample were as follows: return on assets and asset to turnover ratio -0.269; return on assets and turnover growth, 0.098; asset to turnover ratio and turnover growth, -0.064. Only the correlation between the return on assets and asset to turnover was significant at the 5 per cent level.

¹² The choice of managerial techniques might be expected to change with both the size of the firm (Scott and Bruce, 1987), its production technology and the complexity of its operating environment (Woodward, 1965).

¹³ Details of the variables included in the exploratory analysis and the subsequent development of the strategic choice models are given in Roper (1998).

¹⁴ Two possibilities are evident. First, there may be some common "missing factor" from each of these regressions which would be reflected in correlated equation errors. Secondly, there may be other factors, particular to each strategic initiative which may be missing. In this latter case no significant correlation would be expected between equation errors.

¹⁵ Variables were included in Table II where they were significant in one of equations at the 10 per cent level. Individual coefficients are included where their t-statistic was greater than unity. Industry controls – at the 2-digit level – were included in the initial formulations of the model but where largely insignificant

¹⁶ The system coefficients relating to firms' initial market

position and market conditions represent the direct marginal effects of each variable. Both sets of factors may also have been having an indirect effect through their impact on the firm's strategic choices. The total impact of any variable on performance will be sum of direct and indirect effects (see below).

¹⁷ On the persistence of turnover growth rates see Storey (1994). On profit rates see Mueller (1977) who for larger U.S. companies argued that there was considerable persistence of above or below average return on assets. More recent studies have linked profit persistence to labour market factors (Canyon and Machin, 1991) and firms' innovation capability (Geroski, Machin and Van Reenan, 1993).

¹⁸ Also included in the initial analysis was a variable relating to firms' subjective view of how their product price compared to that of their competitors. This was found to be unimportant in the analysis reflecting the results of the PIMS studies (see, for example, Buzzell and Gale, 1987).

¹⁹ In the original dataset each aspect of firms' market position was assessed on a standard five point scale. For the regression analysis these five point indices were translated into an intensity indicator with range 20 to 100.

²⁰ See Greene (1993) for a discussion of the derivation of marginal effects from Logit models.

²¹ The presence of a constant term in the business performance regressions means that the coefficients represent the effect of each variable relative to the firm represented by the constant term.

²² The marginal effects from the logit models are computed at variable means. The marginal effects of each factor on individual strategy choices are also combined at variable means. A simple example of the computation of direct and indirect effects is given in the Annex.

²³ Where variables are 0/1 dummies the marginal effects represent the effect on growth or profitability of the firm having a particular characteristic. Where variables are continuous the marginal effects represent the impact of a unit change.

²⁴ The lack of any simultaneity between turnover growth and profitability also suggests that turnover growth equation estimated using OLS are unlikely to be subject to serious simultaneous equation bias. This is important for the small business literature where a common marginalisation is to consider in isolation the determinants of sales growth.

²⁵ The relative growth and profitability impacts of the direct and indirect effects identified in Table III will vary between companies. At variable means, however, the direct effects were reducing turnover growth by 1.5 per cent pa, compared to a strategy effect of +5.1 per cent pa. In terms of return on assets the direct effect was -4.7 per cent, with a strategy effect of 1.8 per cent.

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