

Practice Makes Profit: Business Practices and Firm Success*

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ABSTRACT. Which business practices set successful firms apart from others? We address this question using data from an official survey of almost 3000 New Zealand firms. Questions cover: leadership, planning practices, customer and supplier focus, employee practices, quality and process monitoring, benchmarking, community and social responsibility, innovation, IT use, business structure and the competitive environment. Some of these are internal practices reflecting a firm's resources and capabilities; some are characteristics of the external environment. We find that capital investment choices, R&D practices, market research and a range of employee practices are positively associated with firm success; industry structure is also a key determinant of success. The association between specific business practices and firm success is mostly independent of firm size, age and industrial sector, other than for export marketing.

KEY WORDS: firm performance, business practices, HR practices, firm success, innovation

JEL CLASSIFICATIONS: D21, L20, L26, O31

1. Introduction

Which business practices set successful firms apart from others? We analyse the relationship of firm performance with firm business practices (reflecting its resources and capabilities) and characteristics of the external environment. We do so using a new official dataset, compiled by New Zealand's official statistical agency. The data cover almost 3000 firms representative of the entire economy (which, in turn, comprises mainly small and medium sized enterprises). We

find that investment in capital equipment, R&D and market research are strongly associated with firm success; so too are incentive-related and a range of other employee practices. Industrial structure is also associated strongly with firm performance. This is the first study to analyse the unit record data within this survey. As well as addressing the substantive question posed at the outset, the paper discusses the properties of this survey and of the data.

A key strategic management question is how firms achieve and maintain competitive advantage relative to their rivals (Barney and Arkan, 2001; Teece et al., 1997). Commonly, analysts differentiate between internal firm characteristics and the external environment (Barney, 2002; Grant, 1998). The former includes the firm's goals, values, resources, capabilities, systems and organisational structure. The latter includes the nature of the industrial sector in which a firm operates and broader economic trends. A competitive strategy requires the firm to decide how it will position itself and its products in light of the external environment so maintaining competitive advantage in specific product areas (Ansoff, 1987; Day, 1990; Mintzberg et al., 1998; Varadarajan and Jayachandran, 1999). This positioning requires appropriate corporate strategies (deciding which broad businesses in which to operate), business strategies (including how resources will be deployed internally) and external marketing strategies.

Contemporary strategy research has two principal strands: industry-based approaches and resource-based approaches. The industry-based approach (e.g. Porter, 1980, 1985) highlights the importance of external factors, such as the industry's market structure, in influencing firm success. While these factors are external to the firm, individual firms can nevertheless make

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choices to alter their interaction with the market, for instance by creating entry barriers (and hence quasi-monopolies) through product differentiation (Baumol, 2002; Syverson, 2004). The resource-based view (Penrose, 1959; Wernfelt, 1984) emphasises internal processes and choices regarding the firm's resources and capabilities that ultimately contribute to the firm's profitability. Competitive advantage, in this view, stems from superior acquisition, use, development and protection of the firm's resources (Eisenhardt and Martin, 2000; Grant, 1998; Makadok, 2001; Teece et al, 1997).

Empirical work suggests that both pillars are important (Amit and Shoemaker, 1993; Barney, 2002). Spanos and Lioukas (2001), for instance, find both industry-level and firm-level influences are significant sources of rent generation within their analysis of medium-large Greek firms. Within a specific industry, Hewitt-Dundas and Roper (2001) find that in a mature industry (furniture), industry characteristics have an important bearing on overall firm performance. However, the strength of an individual firm's own resource base is also important and is key to determining the success of a firm's business strategy.

In the economic analysis of firm dynamics, Haltiwanger et al. (1999, 2000) provide a conceptual underpinning for analysing firm outcomes that is related to the strategic management approaches. They assume that heterogeneity of firm outcomes reflects heterogeneity in firms' initial characteristics and subsequent choices. Components of this heterogeneity include: idiosyncratic ability of managers; the firm's organisational practices and policies; choice of productive inputs such as technology and capital; and nature of the internal labour market. Each of these components may influence the firm's choices and the productivity and profitability of the firm. Roper (1998) finds that characteristics of the entrepreneur (akin to Haltiwanger's "idiosyncratic ability of managers") determines small firms' propensity to undertake management initiatives. These characteristics also influence initiatives relating to new product development and marketing strategies although (reflecting the findings of Spanos and Lioukas) the external environment and the firm's market position remain relevant.

Heterogeneity of outcomes can persist over time through various path dependencies. For instance, Haltiwanger et al. (2000) find that high quality staff attract other high quality staff, even to individual business units within a firm. Further, the consistent introduction of modern technologies embodied in new physical capital can contribute positively to maintenance of high productivity (Aghion and Howitt, 1998; Griliches, 1994; Nickell and Nicolitsas, 2000). These human resource and technology choices are themselves underpinned by a firm's management practices. For instance, innovative human resource management practices are shown to boost productivity in the US steel industry (Ichniowski et al., 1997) and performance pay is found to boost productivity in the glass industry (Lazear, 2000).¹ The nature of IT practices is important in choosing appropriate technology paths (Bresnahan et al., 1999). Ultimately, as these examples indicate, choices regarding a range of firm practices, adopted in the light of external environmental factors, are important in determining firm success (Haltiwanger et al., 2000; UK Treasury, 2000).

A study by Bloom et al. (2005) bridges the strategic management and micro-economic approaches to studying the determinants of firm performance. They survey management practices of 731 medium sized manufacturing firms across four countries, with the survey being based on models of productive management researched by McKinsey Global Institute. They then relate aggregate measures of a firm's management practices to several measures of its performance, finding a statistically significant role for management practices on firm performance in addition to the roles of other control variables. Management practices themselves depend on several factors including the competitive structure of the industry, firm age and country regulation.

Our study has several features in common with the Bloom *et al* study. We use a survey-based approach grounded in the strategic management literature to determine management practices and then link these practices to measures of firm performance. Both studies establish associations (rather than causal links) between reported management practices and perfor-

mance.² In contrast to Bloom et al., our concentration is on finding the *individual* management practices that impact most on firm performance rather than the influence of an *aggregate* bundle of management practices (see Fabling and Grimes, 2003, for the impact of aggregate measures of management practices on firm performance using the same dataset). Our dataset has some advantages and some disadvantages relative to that used in the Bloom et al. study. The key advantages are the much larger sample compared with other studies (2742 compared with Bloom et al.'s 731, and with Spanos and Lioukas's 147) and much higher response rate to the survey (82% compared with Bloom et al.'s 54%, and with Spanos and Lioukas's 13%); while the subjective (rather than Bloom et al.'s objective) measurement of firm performance is a disadvantage (Spanos and Lioukas also use subjective measures).

Our data cover 2742 firms surveyed within the New Zealand (NZ) *Business Practices Survey* (BPS). This survey was conducted in 2001 jointly by NZ's official statistical agency, Statistics New Zealand, and the Ministry of Economic Development. A detailed description of the survey is provided in Knuckey and Johnston (2002), which also reports comprehensively on the differing nature of business practices across different firm types. The BPS surveyed a wide set of business practices of NZ firms and environmental factors facing them. The survey covers both industry and firm level characteristics and choices, and so can be used to indicate the relative importance for firm performance of firm level and industry level factors. Properties of our data are discussed in more depth in Section 3.

Our analysis highlights practices and external environmental characteristics that have significant association with business success across firms. We examine whether the importance of these practices and environmental factors differ across firms of different sector, age and size. In 2002, of the 39,260 (non-agricultural) NZ firms with 6 or more full-time equivalent employees (FTEs), 46.5% had fewer than 20 employees and 96.6% had fewer than 100 employees (Ministry of Economic Development, 2003). In our sample, 93.1% of firms have fewer than 50 FTEs.

Our study is designed to accommodate the possibility that factors which accompany large firm success may be different from those which accompany success of small firms. Additionally, firm-level performance determinants may differ according to the age of the firm or the sector in which it operates.

Finding which business practices and environmental factors are associated with firm success is a complex task because of the large number of questions contained in the survey and the range of success measures that are surveyed. Over 180 questions regarding strategies and outcomes were asked in the survey; and given multiple response categories, over 700 potential responses were available. In Section 2, we present a framework for interpreting this extensive information. The framework is based on the analytical approaches outlined above, with emphasis both on internal choices of the firm and on internal and external characteristics facing the firm. We use this framework in our subsequent interpretation of results.

Section 3 describes the data. Section 4 presents our econometric approach to determining which firm practices and environmental characteristics are associated with firm success, and presents our results. Section 5 sets out our conclusions. We emphasise that the survey, while comprehensive, is a single snap-shot; the techniques used here do not determine causality of linkages. Our purpose instead is to find which business practices and characteristics are *associated* with firm success. These findings provide a basis for further analysis of factors that lie behind the associations, using both this dataset and comparable data that may in future become available.

2. Analytical framework

We start with a generalised production function incorporating quality differences across firms in each of output, labour and capital, and in the efficiency with which quality-adjusted labour and capital are combined into quality-adjusted output.³ In a monopolistically competitive market, output prices will depend on the perceived quality of outputs relative to those of competitors (Syverson, 2004). We denote quantities of firm i 's output, labour input and capital

input as Y_i , L_i and K_i respectively;⁴ the quality (productivity) of the labour and capital inputs respectively as λ_i and μ_i ; and the quality of output as v_i . The efficiency with which firm i combines quality-adjusted labour and capital into quality-adjusted output is denoted A_i . We normalise variables so that: $E(\lambda_i) = E(\mu_i) = E(v_i) = E(A_i) = 1$. Values of λ_i , μ_i , v_i and A_i greater (less) than 1 indicate superior (inferior) quality relative to the norm across all relevant firms. The generalised production function for each firm is of the form:

$$Y_i \cdot v_i = f\{A_i, L_i \cdot \lambda_i, K_i \cdot \mu_i\} \quad (1)$$

where the first partial derivative of $f\{\cdot\}$ with respect to each argument is positive. A specific example of (1) is given by the CES production function of Kelejian and Black (1970) incorporating augmented labour and augmented capital inputs.

The output price (q_i) received by firm i is a non-decreasing function of output quality (v_i). The average wage which firm i pays (w_i) and its average capital cost (r_i) are non-decreasing functions of λ_i and μ_i respectively. The functional forms of $q(v_i)$, $w(\lambda_i)$ and $r(\mu_i)$ are each determined by the product and factor markets in which the individual firm participates.

Each of v_i , λ_i and μ_i is assumed to be a function of the vector of business practices adopted by the firm, $\mathbf{P}_i$. As discussed in the resource-based approach to competitive advantage and by Haltiwanger et al. (2000), the scope of relevant business practices affecting each of these variables may be very wide. For instance, they cover choices concerning technologies as well as broader management processes. The efficiency parameter, A_i , is assumed to be a function of both $\mathbf{P}_i$ and a vector of characteristics ($\mathbf{C}_i$) over which management of the firm has no direct control. These characteristics may relate to the general economy (e.g. the economic cycle, which may affect some firms more than others), the industry (e.g. market structure) or exogenous characteristics of the firm (e.g. historical performance).

The firm maximises profit, Π_i , given by (2), through its choices of L_i , K_i and $\mathbf{P}_i$, taking $\mathbf{C}_i$ as given:

$$\begin{aligned} \Pi_i = & q(v(\mathbf{P}_i)) \cdot f\{A(\mathbf{P}_i, \mathbf{C}_i), L_i \cdot \lambda(\mathbf{P}_i), K_i \cdot \mu(\mathbf{P}_i)\} \\ & - w(\lambda(\mathbf{P}_i)) \cdot L_i - r(\mu(\mathbf{P}_i)) \cdot K_i \end{aligned} \quad (2)$$

Writing the problem facing the firm as in (2) makes explicit that the firm's $\mathbf{P}_i$ choice affects its productivity in a different manner from its profitability. High productivity relative to the norm may not translate into high relative profitability if the revenue from increased quality-adjusted output accrues to the factors of production. Conversely, a firm may reap high relative profitability through its $\mathbf{P}_i$ choice by increasing output quality, holding its input and output quantities constant. In this case, despite having high profitability, the firm's productivity (defined as the number of units of output per units of input) may be only at the norm. Depending on the nature of the demand curve facing the firm, the firm may choose to reap higher quality through higher market share and/or higher price.

We cannot estimate (1) or (2) directly since we do not have quantitative data for Y_i , L_i or K_i . Our data include qualitative responses regarding relative profitability, relative productivity and market share for each firm, plus extensive qualitative data covering firms' practices and characteristics. From (2), it is possible to predict the reduced form impacts of some specific $\mathbf{P}_i$ choices on particular business results of the firm, and we concentrate on these reduced form impacts. The purchase of new capital equipment (in a vintage capital framework with increasing quality over time) increases μ_i , resulting in high relative productivity when the equipment is up-to-date relative to that of its competitors. Whether this investment flows through to high profitability and/or market share depends on the nature of the other functions embedded in (2). Market research activities are less likely to impact on relative productivity since they are not aimed at changing the production process. Rather, they are most likely to impact on market share and/or profitability. Other forms of R&D may impact on productivity and/or on product quality and so affect productivity, profitability or market share. Similarly, employee-related

practices may impact on productivity via A_i and λ_i , but could impact purely on product quality (and hence profitability or market share) without raising productivity.

In general, a firm's P_i choice will affect some combination of its relative profitability, relative productivity and market share. In our analysis in Section 4, we seek to determine which elements of P_i impact on these three outcomes. In keeping with the analysis above, we hypothesise specifically that new capital investment will result in high relative productivity (and possibly in high relative profitability and market share), while market research elements of P_i will have their major effects on market share. These specific hypotheses are tested in Section 4.

We examine also the effect on firm performance of external characteristics within C_i for which data are available. The industry-based strategic management approach emphasises the importance of industry structure as a determinant of firm performance. In section 4, we test explicitly whether industry structure matters as posited in this approach. Other elements of C_i covered within the dataset that we test for an impact on firm performance include: the firm's sector, perceptions of the general economic climate, availability of finance or capital more generally, and availability of skilled labour. Location is one characteristic that could be relevant for some firms' relative performance; however we have no data for this variable and so cannot test its significance here.

3. Data

In 2000/01, Statistics New Zealand (the country's official statistical agency) conducted a comprehensive survey "to collect information on the business practices of New Zealand businesses. ... to quantify business behaviour, capability and performance across a wide selection of industries." The survey was wide-ranging both in its coverage of firms and in the range of surveyed business practices and firm characteristics. The range of business practices and characteristics that were surveyed was similar to that covered by Spanos and Lioukas (2001). The survey was conducted at a time when the aggregate economy had a neutral "output gap" (Reserve Bank of

New Zealand, 2005, p. 27) and the economy was growing moderately (2.3% p.a. in the year to March 2001, following average growth of 2.6% p.a. in the previous two years).

A major strength of the survey is its comprehensive and methodologically sound sampling approach (Knuckey and Johnston, 2002; Statistics New Zealand, 2002). Key aspects of this approach include: the official status of the questionnaire; its extensive piloting to ensure the questionnaire could be answered by one person per firm, ensuring a very high response rate;⁵ the target population being all non-farm private sector firms with at least six FTEs; the sampling frame being based on all New Zealand enterprises (total eligible firms to be sampled was 36,953); the stratified sampling design with two-way stratification by sector and employment size;⁶ and the weighting of each enterprise to make the sample representative of the underlying population of firms in the economy.⁷

Most questions in the survey were qualitative,⁸ partly because of the type of information that was being sought and partly to assist response rates.⁹ There were also a small number of quantitative questions asked in the survey.¹⁰ We use both types of question in our empirical analysis. For each question, there are normally either two potential responses regarding the practice (Yes/No) or 4 to 6 potential responses (a graded scale plus "don't know"). We test each category of response separately in our empirical work rather than use a restrictive representation of the responses such as a Likert scale.

Knuckey and Johnston (2002) describe the data in detail.¹¹ The content of the questionnaire was based on a model of firm best practice informed by the strategic management literature and by previous surveys (Knuckey et al., 1999; Australian Manufacturing Council, 1994). For each firm, Knuckey and Johnston formed six Business Practice Indices covering: leadership and planning; customer focus; quality and supplier focus; employee practices; information and benchmarking; and innovation and technology. Each index was an unweighted summary measure of the firm's responses to questions surveying its practices in the relevant area. Together, these indices summarised the information content of 55 separate questions. How-

ever the appropriateness of the (equal) weighting of questions within each index was not verified by any external metric and the survey contained additional questions that were not incorporated into the indices. In contrast, we make use of all the survey information in our empirical work, and subject the significance of each question to statistical test.¹²

The BPS also surveys Business Results. Using very similar performance questions and scales to those used by Spanos and Lioukas (2001), each firm is asked to record against a qualitative 3-point scale (plus “don’t know”) their firm’s situation for seven items:¹³

- profitability relative to major competitors;
- return on investment (ROI) relative to major competitors;
- productivity relative to major competitors;
- market share relative to three years’ prior;
- profitability relative to three years’ prior;
- net cash flow over the past twelve months;
- sales of goods and services over the past twelve months.

Based on the analytical framework outlined in Section 2, we seek to explain firm performance given by three of these business result measures – relative profitability, relative productivity and market share. We explain firm performance on

each of these measures by firm practices (P_i) and characteristics (C_i).¹⁴

We divide the responses to each of the business result questions (our dependent variables in the analysis that follows) into binary outcomes, grouping together the neutral and unfavourable responses as one outcome and the favourable responses as the other outcome for the variable. We then undertake probit analysis on these data.

Our reason for converting the data into binary variables is that comparatively few respondents in each category responded that their firm was doing worse than their competitors or worse than their own history. For instance, as Table I shows, only 3.8% of respondents considered their productivity to be lower than that of their competitors. In contrast, there were material numbers of firms responding in each of the neutral and favourable categories (33.6% of respondents considered their productivity to be higher than that of their competitors). We adopt a maintained hypothesis that there was a respondent bias away from the unfavourable response; i.e. we conjecture that many respondents who “should” have answered that their performance was unfavourable instead answered in the neutral rather than the unfavourable category. At the conclusion of the paper, we test whether our results are robust if we separate the unfavourable and neutral

TABLE I
Summary of responses to business result questions

Response*	Surveyed business result						
	Relative profitability ^a	Relative ROI ^a	Relative productivity ^a	Market share ^b	Profitability ^b	Net cashflow ^c	Sales ^b
Low	10.2%	9.8%	3.8%	10.3%	23.3%	16.1%	16.5%
Neutral	40.8%	35.6%	41.5%	25.4%	24.4%	22.1%	21.3%
High	26.6%	25.0%	33.6%	55.5%	49.1%	57.6%	59.4%
Don't Know	22.5%	29.6%	21.2%	8.8%	3.3%	4.2%	2.8%
Inferred	1.1%	1.9%	1.4%	1.4%	0.6%	0.4%	0.7%
<i>Response converted to binary variable</i>							
Low	65.8%	64.4%	57.4%	39.2%	49.2%	39.9%	38.9%
High	34.3%	35.6%	42.6%	60.8%	50.8%	60.1%	61.1%
Sample size	2147	2002	2191	2529	2655	2646	2676

Notes: *Survey responses fall into three groups (corresponding to superscripts after business result variables):

^aLow = lower than competitors, Neutral = on a par with competitors, High = higher than competitors

^bLow = decreased, Neutral = stayed the same, High = increased

^cLow = negative, Neutral = neutral, High = positive.

categories, using ordered probit estimates across all three categories of responses. We find that the results are robust, but the probit estimates have some preferred properties.

The binary data excludes the “don’t know” response category to the business result questions. Consistent with our differentiation of the favourable responses from the unfavourable/neutral responses, we hypothesise that the practices of the “don’t know” firms are also differentiated from those that had favourable business results. Specifically, we hypothesise that those who answer “Don’t Know” about their business result will tend to have different business practices to those who answered favourably but will have similar business practices to those who answered with an unfavourable/neutral response.

We keep this “Don’t Know” group for an out-of-sample test of the relationship between business practices and business performance. We then test whether the same relationships between business practices and business results hold for the “Don’t Know” group as for the unfavourable/neutral group, and whether they differ from the favourable group. If so, we take that as out-of-sample confirmation of our findings, indicating that they are likely to be reflecting real differences in firm behaviour and characteristics, rather than just chance results.

This out-of-sample test is particularly important since our performance measures (i.e. our dependent variables) are self-reported. Bertrand and Mullainathan (2001) raise concerns over using self-reported qualitative measures as dependent variables owing to the possibility of measurement error for these vari-

ables being correlated with characteristics and behaviours of the respondents. This is most likely to be the case where respondents do not have a legitimate “don’t know” option for their answer. One feature of the BPS is that the “don’t know” option is presented explicitly to respondents. In terms of our dependent variable, it is reasonable to expect firms to have reliable information on whether or not their market share has increased.¹⁵ The relative profitability and relative productivity measures may be based on less reliable information. Reflecting this observation, the sample size (excluding the “Don’t Know” respondents) for the market share measure is 2529, while those for the profitability and the productivity measures are 2147 and 2191 respectively. For these self-reported measures to have validity in the face of the measurement issues raised by Bertrand and Mullainathan, we require that our estimated (in-sample) relationships determining high from low relative performance can distinguish also between high performers and those in the out-of-sample (“don’t know”) group.

The bulk properties of the data (pre- and post-combination into binary responses) are summarised for all seven-business result questions in Table I. Looking at the inter-relationship between business result responses, we see a considerable degree of consistency across performance indicators. Table II shows that, on a pairwise basis, a majority of firms gave consistent responses to business result questions. We should therefore expect a number of business practices to impact across several of the outcome variables. Table III indicates, however, that there are relatively few stellar performers (answering “high” to

TABLE II
Percentage of firms with same binary response across business results

Binary business result	Binary business result					
	Relative profitability	Relative ROI	Relative productivity	Market share	Profitability	Net cashflow
Relative ROI	91%					
Relative productivity	77%	75%				
Market share	57%	57%	59%			
Profitability	65%	63%	61%	74%		
Net cashflow	62%	60%	59%	66%	71%	
Sales	56%	55%	55%	79%	76%	70%

TABLE III
Percentage of firms with "high" response across multiple business result questions

Number of "High" responses	Survey response	Binary variable
None	16.5%	11.5%
One	12.5%	10.9%
Two	13.1%	11.5%
Three	15.3%	14.3%
Four	16.6%	16.6%
Five	9.4%	11.3%
Six	7.4%	9.7%
All seven	9.2%	14.3%
Sample size	2742	1844

all questions). Instead, the data show an even distribution of poor, average & stellar performers across all the results, consistent with what might be expected across the economy.

4. Methodology and results

Our estimation strategy follows from the conceptual framework outlined in equations (1) and (2). Our data precludes a structural modelling approach, and instead we adopt a reduced form methodology. For each of the three business results (relative profitability, relative productivity and market share), we test the significance of each element of P_i and C_i after controlling for other business practices and characteristics. Because of the large number of variables in the survey, we divide the survey questions into six groups.¹⁶ We test the significance of each question response within a group while at the same time including five composite variables representing the overall responses to each of the five other groups.¹⁷ Initially, we identify each individual response that is significant at the 20% level and then follow a general to specific modelling approach, testing down until only P_i and C_i variables that are significant at the 5% significance level remain.

We test the robustness of our findings across different types of firms, specifically according to industrial sector, size and age. Initial analysis, reported in Fabling and Grimes (2003), showed that results did not differ materially across industrial sector, except in some cases for agriculture, fishing and forestry (AFF) relative to

other sectors, but did sometimes differ according to size and age of firm. Without adjusting for size and age effects, the results would be characterised by heteroskedastic residuals and it would be difficult to draw inferences relating to firms of different types. We therefore test for firm age and firm size interaction effects on both intercept and slope coefficients in order to account for differences in firm type. We also test for interactions with the intercept arising from sectoral effects.

In constructing the firm age and firm size interaction terms, we took advantage of the initial survey design and partitioned the sample into eight categories corresponding to logical groupings with reasonable sub-sample sizes. The age-size groupings, with number of sub-sample observations and each group's weighted proportion within the sample, are as follows.

Age-Size Category ¹⁸	No. Observations	Weighted Sample %
Large – over 10 years	524	5.2
Large – under 10 years	154	1.7
Medium – over 10 years	590	10.7
Medium – 5 to 10 years	148	2.7
Medium – under 5 years	176	3.3
Small – over 10 years	625	40.5
Small – 5 to 10 years	231	15.5
Small – under 5 years	300	20.4

In each case, variables¹⁹ were entered directly (i.e. without interactions) and with age-size interaction terms, where the sum of the coefficients on the latter are constrained to equal zero.²⁰ Interaction terms are retained if and only if they are jointly significant at the 5% level, indicating that the effect differs across one or more firm type. The coefficients on the uninteracted variables reflect the average effect of each variable on the relevant business result. We concentrate in our reporting on this average effect, and report also where age-size interaction terms are significant.

Results using probit estimation applied to the binary response categories are presented in Table IV. Robustness tests are described subsequently. The figures in the body of the table indicate the *ceteris paribus* probability that a shift in firm characteristics or firm behaviour

TABLE IV
Business results explained by practices and characteristics

Survey question	Business result equation		
	Relative profitability	Relative productivity	Market share
Practices			
<i>Capital-augmenting</i>			
Core equipment fully up-to-date (Productivity: equipment at most 4 years behind)	0.091* (0.015)	0.122** (0.009)	0.131** (0.000)
<i>Labour and/or efficiency-augmenting</i>			
Investment in innovation-related employee training			0.125** (0.001)
Performance pay for many or all staff	0.121** (0.007)		
Measure employee satisfaction at least bi-annually		0.131** (0.001)	
Non-managerial staff always have authority to contact suppliers over problems	0.084* (0.044)		
Health & safety processes in place			−0.124* (0.024)
More than 50% of employees rotated job over last year			0.115 (0.048)
<i>R&D</i>			
Commissioned external R&D over past year	0.169** (0.000)	0.152** (0.002)	
Over 20% of total expenditure on development of innovations			0.161* (0.020)
Conducted continuous in-house R&D over past two years	0.205** (0.001)		
Company used some method to protect their inventions		0.103** (0.010)	
Over 30% of sales from completely new goods/services			0.140* (0.020)
<i>Market research</i>			
A great deal of focus on new domestic markets			0.120** (0.001)
At least a little focus on new export markets			0.184** (I) (0.000)
A great deal of staff visits to major customers		0.119* (0.013)	
Very close monitoring of competitors' goods/services			0.123** (0.004)
Industry New Zealand a very important source of ideas for innovations			−0.311** (0.001)
Characteristics			
<i>General economy</i>			
Economic climate reported as a barrier to innovation			−0.120** (I) 0.001)
<i>Industry</i>			
Firm in agriculture forestry & fishing industries	−0.098* (I) (0.021)		
Oligopolist	0.186** (0.000)	0.169** (0.001)	
Competition reported as a barrier to innovation	−0.110** (0.008)	−0.158** (I) (0.000)	−0.086* (0.040)
Market too small or unknown reported as a barrier to innovation			−0.098* (0.049)
<i>Finance</i>			
External borrowing was not available when sought in past year	−0.224* (0.017)	−0.202* (0.043)	
Availability of finance reported as a barrier to improved performance	−0.138* (0.011)		
Access to capital reported as a barrier to innovation	−0.121* (0.013)		
<i>R</i> ²	0.121	0.075	0.125

Note: Reported coefficients are the predicted impact on the probability of being in the “high” response category if the relevant dummy variable were to change from zero to one, holding all other independent variables at their means. *P*-values are shown in brackets below the coefficients: ** denotes significance at the 1% level; * denotes significant at the 5% level. (I) indicates coefficient has age/size interaction terms jointly significant at 5%. *R*² is the log likelihood expressed on a scale of 0 (constant-only) to 1 (perfect prediction). An *F*-test for joint significance of all variables has *P*-value = 0.0000 in each equation.

(from not adopting to adopting the practice) will be associated with a lift in the firm's business results from "low" to "high".

Across the three equations, 17 practice variables are significant in one or more equation; a further 8 variables representing characteristics of the economy, market or firm, are significant. Significant age-size interaction terms, marked with (I), arise in each equation.

We divide the significant practice questions into four categories, corresponding to our conceptual discussion in Section 2. The categories are capital-augmenting practices, labour and/or efficiency-augmenting practices, R&D practices, and market research practices.

Capital-augmenting practices are considered to impact primarily on capital quality (μ_i), and hence to be productivity enhancing in the first instance. Having up-to-date core equipment is the key capital-augmenting practice. Its effect is pervasive; having up-to-date capital equipment has a positive and significant impact on each of productivity, profitability and market share. *Ceteris paribus*, the mean firm has between a 9% and 13% greater probability of being in the "high" performance category for each of profitability, productivity and market share if it has up-to-date core equipment.

Six employee-related practices are significant. Conceptually, these are most likely to impact on labour quality (λ_i), although they could also impact on A_i (general efficiency) if they lead to more efficient combination of factors of production through better intra-firm processes. Having performance pay systems (for many or all staff) has a significant relationship with profitability at the 1% level. The mean firm has a 12% greater probability of being in the high profitability category if it has performance pay. The significance of this variable is consistent with the findings of Lazear (2000) with respect to performance pay in the US glass industry.

The finding that a range of employee (human resource) practices is significant (i.e. measuring employee satisfaction, job rotation, delegating authority to employees, adopting performance pay and investing in training), is consistent with Ichniowski et al's (1997) findings that a package of human resource practices is important for firm performance. It is also consistent with a

resource-based theory of firm performance, with emphasis on the importance of employee resources for firm success. One HR practice is found to have a negative impact on firm performance: having health and safety processes in place. It is possible that this represents a regulatory cost in which firms incur costs when they meet (or have to meet) certain health and safety regulatory requirements.

Five R&D practices have a significant positive association with business results. Firms that commission external R&D and/or conduct internal R&D perform well on profitability and productivity. In each case, the mean firm has between a 15% and 21% greater probability of being a high performer if it undertakes one of these forms of R&D. *Ceteris paribus*, firms that derive at least 30% of sales from new products and/or spend a high portion of their budget on innovation development have a higher probability of favourable market share than do other firms. These practices are most likely to impact on the production function through A_i or μ_i , with effects also on product quality (v_i).

Related to the R&D findings are those for market research. Not surprisingly, most market research practices relate positively to market share. One result – the negative association between market share and use of Industry NZ as a very important source of innovation ideas – is curious. Industry NZ is a government-sponsored organisation designed to assist development of domestic firms. It is possible that a selection effect is at work here; firms that are struggling in the market may be those that are most likely to use Industry NZ (rather than other organisations) as a major source of innovation ideas. Our results therefore do not imply that Industry New Zealand assistance itself is counter-productive.

Of the 17 significant practice variables, there is only one (focusing on new export markets) in which the relationship between the practice and the business result varies significantly by firm type. We find that this practice is positive and significant for small and medium sized firms that have been in operation for up to ten years; it is not significantly different from zero for old or large firms. This finding is intuitively sensible since new export marketing is particularly

important for the growth prospects of younger, growing firms. Older, larger firms tend already to be exporters or to have taken a prior decision to operate solely within the domestic market.

Of the 8 characteristics variables, 6 are of the form in which the characteristic represents a perceived barrier to performance. Firms seeing these characteristics as barriers to performance also (consistently) reported that one or more of their business results was unfavourable. Three of these questions relate to some form of finance constraint. We cannot ascertain the direction of causality from the data with certainty. We note, however, that each of the three relationships is negative and significant for profitability, but only one is significant for productivity and none is significant for market share. This may suggest that the dominant direction of causality is unprofitable firms finding it difficult to access finance, rather than a lack of access to finance causing wider problems for the firm.

Market structure appears to be important for business results consistent with industry-based theories of firm performance. Operating in an oligopolistic (rather than a competitive or single seller) market has benefits for each of profitability and productivity, while those that see competition as a barrier to innovation have significantly negative business outcomes across all three measures. The sector in which a firm operates is important for profitability, with agriculture/forestry/fishing firms performing relatively poorly on this measure. We find that small, young firms in this sector are particularly likely to have low profitability.

We have subjected the results presented in Table IV to a number of robustness checks. First, we re-entered firm demographic variables into the equations to test if they were significant when added at the end of the estimation process. We entered dummies for each of the age categories, size categories and (1-digit) sector categories (noting that agriculture is already included in the profitability equation).²¹ The results are presented in the Appendix. None of the age or size dummies was significant in any of the three equations. No sector dummies were significant when added to the profitability or productivity equations. Eight sector dummies were significant at 5% when added to the market share equation.

However, in this case – as in the other two equations – the remaining estimates were hardly changed. In each equation, all variables retained the same sign; all were significant at 5% other than three variables that were significant at 7% (and other than the agriculture sector dummy which is not significant at 20% once the other demographic dummies are added).

Second, we re-entered each variable that was significant at the 20% level in the general-to-specific search to test (a) whether it is significant at the 5% level when added to the final specification, and (b) whether any variable in the final specification becomes insignificant at 5%. No changes were recorded in the profitability or productivity equations. In the market share equation, no variable is significant at 5% when added, but the job rotation variable is no longer significant in the presence of each of three other included variables.²² Correspondingly, we do not emphasise the importance of job rotation in our discussion. Apart from this case, the significance of each variable across the three equations is robust to the addition of the other demographic, practice and characteristics variables.

As a final robustness check, we re-estimate the equations presented in Table IV using ordered probit, incorporating the three response categories (high, neutral, low) for each of the dependent variables. We emphasise that the potential for respondent bias (answering in the neutral rather than the unfavourable category when the latter is objectively more appropriate) means that we place less reliance on the ordered probit than the standard probit results. The issue appears to be most acute for productivity, where fewer than 4% of respondents considered their firm to have lower than average productivity as opposed to almost exactly a third who considered they had higher than average productivity. Thus we do not expect the data to be able to discriminate as strongly between the three groups as between the binary categories.

In keeping with our priors, the R^2 of each ordered probit equation falls relative to the corresponding equation in Table IV. The ordered probit equations correctly predict a slightly greater proportion of “high” performers than does the standard probit approach, but are poor in discriminating accurately

between neutral and low performers. A number of variables are no longer significant in the ordered probit regression. However all variables remain of the same sign, and at least half of the variables remain significant at the 5% level in each equation. The profitability equation has the greatest explanatory power ($R^2 = 0.086$) with strong positive associations between profitability and each of: up-to-date core equipment, performance pay, external and internal R&D, oligopoly market structure and two finance-related variables.²³ Thus, as with the standard probit results, the ordered probit estimates indicate that both industry structure and internal firm practices are important for firm success.

The importance of both internal firm-resource-based factors and industry factors mirrors the results of Spanos and Lioukas (2001) that each set of factors is relevant to rent generation. We find that firms operating in an oligopolistic market tend to have favourable results relative to firms operating in other market structures. Nevertheless, internal firm management practices are important in determining firm performance notwithstanding the market structure in which the firm operates.

These results relate to the effects of individual firm practices and (internal and external) characteristics on business results. In Figure 1, we use the probit estimates to plot kernel densities for sub-samples of firms to demonstrate the impact business practices and characteristics have on the likelihood of being a “high” (favourable) versus a “low” (unfavourable/neutral) performer for each business result. We divide the sample into firms that had “high” performance on each metric; those that had “low” performance, and the “don’t knows”. Figure 1 demonstrates that the “high” performers’ probability distribution sits to the right of the “low” performers’ distribution for each of the business results. This is to be expected since the two groups together constitute the sample over which each equation was estimated.

More important as a test of the robustness of our methodology is the profile of the “don’t know” sub-sample. The predictions for this group are completely out of sample; i.e. we excluded this group from our probit estimations. For each business result, the kernel density of the “don’t know” group is either very similar to that of the “low” performers (productivity and market share) or sits to the left of the low

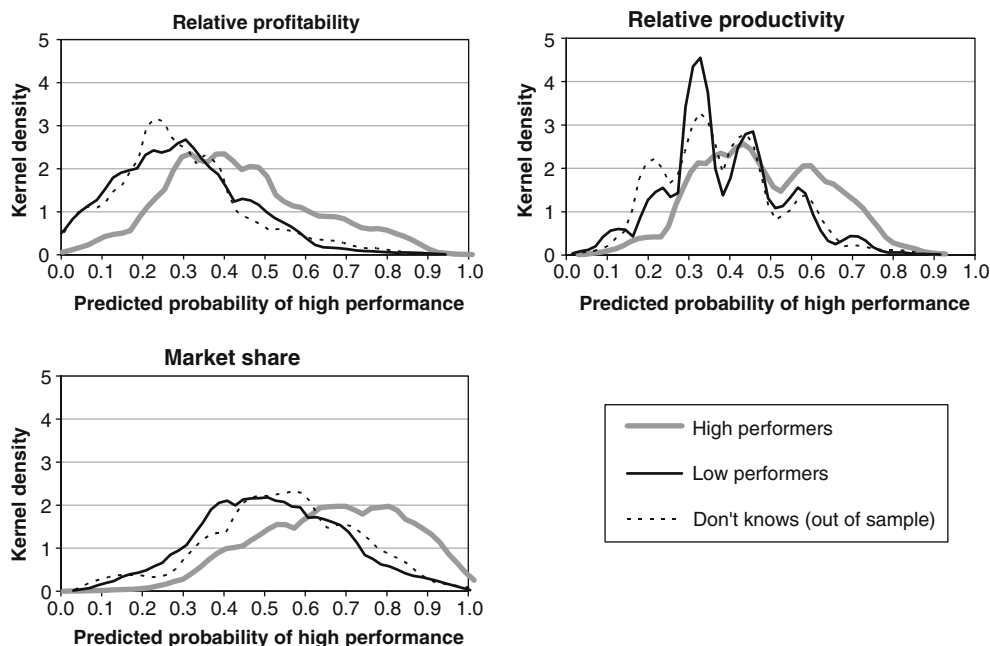


Figure 1. Kernel densities by business result.

performers indicating still worse performance (profitability). The “don’t know” curve sits to the left of the high performers in each case. These results provide out-of-sample confirmation of our findings. The practices and firm characteristics presented in Table IV are able to differentiate (out-of-sample) between firms that consider they perform well for each business result from those that do not know how to regard their performance.

5. Conclusions

Our work focuses on the association of firms’ business results with their business practices and the firm’s characteristics. Spanos and Lioukas (2001) find that both internal firm practices and external (industry) characteristics are important in determining firm performance. Consistent with their findings and with those of Haltiwanger et al. (2000) and Bloom et al. (2005), we find that firm heterogeneity pertaining to features both internal and external to the firm are associated with business success.

Four categories of business practices are found to be particularly important. The first is investment in up-to-date capital equipment, which we interpret as a capital-augmenting practice. Labour-augmenting (and/or efficiency-enhancing) employee-related practices constitute the second group. This group includes incentive practices (adoption of performance pay for most employees) and more general HR practices (e.g. measuring employee satisfaction). The third and fourth groups relate to R&D and market research. R&D practices are associated

positively with each of the business results, whereas market research is associated primarily with higher market share.

Industry structure is also found to be important. Firms that operate in an oligopolistic setting, and/or do not perceive competition as a barrier to innovation, tend to perform well on all three measures of performance. This finding is consistent with industry-based approaches to competitive advantage. While we cannot ascertain causality, the results suggest that industry factors are not the sole determinants of competitive advantage; capabilities and resource use within the firm are also important. Successful firms are “up with the play” in terms of capital equipment and product and process development. They complement these innovation practices through their attention to human resources within the firm. Successful firms emphasise mechanisms to incentivise and reward performance and pay attention to a range of human resource management practices.

Our results are derived from analysis of almost 3000 firms that are carefully sampled to be representative of an entire economy. The results from this large sample complement insights gained from case studies of successful firms²⁴ and from smaller, less representative surveys. Case study results and commercial instinct suggest that innovative firms that look after their staff and which operate in an oligopolistic setting, will tend to be in the upper tier of business performers. Our analysis, using a new and much wider dataset than previous studies, is consistent with this intuition.

APPENDIX: robustness test results

Business Results with Additional Demographic Variables Included

Survey question	Business result equation		
	Relative profitability	Relative productivity	Market share
Practices			
<i>Capital-augmenting</i>			
Core equipment fully up-to-date (Productivity: equipment at most 4 years behind)	0.097* (0.013)	0.125** (0.007)	0.142** (0.000)

APPENDIX
Continued

Survey question	Business result equation		
	Relative profitability	Relative productivity	Market share
Characteristics			
<i>Labour and/or efficiency-augmenting</i>			
Investment in innovation-related employee training			0.132** (0.000)
Performance pay for many or all staff	0.118* (0.011)		
Measure employee satisfaction at least bi-annually		0.144** (0.000)	
Non-managerial staff always have authority to contact suppliers over problems	0.078 (0.063)		
Health & safety processes in place			-0.142* (0.012)
More than 50% of employees rotated job over last year			0.110 (0.051)
<i>R&D</i>			
Commissioned external R&D over past year	0.180** (0.000)	0.164** (0.001)	
Over 20% of total expenditure on development of innovations			0.159* (0.023)
Conducted continuous in-house R&D over past two years	0.205** (0.001)		
Company used some method to protect their inventions		0.116** (0.004)	
Over 30% of sales from completely new goods/services			0.136* (0.030)
<i>Market research</i>			
A great deal of focus on new domestic markets			0.118** (0.002)
At least a little focus on new export markets			0.125** (I) (0.001)
A great deal of staff visits to major customers		0.105* (0.028)	
Very close monitoring of competitors' goods/services			0.117** (0.006)
Industry New Zealand a very important source of ideas for innovations			-0.324** (0.001)
Characteristics			
<i>General economy</i>			
Economic climate reported as a barrier to innovation			-0.154** (I) (0.000)
<i>Industry</i>			
Firm in agriculture, forestry & fishing industries	-0.094 (I) (0.291)		
Oligopolist	0.191** (0.000)	0.167** (0.001)	
Competition reported as a barrier to innovation	-0.119** (0.004)	-0.165** (I) (0.000)	-0.087* (0.037)
Market too small or unknown reported as a barrier to innovation			-0.088 (0.068)
<i>Finance</i>			
External borrowing was not available when sought in past year	-0.219* (0.028)	-0.212* (0.043)	
Availability of finance reported as a barrier to improved performance	-0.144** (0.007)		
Access to capital reported as a barrier to innovation	-0.118* (0.011)		
<i>Industry</i>			
Firm in agriculture, forestry & fishing industries (ANZSIC division A)		-0.036 (0.722)	0.210* (0.030)
Firm in mining industry (ANZSIC division B)	-0.127 (0.269)	0.006 (0.962)	0.137 (0.247)
Firm in manufacturing industry (ANZSIC division C)	0.018 (0.845)	0.016 (0.858)	0.280** (0.001)
Firm in construction industry (ANZSIC division E)	0.079 (0.497)	0.124 (0.281)	0.229 (0.025)
Firm in wholesale trade industry (ANZSIC division F)	0.025 (0.798)	-0.010 (0.919)	0.247** (0.006)
Firm in retail trade industry (ANZSIC division G)	0.056 (0.609)	-0.005 (0.962)	0.139 (0.203)
Firm in accommodation, cafes & restaurants industries (ANZSIC division H)	0.081 (0.459)	0.195 (0.075)	0.196 (0.060)

APPENDIX
Continued

Survey question	Business result equation		
	Relative profitability	Relative productivity	Market share
Characteristics			
Firm in transport & storage industries (ANZSIC division I)	0.071 (0.511)	−0.006 (0.952)	0.270** (0.002)
Firm in communication services industry (ANZSIC division J)	0.041 (0.760)	0.211 (0.149)	0.290** (0.004)
Firm in finance & insurance industries (ANZSIC division K)	−0.013 (0.904)	0.019 (0.858)	0.221* (0.017)
Firm in property & business services industries (ANZSIC division L)	−0.029 (0.773)	−0.006 (0.952)	0.199* (0.045)
Firm in education industry (ANZSIC division N)	−0.152 (0.132)	−0.044 (0.716)	0.168 (0.140)
Firm in health & community services industries (ANZSIC division O)	−0.121 (0.245)	−0.063 (0.567)	0.192 (0.064)
<i>Size</i>			
Small (6–19.5 full-time equivalents)	−0.043 (0.239)	0.052 (0.217)	−0.069 (0.165)
Medium (20–40.5 full-time equivalents)	−0.003 (0.932)	0.039 (0.327)	−0.022 (0.657)
<i>Age</i>			
Old (over 10 years of operations)	0.046 (0.380)	0.019 (0.739)	−0.077 (0.201)
Middle (5–10 years of operation)	0.066 (0.304)	0.092 (0.191)	0.004 (0.961)
R^2	0.134	0.090	0.139

Notes: The omitted sector is “Cultural & recreational services industries (ANZSIC division P)”; the omitted size category is large firms; the omitted age category is young firms. The interaction terms in the relative productivity equation are no longer jointly significant at the 5% level; other interaction terms remain significant at 5%.

Reported coefficients are the predicted impact on the probability of being in the “high” response category if the relevant dummy variable were to change from zero to one, holding all other independent variables at their means. *P*-values are shown in brackets below the coefficients: ** denotes significance at the 1% level; * denotes significant at the 5% level. (I) indicates coefficient has age/size interaction terms jointly significant at 5%. R^2 is the log likelihood expressed on a scale of 0 (constant-only) to 1 (perfect prediction). An *F*-test for joint significance of all variables has *P*-value = 0.0000 in each equation.

Notes

* This is a revised version of a paper presented to the New Zealand Association of Economists conference, Auckland, June 2003. The views expressed are those of the authors and do not necessarily reflect the position of their employers. We thank Ed Lazear, Bob Buckle, Dean Hyslop, Hayden Johnston, two referees and the editor of this journal for their helpful comments.

¹ Lazear notes that while adoption of performance pay may boost firm productivity, it may not boost firm profitability; that depends on how the productivity benefits are shared between shareholders, employees, customers and suppliers.

² As discussed by Bloom et al. (2005), significant associations – while not revealing direction of causality – nevertheless indicate that the surveyed management practices are important to the operation of firms.

³ Quality may be tangible (e.g. a product with more features) or intangible (e.g. a brand name).

⁴ Outputs may be single or multiple; in the latter case Y_i becomes a vector representing the range of the firm’s outputs; corresponding remarks apply to L_i and K_i .

⁵ The questionnaire was sent to 3378 enterprises with response from 2756 enterprises (81.6% response rate); 96% of respondents answered 90% or more of the questions (with the mean proportion of questions answered being 97%). Responses to unanswered questions were inferred by Statistics New Zealand using a “nearest neighbour” methodology. We drop 14 observations from this set due to the absence of either the industry or age variable.

⁶ Size stratification was: 6–19.5 FTEs (Small); 20–49.5 FTEs (Medium); ≥50 FTEs (Large).

⁷ We use weighted responses throughout our analysis.

⁸ E.g. “How important are competitors as a source of ideas and information for new and improved products, services or processes?”

⁹ On-site interviews were conducted with a sample of respondents to verify the accuracy of the data collected (Knuckey and Johnston, 2002).

¹⁰ E.g. "In the last 12 months what was the value of sales generated through the internet?"

¹¹ See www.med.govt.nz/irdev/ind_dev/firm-foundations/firm-foundations.pdf for the questionnaire.

¹² Despite the simple nature of the Knuckey & Johnston indices, Fabling and Grimes (2003) find that two indices (Employee Practices, and Innovation and Technology) have significant explanatory power over measures of firm performance.

¹³ For the first three categories, choices are "lower", "on a par", "higher". For net cash flow, choices are "negative", "neutral", "positive". For the remaining three questions, choices are "decreased", "stayed the same", "increased".

¹⁴ In examining the wider properties of the data, we make use of the information covered by all seven-business result measures. Fabling and Grimes (2003) presents results for all seven-business results, showing similar determinants across all seven measures to those for the three measures presented here.

¹⁵ As discussed, if they do not have this information they are more likely to be low performers than high performers, consistent with our maintained hypothesis.

¹⁶ The groups are: leadership and planning; customer focus; quality and supplier focus; employee practices; information and benchmarking; innovation and technology.

¹⁷ The composite variables that we use are the six Business Practice Indices (BPIs) compiled by Knuckey and Johnston (2002). We also constructed principal components (PCs) using the same groupings; the correlation coefficients between the respective BPIs and PCs ranged from 0.73 to 0.99 (averaging 0.87) indicating that each approach acts as a similar control for the remaining practice groupings.

¹⁸ Size categories are: 6–19.5 FTEs (Small); 20–49.5 FTEs (Medium); ≥ 50 FTEs (Large). Age refers to the time since establishment of the firm. We did not disaggregate the large firm under 10 year category into 5–10 years and under 5 years given the few observations in the category.

¹⁹ Where questions have more than two responses (e.g. not at all, a little, a moderate amount, a great deal) we enter each option as separate variables and retain those that are significant. In cases where initially estimated coefficients are similar for two categories and significantly different from those in the other categories we combine the significant categories to form one category (e.g. we may combine the responses to "a moderate amount" and "a great deal"). Ultimately, all practice variables that appear in the equations are binary variables.

²⁰ To do so, we construct a dummy variable D_i for each type of firm ($i = 1, \dots, 8$) then construct seven interaction terms ($D_i - D_{i-1}$) for $i = 2, \dots, 8$ which we multiplied by each explanatory variable.

²¹ In each case, one category is omitted to avoid perfect multicollinearity with the constant.

²² The three variables relate to the importance of a firm's flexibility strategy, overseas ownership, and linkages with universities and polytechnics.

²³ Significant variables in the relative productivity equation are: measuring employee satisfaction; staff visits to major customers; oligopolist; competition reported as a barrier; and external borrowing not available. Significant variables in the market share equation are: core equipment fully up-to-date; focus on new export markets; Industry NZ a source of innovation ideas; economic climate reported as a barrier; competition reported as a barrier; and market too small or unknown.

²⁴ For New Zealand case studies of firm management and growth, see Campbell-Hunt *et al* (2001).

References

- Aghion, P. and P. Howitt, 1998, *Endogenous Growth Theory*, Cambridge, MA: MIT Press.
- Amit, R. and P. J. H. Shoemaker, 1993, 'Strategic Assets and Organisational Rent', *Strategic Management Journal* **14**(1), 33–46.
- Ansoff, H. I., 1987, *Corporate Strategy, Revised Edition*, Harmondsworth: Penguin Books.
- Australian Manufacturing Council, 1994, *Leading the Way – A Study of Best Manufacturing Practices in Australia and New Zealand*, Melbourne.
- Barney, J. B., 2002, *Gaining and Sustaining Competitive Advantage*, 2nd edition, New Jersey: Prentice Hall.
- Barney, J. B. and A. M. Arian, 2001, 'The Resource-Based View: Origins and Implications', in M. A. Hitt *et al.* (eds.), *The Blackwell Handbook of Strategic Management*, Oxford: Blackwell, .
- Baumol, W., 2002, *The Free-Market Innovation Machine*, Princeton: Princeton University Press.
- Bertrand, M. and S. Mullainathan, 2001, 'Do People Mean What They Say? Implications for Subjective Survey Data', *American Economic Review (Papers and Proceedings)* **91**(2), 67–72.
- Bloom, N., S. Dorgan, J. Dowdy, J. Van Reenan and T. Rippin, 2005, *Management Practices Across Firms and Nations*, Centre for Economic Performance, London School of Economics .
- Bresnahan, T. F., E. Brynjolfsson and L.M. Hitt, 1999, *Information Technology, Workplace Organisation, and the Demand for Skilled Labour*, NBER Working Paper No. 7136, Cambridge Mass: NBER.
- Campbell-Hunt, C., J. Brocklesby, S. Chetty, L. Corbett, S. Davenport, D. Jones and P. Walsh, 2001, *World Famous in New Zealand: How New Zealand's Leading Firms Became World Class Competitors*, Auckland: Auckland University Press.
- Day, G. S., 1990, *Market Driven Strategy: Processes for Creating Value*, New York: The Free Press.

- Eisenhardt, K. M. and J. A. Martin, 2000, 'Dynamic Capabilities: What are They?' *Strategic Management Journal* **21**(10), 1105–1121.
- Fabling, R. and A. Grimes, 2003, Practice Makes Profit: Business Practices for Firm Success, Paper presented to New Zealand Association of Economists Conference, Auckland.
- Grant, R. M., 1998, *Contemporary Strategy Analysis*, 3rd Oxford: Blackwell.
- Griliches, Z., 1994, *R&D and Productivity: The Econometric Evidence*, Chicago: University of Chicago Press.
- Haltiwanger, J., J. Lane and J. Speltzer, 1999, 'Productivity Differences Across Employers: The Roles of Employer Size, Age, and Human Capital', *American Economic Review* **89**(2), 94–98.
- Haltiwanger, J., J. Lane and J. Speltzer (2000) Wages, Productivity, and the Dynamic Interaction of Businesses and Workers, NBER Working Paper No. 7994, Cambridge Mass: NBER.
- Hewitt-Dundas, N. and S. Roper, 2001, 'Strategic Re-Engineering: Small Firms' Tactics in a Mature Industry', *Small Business and Enterprise Development* **8**(3), 317–336.
- Ichniowski, C., K. Shaw and G. Prennushi, 1997, 'The Effects of Human Resource Management Practices on Productivity: A Study of Steel Finishing Lines', *American Economic Review* **87**(3 June), 291–313.
- Kelejian, H.H. and S.W. Black (1970), 'A Macro Model of the US Labor Market', *Econometrica* **38**(5), September.
- Knuckey, S., J. Leung-Wai and M. Meskill, 1999, Gearing Up: A Study of Best Manufacturing Practice in New Zealand, Wellington: Ministry of Commerce.
- Knuckey, S., H. Johnston, C. Campbell-Hunt, K. Carlaw, L. Corbett and C. Massey, 2002, Firm Foundations: A Study of New Zealand Business Practices & Performance, Wellington: Ministry of Economic Development, www.med.govt.nz/irdev/ind_dev/firm-foundations/firm-foundations.pdf.
- Lazear Edward (2000) Performance Pay and Productivity. *American Economic Review* **90**(5):1346–1361 December.
- Makadok, R., 2001, 'Toward a Synthesis of the Resource-Based and Dynamic Capability Views of Rent Creation', *Strategic Management Journal* **22**, 387–401.
- Ministry of Economic Development, 2003, SMEs in New Zealand: Structure and Dynamics, September, Wellington.
- Mintzberg, H., B. Ahlstrand and J. Lampel, 1998, *Strategy Safari: A Guided Tour Through the Wilds of Strategy Management*, London: Prentice Hall.
- Nickell S. and D. Nicolitsas, 2000, "Human Capital, Investment and Innovation: What are the Connections?" in R. Barrell, G. Mason and M. O'Mahony (eds.), *Productivity, Innovation and Economic Performance*, Cambridge: Cambridge University Press.
- Penrose, E. T., 1959, *The Theory of the Growth of the Firm*, Oxford: Basil Blackwell.
- Porter, M. E., 1980, *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, New York: The Free Press.
- Porter, M. E., 1985, *Competitive Advantage: Creating and Sustaining Superior Performance*, New York: The Free Press.
- Reserve Bank of New Zealand, 2005, Monetary Policy Statement, June, Wellington.
- Roper, S., 1998, 'Entrepreneurial Characteristics, Strategic Choice and Small Business Performance', *Small Business Economics* **11**(1), 11–24.
- Spanos, Y. E. and S. Lioukas, 2001, 'An Examination into the Causal Logic of Rent Generation: Contrasting Porter's Competitive Strategy Framework and the Resource-Based Perspective', *Strategic Management Journal* **22**, 907–934.
- Statistics New Zealand, 2002, Business Practices Survey: Technical Report, Wellington.
- Syverson, C., 2004, 'Product Substitutability and Productivity Dispersion', *Review of Economics and Statistics* **86**, 534–550.
- Teece, D. J., G. Pisano and A. Shuen, 1997, 'Dynamic Capabilities and Strategic Management', *Strategic Management Journal* **18**(7), 509–533.
- UK Treasury, 2000, Productivity in the UK: The Evidence and the Government's Approach, November, London.
- Varadarajan, P. R. and S. Jayachandran, 1999, 'Marketing Strategy: An Assessment of the State of the Field and Outlook', *Journal of Marketing Science* **27**(2), 120–143.
- Wernefelt, B., 1984, 'A Resource-Based View of the Firm', *Strategic Management Journal* **5**, 171–180.

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