Diversification and the Performance of Australian Enterprises*

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Abstract

The aim of this paper is to examine empirically the relationship between diversification and firm performance. The paper uses a sample panel of large Australian firms covering the period 1989 to 1994. Following a discussion of some arguments for and against diversification, bivariate and multivariate analyses are performed to test whether diversification *ceteris paribus* improves or impedes performance. The results indicate that diversification has a negative impact on firm performance, controlling for firm size, gearing, and whether or not firms are listed and foreign owned.

1. Introduction

This focus of this paper is the effect of diversification on the performance of Australian enterprises. Diversification is defined as "the spreading of its operations by a business over dissimilar economic activities" (Amey, 1964, page 252).

A key issue in the business strategy literature is the extent to which firms should specialise in particular product areas, or, to put it another way, "stick to their knitting." In Australia, for example, Phil Ruthven (1994) (using the IBIS Enterprise Database, which forms the basis of the present paper[1]) reports that one of the main determinants of business success is "focus," and that one of the worst strategies a firm could pursue is to evolve into a large conglomerate. Ruthven presents supporting evidence based upon those firms that appear in the 100 highest performing Australian companies, ranked by their return on shareholders' funds. This view that focus is necessary for business success has recently gained quite widespread support in the international empirical literature.

The aim of this paper is to examine empirically the relationship between diversification and firm performance. The paper uses a sample panel of large Australian firms drawn from the IBIS Enterprise database. The sample panel covers the period 1989 to 1994.

The paper is organised as follows. In Section 2 we discuss some theoretical arguments for and against diversification as a successful business strategy. In Section 3 we provide a brief overview of the relevant empirical literature. As an introduction to the quantitative analysis that follows, Section 4 presents a description of the data, and outlines various ways in which diversification can be measured using the IBIS database. In Section 5 we compare the

[1] The IBIS Enterprise Database is a large unit-record database of (mainly financial) information on Australian firms. For a discussion of the IBIS database, see Kells and Worswick (1997).

financial performance of focused and diversified firms. In Section 6 we present a multivariate analysis of the influence of diversification (and other variables) on the performance of Australian enterprises using panel data techniques. Finally, Section 7 presents some conclusions and some suggested directions for further research in this area.

2. Theoretical arguments for and against diversification

2.1. Why diversify?

A well-known motivation for diversification involves the realisation of managerial economies of scale. As firms become larger, the per unit cost of engaging managerial and administrative resources declines. As managerial resources are not uniquely applicable to any single production technology, the same managers can oversee diverse operations. A company that is prevented from reaching a certain scale in one line of business (due to the size of its market or antitrust controls, say) can still grow by acquiring related but not identical business, or businesses in other industries altogether. Similar arguments underlie the suggestion that diversified companies are able to realise economies of scope ("synergies") in production and marketing.

Another group of arguments for diversification relates to the exploitation of financial synergies. These arguments generally involve earnings smoothing and the relative efficiency of the internal capital market. It has often been said in the finance literature that two firms with less than perfectly correlated income flows can, by merging, reduce the probability of either firm defaulting and so increase the value of both firms (though as we note below, this argument has been shown to be seriously flawed). Another possible value-increasing strategy

for merging firms would be to increase gearing by increasing borrowing and using the proceeds to retire equity:

> The debt-to-equity ratio of the merged firm can be increased to offset the decrease in the volatility of the merged firm's rate of return. The increased amount of debt implies that the total value of the firm is increased through the merger due to the tax deductibility of interest payments (Copeland and Weston, 1992 page 694).

In addition to this ability to exploit latent debt capacity, larger firms might have better access to capital markets, and this may reduce the risk to lenders to diversified firms (Levy and Sarnat, 1970, page 801).

A further dimension concerns the relative efficiency of internal and external capital markets. Insofar as internal capital markets allow a more efficient allocation of funds across competing uses (arising from the absence of asymmetries of information and the possibility of better control of the outcomes of investments) than external capital markets, then diversification is attractive insofar as it enables greater use of internal funds.

A recent view put forward is that firms diversify in order to build up a portfolio of product areas that matches their competitors' (Scott, 1993). The main rationale for this strategy is that it enables companies to reduce the risk and uncertainty in repeated game situations. The work undertaken by Scott (1993) has demonstrated that if two conglomerates are found to both operate one particular line of business, then there is a strong likelihood that the companies will have other lines of business in common. A similar result was shown for their research and development activities. According to Scott, this is part of a strategy of conglomerates to restrict competition both in a static and a dynamic sense.

A further motivation for diversification may be that managers, having formed a view about the expected future profitability of their main business and that business's industry, might, if that outlook is negative (for example because the firm's market power is being eroded by increasing competition, or certain products are in irreversible decline), gamble that to diversify into an industry with a more positive outlook will preserve the firm that would otherwise decline (and so preserve the market value of its managers in the employment market).

2.2. Criticisms of diversification as a strategy

In recent years a number of arguments have been used to disrupt some of the standard justifications for diversification. Copeland and Weston (1992) and Galai and Masulis (1976) argue convincingly that the positive valuation effect of combining two firms with imperfectly correlated income flows, and so reducing default risk, is illusory and involves changing the relative positions of bond and equity holders: "the bondholders receive more protection since the stockholders of each firm have to back the claims of the bondholders of both companies" (Galai and Masulis, 1976, page 68). It is shown by these authors using option-pricing arguments that the value of the company's equity is consequently reduced.

Another argument against earnings smoothing has been framed in terms of shareholder preferences: why should firms merge to reduce the volatility of their returns when shareholders are well placed to do so via the stock market? More controversially, it has been suggested that diversification may destroy value by interfering with shareholders' ability to diversify their portfolios (Levy, 1991). A conglomerate forces its shareholders to hold stock in its component businesses in a fixed proportion (equivalent to the value of the company's equity attributable to each of its businesses) which may not be compatible with shareholders'

optimal portfolio decisions. Arguments of this type have been used to justify recent de-merger activity, such as the separation of ICI plc into ICI (chemicals) and Zeneca (pharmaceuticals).

Another argument against diversification is that businesses which would optimally fold are able nevertheless, because they are part of a conglomerate, to continue to operate via subsidies from other parts of the conglomerate.

Finally, in opposition to arguments based on managerial economies of scope, it has been suggested that focused companies may realise managerial economies of specialisation.

3. The empirical literature

There has been a huge amount of empirical work undertaken in the area of diversification and firm performance. Many studies have concentrated on stock market activity (takeovers, equity carve outs, spin offs and so on) to examine the association of focus and stock returns. Other studies have taken a resource-based approach or have used Tobin's q to examine why focus may be desirable. No attempt is made to review the bulk of this literature here: rather, some key recent studies are described in the context of the arguments for and against diversification outlined above. (The reader is also referred to the bibliography below.)

An early study by Reid (1968) confirmed a widely held belief that much diversification was management-driven rather than financially justifiable. Reid found that conglomerate mergers satisfied the desires of managers for larger firms but did not increase earnings or market prices. Similarly, Jensen (1988) concluded that corporate diversification programs exemplify the theory that managers of firms with unused borrowing capacity and substantial free cash flows are more likely to undertake low-benefit or even value-destroying investments. Meyer,

Milgrom and Roberts (1992) found that failing businesses can have too ready access to cross subsidies when they are part of a diversified firm.

There is some evidence suggesting that conglomerate acquirers have an information advantage and are more able to accurately value target companies. Meilicher and Rush (1974) found that over the period 1960 to 1969, conglomerates acquired more profitable firms than non-conglomerate acquirers, and that conglomerate mergers increased the utilisation of latent debt capacity. Evidence counter to this suggested managerial advantage includes studies that have found that conglomerates perform no better than matched portfolios of undiversified companies. For example, Mason and Goudzwaard (1976) compared 22 conglomerates against randomly selected portfolios with similar asset structures for the years 1962 to 1967. They concluded that conglomerates performed statistically worse in terms of their return on assets and return on equity, compared with an un-managed portfolio of similar industry investments. Smith and Weston (1977) found the risk-adjusted performance of conglomerates to be significantly better than that of mutual funds. However, this study was subsequently criticised for its mis-specification of the risk adjustment its authors performed.

Chatterjee and Wernerfelt (1991) adopted a new approach to studying diversification, focusing on the use of surplus productive resources. They found that excess physical resources, most knowledge-based resources and external financial resources are associated with more related diversification, while internal financial resources are associated with more unrelated diversification. In a recent study, Comment and Jarrell (1995) concluded that in the 1980s there was a trend toward focus and specialisation and that this led to improved stock returns overall. Further, while financial economies of scope were available to diversified firms, diversified firms failed to exploit these economies. Also, Comment and Jarrell found that diversified firms exhibited lower firm specific (diversifiable) risk but not lower

systematic risk, supporting the argument that diversification at firm level (rather than diversification by shareholders of their share portfolios) was not value-enhancing.

Taken together, these studies suggest that over recent decades there has been a substantial shift in the view taken of diversification. More sophisticated techniques in financial economics (including arbitrage and option pricing arguments) have shown that previously held ideas about the financial benefits of mergers were misguided. Also, there has been a shift in emphasis from diversification in general to related versus unrelated diversification.

4. The data

4.1. Profile and construction of the data panel

The data in the panel used in the quantitative analysis that follows were extracted from the IBIS database. The IBIS database contains detailed longitudinal information on an annual basis for medium to large firms in Australia over the period 1979 through to the present. The database covers Australian-owned and foreign-owned private and public companies in all industries. In total, the database currently has historical data for approximately 6,000 firms. Of these, approximately 2,900 firms were present on the database in 1994.[2] The database contains detailed financial information including revenue, profit, tax, assets, liabilities and depreciation. The database also contains information about shareholders, the number of employees, subsidiary information, industry information and details relating to senior personnel.

[2] The figures in the present paper were current for the version of the IBIS database that was available at the Melbourne Institute from late 1995 to late 1997. At the time of writing the Institute was in the process of installing the latest version of database, a regular task as the database is being updated continually.

The extracted panel covers the period from 1989 to 1994. Australian firms only were included in the panel (the small number of New Zealand and PNG firms that appear on the IBIS database were excluded). Firms were included in the panel if they satisfied a minimal data requirement for each year of the panel. The minimal data requirement was that the firm had a value in the revenue field. Accordingly, firms that were included have a value for revenue in each year of the panel (also, they all have a value for accounting period, company type, industry and some other variables).

The resulting panel contains 942 firms and covers the period 1989 to 1994 (giving 5,652 observations). Foreign-owned firms make up about 39 per cent of the panel, while government-owned firms comprise 16 per cent. Firms that are owned by the Australian private sector make up about 46 per cent of the panel. No firm in the panel is both foreign-owned and government-owned. Of the 942 firms, approximately 28 per cent are listed on the Australian Stock Exchange. Manufacturing firms make up the largest one-digit industry group in the panel (approximately 31 per cent of the firms), while the agriculture, forestry, fishing and hunting classification has the smallest number of firms.

4.2. Measuring diversification

While in theory discussions of diversification all have a single concept in mind, in practice there are several ways to measure diversification. A very simple way to measure diversification is to count the number of industries a firm operates in. A more sophisticated measure might take account of the relative importance of these industries in terms of their contribution to the firm's revenue. It might also be desirable to capture how different the firms' various segments are to each other. Applying a farmyard metaphor to the task of managing a diversified company, the mother hen's job of managing her chicks is all the more

difficult if the number of her chicks is high; so too, her job is harder if they are scattered broadly (in product space) rather than gathered closely about her.

The IBIS database permits the construction of four different measures of diversification (here called HERF, INDS, SUBS and REL).

HERF is a firm-wide Herfindahl index based on firms' segment revenues. It is the sum of the squares of the shares of each firm's operating segments' revenues in its total revenue. A firm with one division only will have a firm-wide Herfindahl index of one. A less than perfectly focused firm will have a Herfindahl index with a value less than one (though greater than zero). This measure is sensitive to the relative sizes of a firm's operating segments.

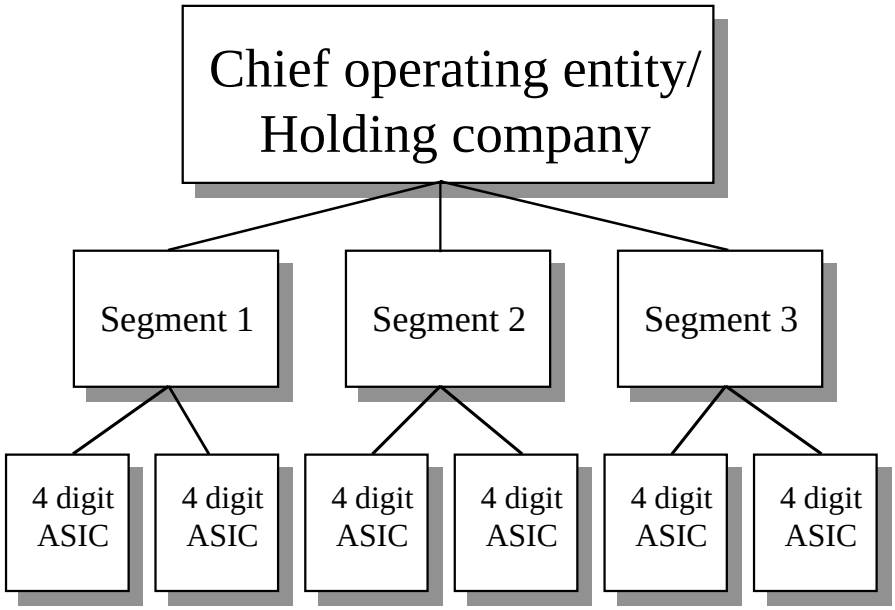
INDS is the number of four digit ASIC industries in which the firm operates. In arriving at the number of industries, each four digit industry is counted only once for each firm, so that a firm with several operations in the same four digit industry is treated equivalently to a firm with only one operation in that industry (*ceteris paribus*).

SUBS is the number of contributing "industry sub-segments" within the firm, and is similar to INDS. The sole difference between these two measures is that the latter (INDS) treats all the businesses operating in one four digit industry as if they were only one business, while the former (SUBS) is the sum of all the industry sub-segments regardless of their industry. Accordingly, INDS measures diversification across industries, while SUBS provides a measure of diversification based on both industry spread and the operating structure of the company.

The last of the measures, REL, captures how closely related a firm's business are. REL is the average of the distances of each contributing business from the firm's main business. These distances take a value of zero if the contributing business is in the same two digit industry as

the main business; one if the business is in a different two digit industry but the same one digit industry; and two if the business is in a different one digit industry. A totally focused firm will have a relatedness index of zero; a highly diversified firm will have a value that approaches two (though never reaches two, as one of the businesses in the average is the main businesses, necessarily having a distance of zero).

Figure 1: Stylised company structure



The relationship between the various diversification measures may be understood by reference to Figure 1, which presents a stylised company structure. The connecting lines should not be understood as denoting ownership; rather, each lower level is contained within the preceding level. For example, the segments are each divisions of the topmost box in the diagram. The revenue Herfindahl index HERF is calculated using the revenue shares of the segments, represented by segments 1 through 3 in the diagram. INDS and SUBS are calculated at the lowest level in the diagram. REL is derived by comparing the two digit industry codes of the

sub-segments (at the lowest level of the diagram) with the two-digit industry code of the chief operating entity.

5. The performance of focused and diversified firms: bivariate analysis

In this section we present a simple bivariate analysis of the data panel that was described above.

In Table 1, the panel of 942 firms has been divided into three parts: highly diversified firms (comprising 290 firms); firms of intermediate diversification (345 firms); and focused firms (307 firms). Firms in the "highly diversified" group are so classified because they operate in four or more four digit industries; firms in the "intermediate" group operate in two or more four digit industries, but in fewer than four; the focused firms operate in fewer than two industries (recall that as the classification variable is the average of two years' observations, it is not necessarily an integer, though it will never be less than one). The "focused" firms are not perfectly focused for the full period, but are perfectly focused (i.e. they operate in only one four digit industry) in at least one of the two years considered. (It is acknowledged that these groupings are somewhat arbitrary; the objective was merely to break the sample into three parts of roughly similar size.)

Table 1: Diversification and firm performance

	Average	*Trimmed mean*	*Median*
Diversified (290 firms)			
Average ROA (EBIT over average total assets, 1990-1994)	5.32	5.34	5.58
Average ROE (NPBT to average shareholders' funds, 1990-1994)	6.55	7.49	9.68
Average margin (EBIT to total revenue, 1989-1994)	3.77	3.95	3.76
Average Herfindahl index, 1989-1994	0.78	0.78	0.88
Average value of relatedness index, 1989 & 1994	0.86	0.86	0.86
Average number of four digit industries, 1989 & 1994	8.03	7.51	6.00
Average number of four digit sub-segments 1989 & 1994	8.48	7.91	6.50
Revenue, 1994 (A$millions)	1,153.9	923.4	338.8
Net assets 1994 (A$millions)	954.1	497.0	120.8
Number of employees, 1994	4,977	3,693	1,281
Intermediate (345 firms)			
Average ROA (EBIT over average total assets, 1990-1994)	6.25	5.59	5.31
Average ROE (NPBT to average shareholders' funds, 1990-1994)	7.89	12.36	11.12
Average margin (EBIT to total revenue, 1989-1994)	5.48	5.47	3.67
Average Herfindahl index, 1989-1994	0.96	0.97	1.00
Average value of relatedness index, 1989 & 1994	0.51	0.51	0.50
Average number of four digit industries, 1989 & 1994	2.58	2.57	2.50
Average number of four digit sub-segments 1989 & 1994	2.71	2.65	2.50
Revenue, 1994 (A$millions)	419.7	307.3	170.0
Net assets 1994 (A$millions)	377.0	198.2	61.5
Number of employees, 1994	1,683	1,004	488
Focused (307 firms)			
Average ROA (EBIT over average total assets, 1990-1994)	6.08	5.49	4.94
Average ROE (NPBT to average shareholders' funds, 1990-1994)	28.85	18.96	9.72
Average margin (EBIT to total revenue, 1989-1994)	5.69	5.64	3.69
Average Herfindahl index, 1989-1994	0.98	0.99	1.00
Average value of relatedness index, 1989 & 1994	0.19	0.18	0.00
Average number of four digit industries, 1989 & 1994	1.26	1.26	1.50
Average number of four digit sub-segments 1989 & 1994	1.32	1.30	1.50
Revenue, 1994 (A$millions)	255.8	189.0	108.3
Net assets 1994 (A$millions)	231.5	153.9	42.6
Number of employees, 1994	1,211	945	471

Notes: Ranking of firms based on average number of four digit industries over 1989 and 1994. Relatively focused firms: number of four digit industries greater than or equal to one and less than two. Intermediate firms: number of four digit industries greater than or equal to two and less than four. Highly diversified firms: number of four digit industries greater than or equal to four. Average total assets is a simple average of the value at the start of the year and the year-end value (similarly for average shareholders' funds). EBIT is earnings before interest and tax. NPBT is net profit before tax. Trimmed means mitigate the influence of outliers by excluding the top 5% and the bottom 5% of observations from the sample distributions. Missing values were excluded from the calculation of averages.

For each of the variables, three measures of central tendency are reported: the mean, a trimmed mean and the median. The trimmed mean eliminates the effect of extreme outliers by excluding the top five per cent and the bottom five per cent of observations from the sample distributions.

Table 1 shows that in terms of average return on equity, the intermediate firms performed on average better than the diversified firms, and that the focused firms performed better than both the diversified and intermediate firms (this is borne out in both the means and trimmed means). This ranking, however, was not borne out in the medians; the middle firm of intermediate diversification performed better than the middle focused firm, indicating that the average performance of focused firms was higher than that of intermediate firms due, to some extent, to the particularly good performance of a relatively small cohort of focused firms.

In terms of averages, the ranking of firms based on the EBIT margin is the same as that described above with respect to ROE (though the difference between the average performance of intermediate and focused firms is much less striking in terms of margins than it is in terms of ROE). Diversified firms on average performed worst of all, while focused firms achieved the highest average EBIT margin.

The table shows that in terms of ROA the three groups performed on average about the same. This illustrates the differences we observed between the three different measures of profitability. It is clear from our analysis that the results of research of this kind will be sensitive to the measure of profitability that is adopted. While the correlation between the measures is high, it is by no means perfect.

The table shows that the different measures of diversification used are associated in a sensible way (though again the association is not absolute). The firms operating in the highest number

of four digit industries (the "diversified" firms) have the lowest mean Herfindahl index and by far the highest number of four digit sub-segments. Also, the diversified classification has the highest mean value of the (un)relatedness index.

Finally, the table shows (not at all surprisingly) that the most diversified firms are on average the largest, in terms of revenue, net assets and employment. Similarly, the most focused are on average significantly smaller than firms in the other two classifications. This point indicates that tests of diversification can, if incorrectly specified, mistakenly be confounded with tests of the so-called "small firm effect" (that smaller firms have higher profitability than larger ones). This is why, in the empirical analysis that follows, we use a size variable on the right-hand-side of our regression equations to control for the effect of firm size.

In general, these bivariate results can be described as mixed. We attempt to build a more satisfactory picture of the relationship between diversification and performance in the multivariate analysis that follows.

6. Diversification and performance: multivariate analysis

In this section we present the results of the multivariate regression analysis we performed using the panel data set described above.

The basic model utilised was of the form:

$$y_{it} = \underline{x}'_{it}\,\underline{\beta} + v_{it}, \qquad v_{it} = \alpha_i + \lambda_t + u_{it} \qquad (1)$$

where y_{it} is a measure of firm i's profits in period t, x_{it} is a $(k \times 1)$ vector of observed characteristics of the firm with unknown weights β, α_i are firm specific *individual effects*,

which allow for heterogeneity across firms, λ_t are *time effects* which allow for heterogeneity over time and u_{it} the usual white noise disturbance terms. Between them, α_i and λ_t can account for any variables not included (possibly unobserved) in x_{it}, which are specific to the firm and time period, respectively. Such a specification is often referred to as *two-factor* model.

Two basic specifications are available for estimation of equation (1); *fixed* or *random effects* models. The former treats the time and individual effects as fixed parameters, the latter as (independent) random drawings from a particular distribution. Much has been said in the literature about the "correct" specification (see, for example, Mundlak, 1978a and b, and Hsiao, 1985 and 1986). However, in order to identify the effects of variables which are time (or conversely, individual) invariant (for example, whether the company is foreign owned or not), one is necessarily restricted to the latter specification (that is, random effects). On the other hand, if *a priori* it can be stated that the population that is being "sampled" from is exhaustive (as is the case here - we are only concerned with the largest, continuously reporting Australian firms), a fixed effects specification is more appropriate (see, for example, Nerlove and Balestra, 1996). Moreover, the fixed effects setting is more robust to any potential omitted variables bias.

In addition to the extent of diversification of the firm, profits are also likely to be affected by company size, whether the company is listed or not, whether the firm is foreign owned or not and its level of gearing (here defined as one less the ratio of average net assets to average total assets, rendered into percentages). Of these, only firm size, gearing and the extent of diversification are appropriate for a fixed effects model. There are problems in estimating equation (1) directly however, as gearing, profits and firm size are all likely to be determined simultaneously. If this were not accounted for, the estimates would suffer from the well-

known problem of simultaneity bias. To avoid this, equation (1) was estimated using *instrumental variables*, where the instruments for gearing and firm size, were one period lags of themselves.

The measure of profits employed was the ratio of earnings before interest and tax (EBIT) to revenue ("MARG"). The choice of this measure was motivated by evidence that the ratio of profits to sales is a close proxy to economic profit. The panel used covers the period 1989 to 1994. The first two years of the sample (1989-90) were excluded, as the gearing variable is only defined from 1990 onwards (and its lagged value was required for an instrument). Firm size was proxied by annual revenue (in billions of 1990 Australian dollars, rendered real via the GDP expenditure deflator).

The estimation results using HERF as the diversification variable are presented in Table 2.

Table 2: Panel data analysis estimation results: Homogeneous models: ordinary OLS and simple IV (dependent variable is MARG; double log form)

Simple OLS		
	Coefficient	*t-statistic*
Annual Revenue (A$b)	-0.0434	-1.9585
Gearing	-0.7907	-14.1649
Herfindahl index	-0.4189	-3.2864
Constant	5.6557	14.7174
Adjusted R^2	0.095	
N	2027	

Simple IV		
	coefficient	*t-statistic*
Annual Revenue (A$b)	-0.0513	-2.2706
Gearing	-0.7238	-12.1384
Herfindahl index	-0.4313	-3.3740
Constant	5.5014	13.8064
Adjusted R^2	0.094	
N	2027	

Table 3 presents the results of one-factor models, which include individual but no time dummies.

Table 3: Panel data analysis estimation results: One Factor Models: Within estimation and IV estimation

Within estimation		
	coefficient	*t-statistic*
Annual Revenue (A$b)	0.4756	5.1815
Gearing	-0.1472	-1.3617
Herfindahl index	0.6174	2.2909
Adjusted R^2	0.6779	
N	2027	

IV estimation		
	coefficient	*t-statistic*
Annual Revenue (A$b)	0.3836	1.9177
Gearing	0.3435	1.9702
Herfindahl index	0.6129	2.2524
Adjusted R^2	0.6732	
N	2027	

Finally, Table 4 presents the final model specification using both time and firm dummies.

Table 4: Panel data analysis estimation results: Two Factor Models: Within estimation and IV estimation

Within estimation		
	Coefficient	*t-statistic*
Annual Revenue (A$b)	0.1548	1.5993
Gearing	-0.0369	-0.3544
Herfindahl index	0.5954	2.2855
Adjusted R^2	0.6983	
N	2027	

IV estimation		
	Coefficient	*t-statistic*
Annual Revenue (A$b)	-0.2095	-0.8477
Gearing	0.5863	3.4745
Herfindahl index	0.5748	2.1666
Adjusted R^2	0.6890	
N	2027	

F-tests (P-values)	
H1: no individual or time effects	4.1922601e-209
H2: no time effects	8.7710425e-016

H3: no individual effects	1.4996269e-203

The F-statistics quite clearly reject the null hypothesis that there are no individual effects and that there are no individual and time effects. Thus on both *a priori* and statistical grounds, this would appear to be our preferred specification (i.e. with fixed firm and time effects). Although the effects of ownership and stock exchange listing cannot be identified (being time invariant), they are implicitly absorbed into the overall firm effect.[3] This specification has good explanatory power, and sensibly signed coefficients. The positive effect of the Herfindahl index on profits is significant (at 5 per cent), suggesting that increased focus does indeed increase profitability. There also appears to be no significant (firm) size effect. Finally, the level of the firm's gearing is significant, and, as expected, positive[4], such that reduced gearing is associated with lower profitability.

7. Conclusion and discussion

The aim of the paper was to examine empirically the relationship between diversification and firm performance. The results indicate that diversification has a negative impact on firm performance (measured by the ratio of profits to sales), controlling for firm size, gearing and whether or not firms are listed and foreign owned.

[3] Individual effects account for any time invariant omitted characteristics, and the time effects account for any individual invariant time effects. However, jointly they *do not* account for any omitted variables that vary across firms and over time.

[4] Recall that the gearing measure employed is the ratio of shareholders' funds to total assets, so that an increase in the gearing variable implies a *reduction* in gearing (ie. a reduction in the ratio of debt to equity).

There is significant scope for further research into the relationship between diversification and performance. Future research might expand the model presented here to consider variables such as industrial action, import penetration and industry concentration. Future research could also examine specific events that significantly change individual firms' level of diversification or focus, such as take-overs and divestments.

Research into business strategy issues such as diversification is part of the on-going research agenda of the Melbourne Institute.

Bibliography

Amey, L. R. (1964) "Diversified Manufacturing Business," *Journal of the Royal Statistical Society*, Series A volume 127 Part 2.

Amihud, Y. and B. Lev (1981) "Risk Reduction as a Managerial Motive for Conglomerate Mergers," *Bell Journal of Economics*, 12, 605-617.

Bettis, R. A. (1981) "Performance Differences in Related and Unrelated Diversified Firms," *Strategic Management Journal*, 2(4) 379-393.

Chatterjee, S. and B. Wernerfelt (1991) "The Link Between Resources and Type of Diversification: Theory and Evidence," *Strategic Management Journal*, 12, pages 33-48.

Comment, R. and G. A. Jarrell (1995) "Corporate Focus and Stock Returns," *Journal of Financial Economics*, volume 37, pages 67-87.

Copeland, T. E. and J. F. Weston (1992) *Financial Theory and Corporate Policy*, Reading: Addison Wesley.

Galai, D. and R. W. Masulis (1976) "The Option Pricing Model and the Risk Factor of Stock," *Journal of Financial Economics*, January-March, pages 53-82.

Gorecki, P. K. (1975) "An Inter-Industry Analysis of Diversification in the UK Manufacturing Sector," *Journal of Industrial Economics*, XXIV (2) 131-146.

Jensen, M. C. (1988) "Takeovers: Their Causes and Consequences," *Journal of Economic Perspectives*, volume 2, pages 21-48.

Jose, M. L., L. M. Nichols and J. L. Stevens (1986) "Contributions of Diversification, Promotion, and R&D to the Value of Multi-Product Firms: A Tobin's q Approach," *Financial Management*, 15, 33-42.

Kells, S. and C. Worswick (1997) "An Introduction to the IBIS Database," Melbourne Institute Working Paper no. 26/97.

Kells, S. and M. Rogers (1997) "Executive remuneration, board structure, corporate strategy and firm performance: A taste of the literature," Melbourne Institute Working Paper no. 22/97.

Lang, L. H. P. and R. M. Stulz (1993) "Does Corporate Diversification Create Value?" Working Paper (New York University, New York, NY).

Levy, H. and M. Sarnat (1970) "Diversification, Portfolio Analysis and the Uneasy Case for Conglomerate Mergers," *Journal of Finance*, September, pages 795-802.

Levy, H. (1991) "Possible Explanations of No-Synergy Mergers and Small-Firm Effect by the Generalised Capital Asset Pricing Model," *Review of Quantitative Finance and Accounting*, volume 1, pages 101-27.

Hsiao, C. (1985) "Benefits and Limitations of Using Panel Data," *Econometric Reviews*, volume 4, pp. 121-174.

Hsiao, C. (1986) *Analysis of Panel Data*, Cambridge: Cambridge University Press.

Lewellen, W. (1971) "A Pure Financial Rationale for the Conglomerate Merger," *Journal of Finance*, 26, 521-537.

Liebeskind, J., and T. C. Opler (1992) "The Causes of Corporate Re-Focusing," Working Paper, University of Southern California, Los Angeles, CA.

Lubatkin, M. and R. C. Rogers (1989) "Diversification, Systematic Risk and Shareholder Return: The Capital Market Extension of Rumelt's Study," *Academy of Management Journal*, 32, 454-465.

Mason, R. H. and M. B. Goudzwaard (1976) "Performance of Conglomerate Firms: A Portfolio Approach," *Journal of Finance*, March, pages 39-48.

Meilicher, R. W. and D. F. Rush (1974) “Evidence on the Acquisition-Related Performance of Conglomerate Firms,” *Journal of Finance*, March, pages 141-49.

Meyer, M., P. Milgrom and J. Roberts (1992) “Organisational Prospects, Influence Costs and Ownership Changes,” *Journal of Economic and Management Strategy*, volume 1, pages 9-35.

Michel, A. and I. Shaked (1984) “Does Business Diversification Affect Performance?” *Financial Management*, 13(4), pages 18-25.

Montgomery, C. A. (1982) “The Measurement of Firm Diversification: Some More Empirical Evidence,” *Academy of Management Journal*, 25, 299-307.

Montgomery, C. A. and B. Wernerfelt (1988) “Diversification, Ricardian Rents, and Tobin’s q,” *Rand Journal of Economics*, 19, pages 623-632.

Mundlak, Y. (1978a) “On the Pooling of Time Series and Cross Section Data,” *Econometrica*, volume 46, pages 69-85.

Mundlak, Y. (1978b) “Models With Varying Coefficients: Integration and Extension,” *Annales de líINSEE*, volume 30-31, pages 483-509.

Nerlove, M. and Balestra, P. (1996) “Formulation and Estimation of Econometric Models for Panel Data,” in *The Econometrics of Panel Data*, second edition, (Eds. Matyas L. and Sevestre P.), Kluwer Academic Publishers, The Netherlands.

Pelepu, K. G. (1985) “Diversification Strategy, Profit Performance, and the Entropy Measure,” *Strategic Management Journal*, 6(3) pages 239-255.

Reid, S. R. (1968) *Mergers, Managers and the Economy*, New York: McGraw Hill.

Rumelt, R. P. (1982) “Diversification Strategy and Profitability,” *Strategic Management Journal*, volume 3(4), pages 359-69.

Ruthven, P. (1994) *Leadership and Success in Corporate Australia*, IBIS Business Papers, Melbourne: IBIS.

Scott, J. T. (1993) *Purposive Diversification and Economic Performance*, Cambridge: Cambridge University Press.

Smith, K. V. and J. F. Weston (1977) “Further Evaluation of Conglomerate Performance,” *Journal of Business Research*, March, pages 5-14.

Teece, D. J. (1982) “Towards an Economic Theory of the Multi-Product Firm,” *Journal of Economic Behaviour and Organization*, 3, pages 39-63.

Varadarajan, P. (1986) “Product Diversity and Firm Performance: An Empirical Investigation,” *Journal of Marketing*, 50(3), pages 43-57.

Varadarajan, P. and V. Ramanujam (1987) “Diversification and Performance: A Reexamination Using a New Two-Dimensional Conceptualization of Diversity in Firms,” *Academy of Management Journal*, 30, pages 380-397.