The Performance of Large Private Australian Enterprises*

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Abstract

This paper provides an overview of the performance of large Australian-based private companies using a data set of 653 companies for the period 1993 to 1996. Four aspects of performance are considered: profitability, growth of revenue, export intensity and innovation. In addition, two important company characteristics – the debt to equity ratio and Tobin's Q – are considered.

Key words: performance, private companies, profitability, exports, innovation, debt to equity, Tobin's Q.

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1. Introduction

This paper is concerned with the performance of private enterprises. 'Performance' is a broad concept and this paper considers the following aspects: profitability (using three different profit ratios), the growth of revenue, export intensity and innovation (using R&D and intellectual property applications). In addition, the paper considers two important firm characteristics that are related to performance. These are the debt to equity ratio and Tobin's Q (which is the ratio of the market value of a firm to its book value of assets). Our central aim is to provide an overview of these variables with a focus on differences between firm types (e.g. listed and non-listed) and across industries.

In Australia, there are almost 1,047,000 private sector businesses, approximately 99.5 per cent of the total number of businesses. These businesses employed an estimated 6.8 million people or 82% of total employment in 1996-97.[1] This paper discusses the performance of a sample of 653 large Australian private firms over the period 1993-96. Even though the number of firms in our sample is low, they account for a disproportionate share of private business activity. Table 4 shows, for example, that the 653 companies account for around 42% of the total revenue of private companies in Australia. These companies represent the 'commanding heights' of the Australian market economy.

The structure of the paper is as follows. The next section discusses the nature of the panel data set. Each subsequent section considers one of the performance measures, with sections on the debt to equity ratio and Tobin Q following these. The final section concludes.

2. Data

Data from four sources are used in this paper: financial information from the IBIS database, intellectual property applications data from IP Australia, SIRCA market

[1] See ABS Cat. No. 1321.0 (1997)

capitalisation data from the University of Sydney and export data from the Pinnacle International Group. The core database used in this paper is the IBIS Enterprise Database. This contains accounting information on an annual basis for medium to large firms in Australia. Each company in the database is assigned an ANZSIC industry code and a company type. For a more detailed description of the database see Kells and Worswick (1997).

A balanced panel of private firms was constructed from the IBIS database for the years 1993-96. To be included in the panel, firms must have non-zero data for all variables required to calculate each of the performance measures used in this paper (except export data which was used where available and Tobin's Q which is only defined for listed firms). In total 653 firms met these criteria. Private firms include public listed industrial companies, public listed mining companies, non-listed public companies, proprietary companies, exempt proprietary companies and non-exempt proprietary companies.

Full definitions of the various variables used in this paper are given in Table 1. For a more detailed discussion of the profitability ratios see Feeny and Rogers (1998).

Table 1 Summary of Performance Measures

Ratio	Description
Return on Assets (ROA)	Net Profit before Tax/Total assets (1993-96)
Return on Equity (ROE)	Net Profit After Tax/Shareholders Funds (1993-96)
Price Cost Margin (EBDITM)	Earnings Before Depreciation Interest and Tax/Total revenue (1993-96)
Revenue Growth	Growth in Revenue (1993-96)
Debt to Equity	Total Liabilities/Shareholders' Funds (1993-96)
Export Intensity	Export Revenue/Total Revenue (1993-96)
R&D Intensity	R&D Expenditure/Total Revenue (1996)
Tobin's Q	Market Capitalisation/Total Assets (1995-96)

Note: Where a performance ratio requires a "stock" variable as the denominator, the value is taken as an average over two years. Due to this averaging, results presented in this paper span the period 1993-96 although data are taken from 1992.

Table 2 provides a breakdown of the different company types included in the panel. Approximately 65 per cent of the firms are public listed industrial companies or non-listed public companies. There are large differences between the mean revenue of the

different company types. Public listed companies have a mean revenue of over $1,000 million while exempt proprietary companies have a mean revenue of just $81 million.

Table 2 Breakdown by private company type

Private company type	No. of Firms	Percent	Mean Revenue ($m)
Public listed industrial companies	214	32.8	1121
Public listed mining companies	40	6.1	461
Exempt proprietary companies	6	0.9	81
Non-Exempt proprietary companies	179	27.4	207
Proprietary companies	5	0.8	110
Non listed public companies	209	32.0	546
Total	653	100	629

An industry breakdown of the panel is provided by Table 3. Almost 40 per cent of the firms in the panel are manufacturing firms, 19 per cent are involved in wholesale trade and over 11 per cent are involved in finance and insurance. Communication services has the highest mean revenue of over $3,900 million. At the other end of the scale, health and community services have a mean revenue of $62 million.

Table 3 Industry breakdown of panel

ANZSIC Industry	No. of Firms	Percent	Mean Revenue ($m)
Agriculture, Forestry and Fishing	4	0.6	171
Mining	55	8.4	677
Manufacturing	257	39.4	619
Electricity, Gas and Water Supply	2	0.3	473
Construction	15	2.3	382
Wholesale Trade	124	19.0	472
Retail Trade	34	5.2	1344
Accommodation, Cafes and Restaurants	2	0.3	126
Transport and Storage	21	3.2	846
Communication Services	6	0.9	3902
Finance and Insurance	73	11.2	398
Property and Business Services	37	5.7	401
Health and Community Services	3	0.5	62
Cultural and Recreational Services	14	2.1	1124
Personal and Other Services	6	0.9	217
Total	653	100	629

Lastly, Table 4 provides a comparison of the coverage of the panel with respect to the entire Australian private sector. Even though the absolute number of firms is small they still account for 42 per cent of total revenue and 32 per cent of Australia's total profit before tax.

Table 4 Comparison of the panel with the Australian private sector

	IBIS Balanced Panel (1996)	Australia (1996)[a]
Total Revenue	441,664m	1,059,062m[b]
Net Profit Before Tax	29,159m	90,429m[c]
Total Assets	529,497m	2,042,463m
Total Liabilities	318,383m	1,260,950m

Source: ABS Catalogue No. 8140.0 (1995-96). (a) Statistics relate to businesses in the public trading and private employing sectors of the economy. (b) Total operating income. (c) Operating profit before tax.

3. Profitability

Three ratios are used to discuss the profitability of private firms in Australia: return on assets (RoA), return on equity (RoE) and the EBDIT margin (EBDITM). Table 5 shows that the profitability of Australian private firms peaked in 1994 for all measures used. The EBDIT margin exhibits the lowest profitability of private firms in terms of the median and the trimmed mean.[2] The standard deviation for return on equity is noticeably higher than that of the other ratios used in the paper

Table 5 Profitability ratios for Australian private firms (1993-96)

Year	Trimmed mean			Median			s.d.		
	ROA	ROE	EBDITM	ROA	ROE	EBDITM	ROA	ROE	EBDITM
	percentage (%)								
1993	11.2	9.8	9.5	11.4	10.0	7.9	11.4	116.9	17.6
1994	12.3	13.9	10.6	12.0	12.4	9.0	34.7	74.7	25.0
1995	11.9	12.8	10.3	11.6	11.7	8.8	13.7	32.6	14.7
1996	11.0	10.2	9.8	10.9	10.6	8.0	10.8	44.6	16.1

Note: The trimmed mean profitability ratios are calculated by omitting the top and bottom 5 per cent of the distribution.

Differences in average (1993-96) profitability between different types of firms are highlighted in Table 6. Australian owned firms have higher profitability ratios in terms of return on assets and the EBDIT margin, but a lower ratio for return on equity. Manufacturing firms were more profitable than non-manufacturing firms for the period for all profitability ratios used. Listed firms were more profitable in terms of return on assets and the EBDIT margin. There are no conclusive results to show whether medium or large firms are the more profitable.

[2] As discussed in Feeny and Rogers (1998), the distribution of firm profitability ratios have high variance and a number of extreme outliers. This suggests use of the median or trimmed mean as measures of central tendency.

Table 6 Profitability ratios for Australian private firms by company type (average 93-96)[3]

Company Type	Trimmed mean			Median			s.d.		
	RoA	RoE	Ebditm	RoA	RoE	Ebditm	RoA	RoE	Ebditm
	percentage (%)								
Foreign owned	11.1	12.5	8.0	10.7	12.0	6.8	12.9	100.5	14.4
Australian owned	12.1	10.8	12.4	12.0	10.7	10.7	26.0	27.5	22.3
Manufacturing	14.5	13.3	11.2	13.8	12.3	10.5	9.2	30.7	10.4
Non-manufacturing	9.6	10.6	9.3	9.4	10.3	6.3	24.8	93.2	22.6
Listed	13.1	10.7	13.7	13.0	10.8	11.4	28.7	29.8	22.5
Non-listed	10.6	12.5	7.9	10.3	11.5	6.7	12.4	92.4	15.5
Public listed industrial	12.9	11.4	11.6	12.9	11.4	10.6	11.9	31.6	15.7
Public listed mining	15.2	7.2	28.9	13.4	7.2	27.9	65.7	14.0	44.2
>1000 employees	12.3	10.8	10.4	12.1	10.8	9.5	27.1	101.6	20.1
<1000 employees	12.7	12.4	9.7	10.6	11.6	7.2	10.8	37.1	17.5

Figure 1 depicts the profitability results graphically for the different types of firms according to the median return on assets.

Figure 1 Median return on assets (average 1993-96)

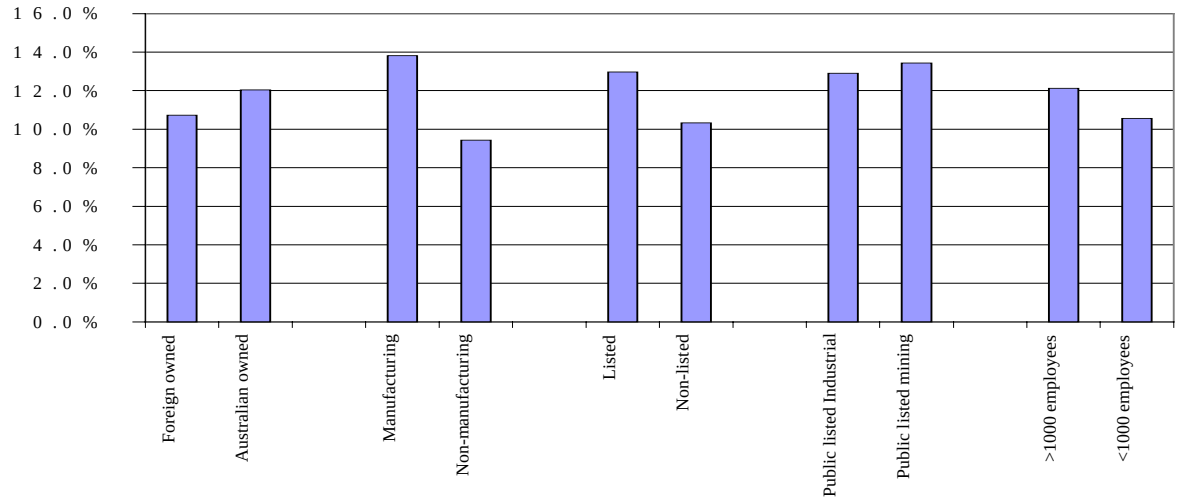


Figure 2 compares the histograms of the three (mean) profitability ratios for listed and non-listed firms. The histograms are calculated using an average of the profitability

[3] Average refers to pooling all the data and then calculating relevant statistics.

ratios over the duration of the panel. Listed companies appear to have a larger proportion of firms clustered around a small range of values than their non-listed counterparts. For the RoA measure, 74 per cent of listed firms have an average between 5 and 20 per cent while the comparable figure is just 57 per cent for non-listed firms.

Figure 2 Histograms of profitability ratios for listed and non-listed firms

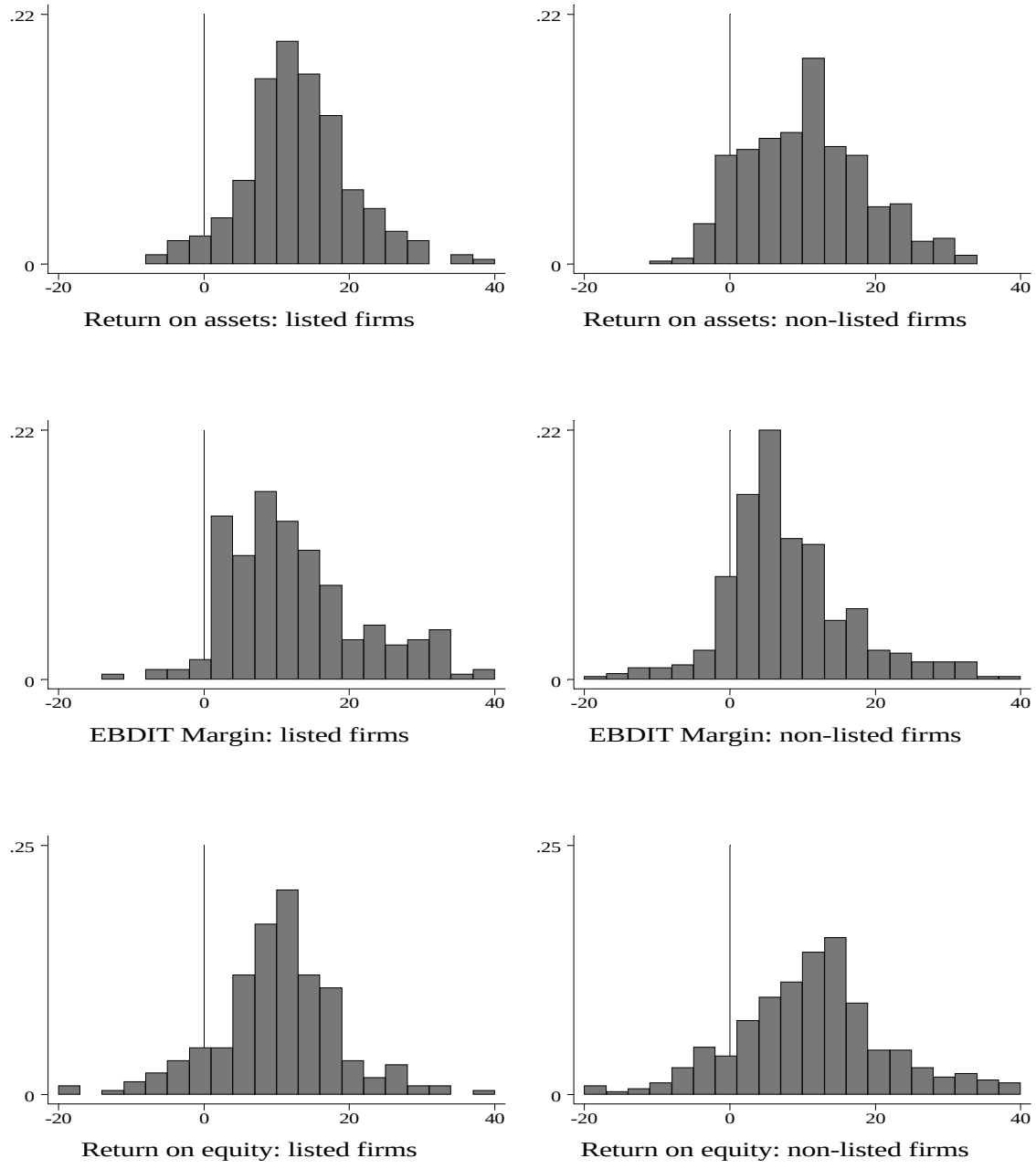


Figure 2 illustrates that there is wide variation in the profitability of firms (this is also indicated by the standard deviations reported in Tables 5 and 6). One question to ask is whether this variation is due to 'variance within industries' or 'variance across industries'. If the former is important it suggests that performance varies significantly even within (supposedly) well defined firm groupings which are often thought to have common characteristics. Table 7 contains one method of assessing this issue. The table shows the results from running a series of ordinary least squares (OLS) regressions with a set of industry dummies variables defined at the 2, 3 and 4 digit level. These regressions are run for each of the profitability measures. The R^2 reported in column four shows the proportion of variance explained by the set of industry dummies. For example, for return on assets the set of 2 digit industry dummies explains about 7% of total variance. For both RoE and RoA the table shows that a relatively small amount of variance is explained by the industry categories, even at the 4 digit industry level (e.g. a set of 4 digit industry dummies explains about 15% of the variance of RoA). Note also that the set of industry dummies cannot be considered 'statistically significant' for return on equity (i.e. the f-statistic shows that the set of industry dummies are not jointly significantly different from each other). The table also shows that the industry dummies are better at explaining the EBDIT margin. One possible explanation is that the EBDIT margin is not as influenced by firm specific accounting and other policies as are RoE and RoA.

Table 7 Analysis of variance across industries (profitability)

Return on assets				
Industry level	*Obs*	*d.f.*	R^2	*F stat*
2-digit	2612	42	0.075	4.99
3-digit	2232	101	0.106	2.49
4-digit	1540	159	0.147	1.50
Return on equity				
Industry level	*Obs*	*d.f.*	R^2	*F stat*
2-digit	2527	42	0.010	0.58
3-digit	2154	101	0.036	0.75
4-digit	1483	156	0.100	0.95
EBDIT margin				
Industry level	*Obs*	*d.f.*	R^2	*f stat*
2-digit	2612	42	0.193	14.67
3-digit	2232	101	0.256	7.25
4-digit	1540	159	0.351	4.70

Note: Each row of the table reports the results of a separate OLS regression where a set of industry dummies are included as explanatory variables (defined at the level indicated by the row heading). The columns of the table are: *obs* – number of observations, *d.f.* – degrees of freedom, R^2 – regression sum of squares / total sum of squares, *f-statistic* – F-test on regression (the 5% critical value for F(60, ∞) is 1.31). The number of observations declines as the industry classification increases since not all firms have 3 or 4 digit classifications. The results in the table are equivalent to an ANOVA using industry as the class or categorical variable (see Kennedy, 1992).

4. Revenue Growth

The growth in revenue for firms is calculated over the period 1993–96. Table 8 shows that Australian owned firms had higher median and trimmed mean average annual growth rates than foreign owned firms. The same is true for non-manufacturing firms over manufacturing firms, and listed over non-listed firms. The table also indicates that public listed industrial firms had greater revenue growth than public listed mining firms over the 1993-96 period.

Table 8 Revenue growth by type of private firm (1993-96)

Company Type	Average Annual Revenue Growth (1993-96)		
	Median	Trimmed mean	s.d.
	Percentages (%)		
Foreign owned	7.6	10.8	70.6
Australian owned	10.3	11.8	90.7
Manufacturing	8.0	10.4	60.7
Non-manufacturing	9.5	12.1	91.4
Listed	11.1	13.2	93.0
Non-listed	7.5	10.2	72.1
Public listed industrial	11.8	13.8	85.1
Public listed mining	8.8	10.4	125.9

Figure 3 shows graphically the difference in revenue growth (1993-96) between different private firm types. The difference in growth rates is greatest between listed and non-listed firms.

Figure 3 Median annual average revenue growth by private firm 1993-96

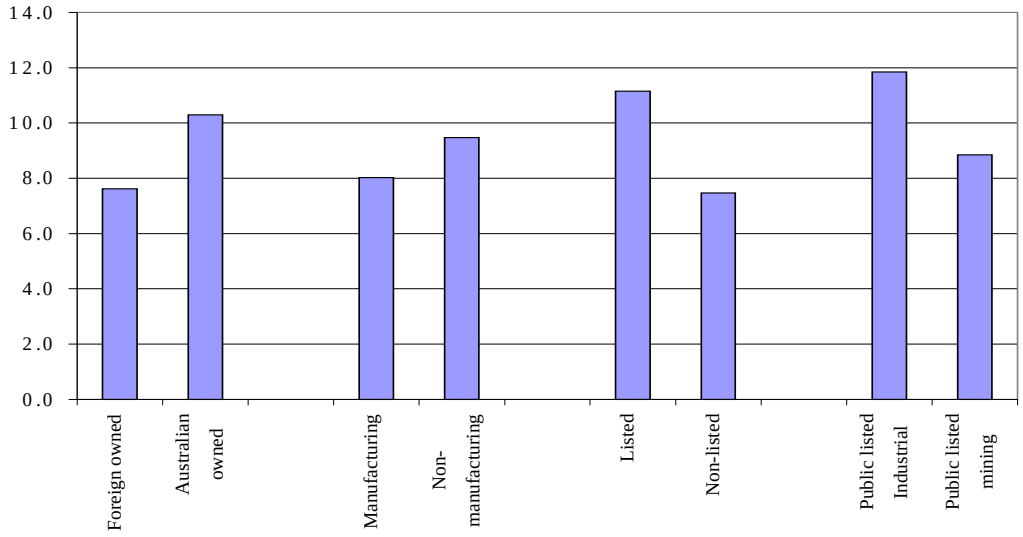


Figure 4 compares the distributions of revenue growth between listed and non-listed firms. There is little difference between the two distributions with 78 per cent of both

listed and non-listed firms having revenue growth between zero and 50 per cent. So although median average annual revenue growth is much higher for listed firms than non-listed firms, the two types of company have similar distributions. A striking feature of the histograms in Figure 4 is the range of average annual growth rates. For both listed and non-listed frims, there are a significant number of firms with annual growth rates exceeding 30 per cent. Part of the reason for such high and low growth rates is likely to be merger and takeover activity. This implies care should be taken in empirical studies to net out the effect of merger and takeover activity.

Figure 4 Histograms of average annual revenue growth for listed and non-listed firms (1993-96)

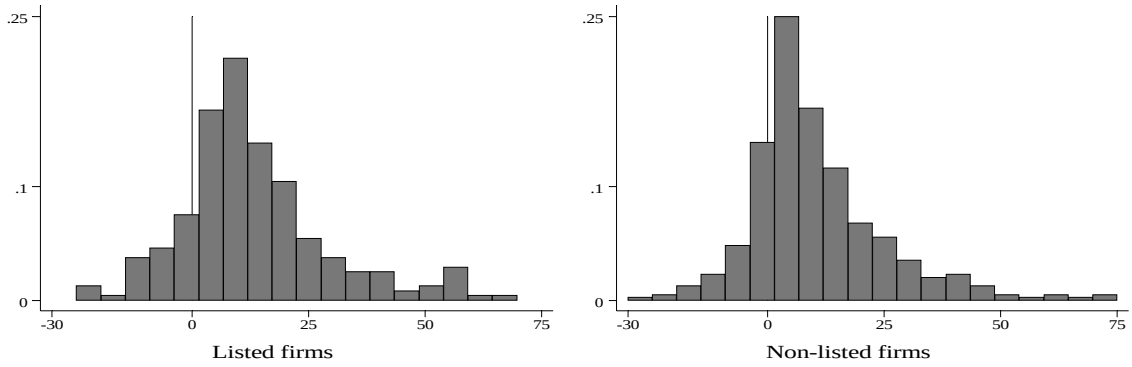


Table 9 shows an analysis of the 'within industry' versus 'across industry' variance. The results are quite different from the profitability analysis in Table 7. At the 4 digit level about half of the variance in growth rates is explaining by a set of industry dummies (although this is due partly to the relatively high number of dummies compared to the number of observations).

Table 9 Analysis of variance across industries (revenue growth)

Industry level	*Obs*	*d.f.*	R^2	*f statistic*
2-digit	653	42	0.162	2.82
3-digit	558	101	0.273	1.70
4-digit	385	159	0.518	1.52

Note: see Table 7.

5. Exports

Export data were obtained from the Pinnacle International Corp. and matched with the IBIS panel. The Pinnacle data are based on survey responses from firms and as such cannot be expected to have complete coverage. However, the results of the surveys are used to compile a public 'scoreboard' of exporters hence it seems likely that most large firms who export extensively will supply data. The number of exporters by type of private firm is shown in Table 10.

Table 10 Exporters by private firm (1993-96)

Company type	No. of firms	No. of exporters
Public listed industrial companies	214	36
Public listed mining companies	40	15
Exempt proprietary companies	6	-
Non-Exempt proprietary companies	179	37
Proprietary companies	5	1
Non listed public companies	209	51
Total	653	140

Export intensity was calculated using the ratio of export revenue to total revenue over the period 1993-96. Using two different data sets is never ideal, and after the panel was matched with the export data a number of firms had an export intensity exceeding 100 per cent. Export intensities close to 100 per cent might be expected due to the inclusion of a number of commodity based export oriented companies included on the panel (e.g. Wambo Mining Corporation Pty Ltd, Swiss Aluminium Australia Ltd, and Standard Wool Australia Pty Ltd).

Table 11 shows statistics on the export intensity (export revenue as a percentage of total revenue) of firms included in the panel over the period 1993-96. As measured by the median and trimmed mean, export intensity increased from 1993 to 1994, fell in 1995, and then increased in 1996.

Table 11 Export intensity for Australian private firms (average 1993-96)

Year	Export Intensity (%)		
	Median	Trimmed mean	s.d.
1993	16.2	25.5	28.9
1994	17.8	25.7	28.2
1995	16.3	25.3	28.6
1996	18.3	27.4	28.8

Table 12 shows differences in export intensity between types of private firms. Perhaps surprisingly, the table shows that Australian owned firms have a higher export intensity than foreign owned firms. Non-listed firms have a higher intensity than listed firms and, surprisingly, non-manufacturing firms have a higher intensity than manufacturing firms. These results appear to be due to two factors. First, there are only three firms included on the panel which export and are not firms in 'Mining', 'Manufacturing' or 'Wholesale Trade'. Second, some of the non-manufacturers have very high export intensities (e.g. mining firms and the commodity-based wholesale firms). As expected, there is a large difference between listed companies, with public listed mining companies having a median export intensity of over 54 per cent compared to a median intensity of just over 6 per cent for public listed industrial firms.

Table 12 Export intensity by type of private firm (average 1993-96)

Company Type	Export Intensity (%)		
	Median	Trimmed mean	sd
Foreign owned	14.5	25.2	29.1
Australian owned	23.8	27.1	27.9
Manufacturing	10.5	16.5	20.5
Non-manufacturing	47.5	46.5	32.7
Listed	15.3	25.3	29.6
Non-listed	18.0	26.4	27.9
Public listed Industrial	6.2	12.3	17.9
Public listed mining	54.7	59.6	26.9
>1000 employees	10.5	19.3	24.8
<1000 employees	25.7	33.3	30.6

Figure 5 depicts graphically the difference in export intensity by private firms over the duration of the panel.

Figure 5 Export intensity by private firms (1993-96)

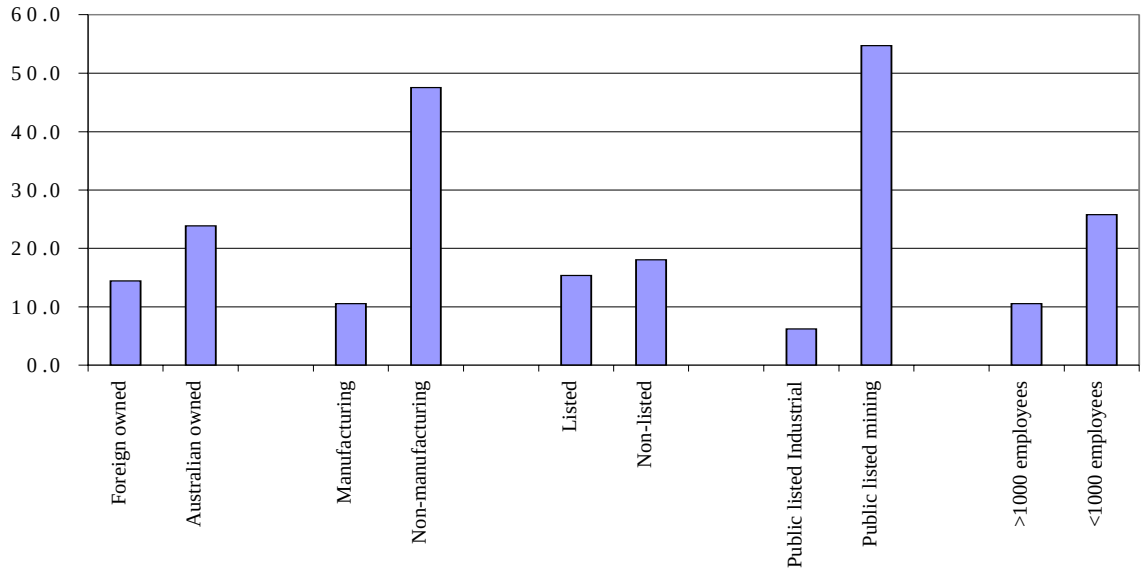


Table 13 shows that a high proportion of the variance in export intensity can be explained by industry dummies, even at a two digit level. These results indicate that industry differences are likely to be important in explaining export intensity.

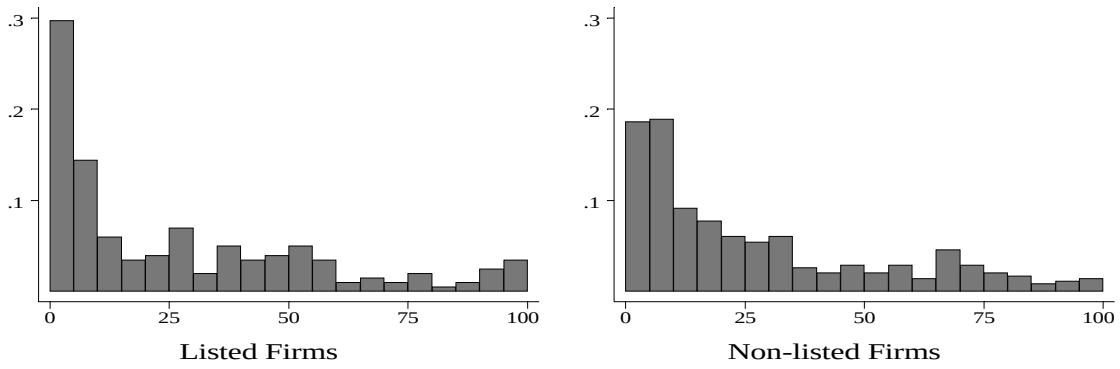
Table 13 Analysis of variance across industries (export intensity)

Industry level	*Obs*	*d.f.*	R^2	*f statistic*
2-digit	560	16	0.439	26.54
3-digit	456	35	0.573	16.10
4-digit	284	44	0.837	27.86

Note: see Table 7.

Figure 6 shows the difference in the distribution of export intensity between listed and non-listed firms. The shape of the distributions are similar although a greater proportion of listed firms have an export intensity close to zero. Moreover, 50 per cent of listed firms have an export intensity of between zero and 15 per cent compared to 46 per cent of non-listed firms.

Figure 6 Histograms of export intensity for listed and non-listed firms (1993-96)



6. Innovation

This section deals with the innovative activities undertaken by firms included in the panel for the year 1996. These activities include expenditure on R&D, and intellectual property applications for patents, trademarks and designs. The data on intellectual

property applications comes from electronic versions of the Annual Records of Proceedings 1996 published by IP Australia.[4] This list of applicants was matched with a list of both the IBIS parent firms and all the majority owned subsidiaries of these firms. The matching of subsidiary information is a vital aspect of obtaining a true view of firm IP activity since firms can file for IP protection through subsidiaries.

Table 14 provides a description of the innovative activities undertaken by all Australian private firms in the panel database. In 1996, 27 per cent of the firms included in the panel undertook R&D expenditure, 17 per cent made at least one trade mark application, 4 per cent made a patent application and 2 per cent a design application.

Table 14 Innovative activities of Australian private firms (1996)

Innovative Activities for Full Panel (n=653)				
Activity	No. of firms	Percent	Mean	s.d.
R&D spend >0	179	27	9104.1	21708.3
Patents	27	4	3.2	3.9
Trademarks	110	17	6.5	10.9
Designs	16	2	5.8	13.3

Note: R&D mean and s.d. ($,000). Patents, trademarks and designs in number of applications.

Table 15 and 16 provide a breakdown of Table 14 into listed and non-listed firms. A higher proportion of listed firms undertook R&D (36 per cent) but smaller proportions made patent and trade mark applications. However, of those listed firms which did make intellectual property applications they, on average, applied for a greater number of patents and trademarks.

[4] 'Applications' refers to 'complete' applications only (i.e. provisional applications are not included).

Table 15 Innovative activities of Australian listed companies (1996)

Innovative Activities for Listed Companies (n=249)				
Activity	No. of firms	Percent	Mean	Sd
R&D spend >0	90	36	11141.8	24685.1
Patents	6	2	3.7	3.2
Trademarks	26	10	9.8	13.3
Designs	6	2	1.2	0.4

Table 16 Innovative activities of Australian non-listed companies (1996)

Innovative Activities for Non-listed Companies (n=404)				
Activity	No. of firms	Percent	Mean	sd.
R&D spend >0	89	22	7043.5	18121.5
Patents	21	5	3.0	4.2
Trademarks	84	21	5.5	9.8
Designs	10	2	8.6	16.5

Figure 7 depicts graphically the proportion of listed and non-listed firms undertaking each of these innovative activities.

Figure 7 Innovative activity by private firm (1996)

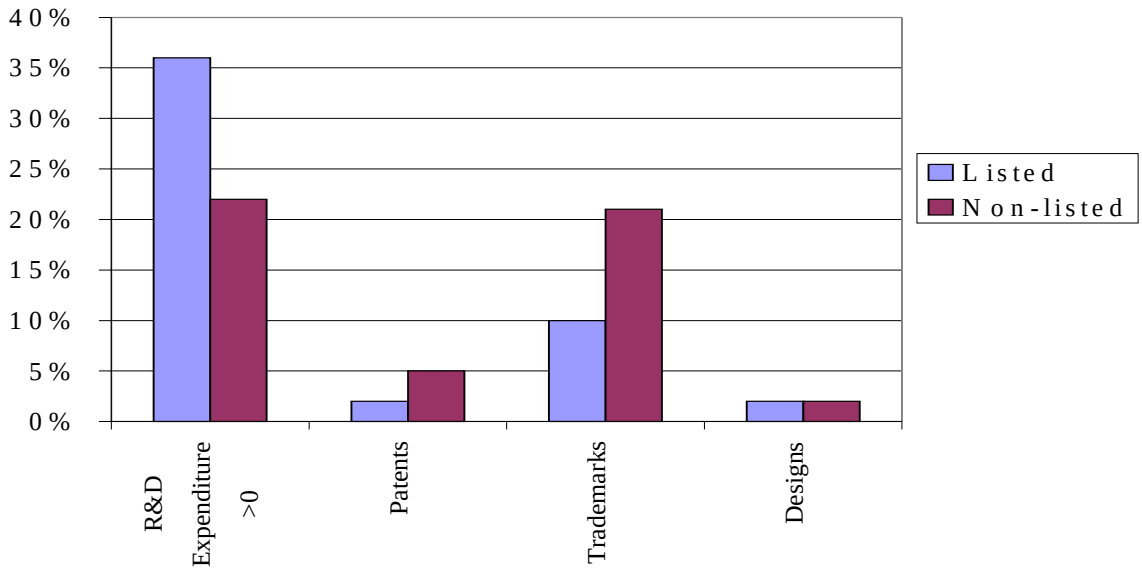


Table 17 analyses the R&D intensity (R&D expenditure / total revenue) of listed and non-listed firms. The table shows that non-listed firms have a higher mean and median R&D intensity than listed companies, although the differences are relatively small.

Table 17 R&D intensity by private firm (1996)

R&D Intensity by Type of Private Firm (n = 179)				
Type	No. of firms	Mean	Median	Std. Dev.
Listed	90	0.01795	0.00585	0.04091
Non-listed	89	0.01803	0.00743	0.03145

Figure 8 shows the distributions of R&D intensities for listed and non-listed firms. Both distributions exhibit a skewness to the right. The non-listed firms have relatively more firms in the 0.015 to 0.03 (i.e. 1.5% to 3%) range of R&D intensity. Equally, of those listed firms that do R&D almost 68 per cent have an R&D intensity of less than 0.01; for non-listed firms, this figure falls to 58 per cent. These results suggest that, of those firms that undertake R&D, listed firms appear less likely to have high R&D intensities. This fact should be considered in the knowledge that, for the panel as a whole, fewer non-listed firms undertaken R&D (22%) than listed firms (36%).

Figure 8 Histograms of R&D intensity for listed and non-listed firms (1996)

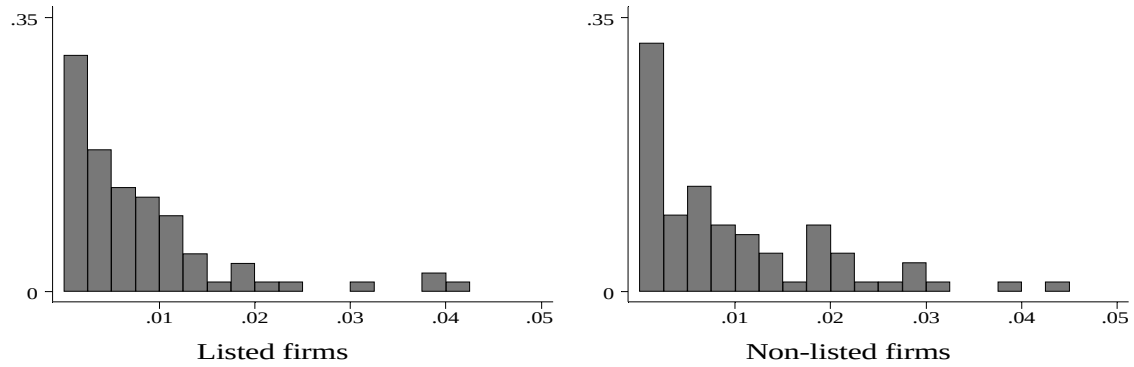


Table 18 provides a breakdown of firms undertaking innovative activities by industry. These types of innovative activities appear to be biased towards manufacturing firms

with almost 50 per cent undertaking R&D expenditure, 9 per cent applying for a patent, 21 per cent applying for a trademark and 5 per cent applying for a design in 1996. None of the four types of innovative activities were undertaken by firms in 'agriculture, forestry and fishing', 'accommodation, cafes and restaurants', or 'health and community services' (although this is based on the very few firms in these industries in the panel). The table shows that R&D and trade mark applications are the most common type of activity of those considered. Moreover, for the 'retail trade', 'transport and storage' and 'communication services' industries trade mark activity is more prevalent than R&D activity.

Table 18 Innovative activity by industry (1996)

Industry	No. of firms	R&D (%)	Patenters (%)	Trade-markers (%)	Designers (%)
Agriculture, Forestry and Fishing	4	-	-	-	-
Mining	55	27.3	3.6	1.8	-
Manufacturing	257	48.6	8.9	21.0	5.1
Electricity, Gas and Water Supply	2	100.0	-	-	-
Construction	15	20.0	-	6.7	-
Wholesale Trade	124	12.9	0.8	16.1	0.8
Retail Trade	34	8.8	-	26.5	5.9
Accomodation, Cafes and Restaurants	2	-	-	-	-
Transport and Storage	21	4.8	-	23.8	-
Communication Services	6	50.0	-	33.3	-
Finance and Insurance	73	4.1	1.4	15.1	-
Property and Business Services	37	18.9	-	13.5	-
Health and Community Services	3	-	-	-	-
Cultural and Recreational Services	14	7.1	-	7.1	-
Personal and Other Services	6	-	-	16.7	-
Total	653	27.4	4.1	16.8	2.5

Table 19 shows the analysis of variance for R&D intensity, as carried out in previous sections. Since the numbers of firms undertaking R&D is low the R^2 values are relatively high.

Table 19 Analysis of variance across industries (R&D intensity)

Industry level	*Obs*	*d.f.*	R^2	*f statistic*
2-digit	185	27	0.179	1.27
3-digit	150	50	0.415	1.40
4-digit	92	58	0.565	0.74

Note: see Table 7.

7. Tobin's Q

Tobin's Q is a performance measure based on the market value of a firm's securities. It is defined as the ratio of a market value of a firm to the replacement cost of its assets (Chakravarty 1995). The market value of a firm is the market value of its outstanding stock and debt. To calculate a proxy for Tobin's Q, the average market value of the firm over a year is added to the book value of non-current liabilities, and then divided by book value of total assets.[5] If Tobin's Q takes a value greater than one, the implication is that the firm is valued at a level greater than the replacement cost of its assets. As market capitalisation data is required to calculate Tobin's Q, this performance measure can only be calculated for the listed firms in the panel.

To gain an insight into Tobin's Q, note that the denominator is based on the book value of the assets. The book value as assessed by accountants does not set out to measure the market value of a firm, hence a number of factors can cause market value and book value to diverge. First, accountants often value assets at historical cost less an allowance for depreciation (which is based on a standard rule not on 'economic depreciation' i.e. the decline in net present value of the asset). Second, accountants do not attempt to value certain non-physical assets that may affect market value (e.g. some types of intellectual property, skilled labour). Equally, expenditures on activities such as R&D and advertising are often immediately expensed rather than treated as assets. An obvious exception to this procedure is when a firm buys another firm and

[5] Daily market capitalisation is obtained from SIRCA, University of Sydney. 'Daily' refers to only those days when the shares were traded and a price recorded. Ideally, the market value of debt should also be used but there is no common data source for this information. For a more detailed discussion of Tobin's Q see Lewellen and Bradrinath (1997). An empirical example of its use in assessing US firm R&D is in Hall (1993).

the purchase price is greater than the book value (i.e. Tobin's Q greater than 1). In this case the difference is allocated to 'goodwill' under intangible assets.[6] Third, certain firms may have high market value due to the specific market conditions they face (i.e. monopoly power, or high demand growth) rather than the assets they utilise. These factors mean that market value and book value will diverge.

Looking at the mean and median values in Table 20, we can see that 4 industries have Tobin's Q substantially above 1: 'mining'; 'electricity, gas and water'; 'communication services' and 'cultural and recreational services'. In mining, for example, it is likely that companies are valued by the market on factors concerning mineral deposits and exploration that are not reported in accounts. Note, however, that the standard deviation for mining companies is very large, implying the market valuation of mining companies varies considerably from the book value. Conversely, manufacturing companies have a mean and median Tobin's Q close to 1 with a relatively small standard deviation. These figures are consistent with the return on assets and EBDIT margin profitability ratios which indicate that public listed mining firms have a higher level of profitability than public listed industrial firms.

[6] For a discussion of some of these issues for Australia see Hampton and Bishop (1998) and Sveiby (1998).

Table 20 Tobin's Q by industry (average 1995-96)

ANZSIC Description	No of Observations	Mean	Median	s.d.
Agriculture, Forestry and Fishing	7	0.53	0.48	0.1
Mining	85	1.7	1.18	1.9
Manufacturing	165	1.02	0.94	0.4
Electricity, Gas and Water Supply	2	1.17	1.17	0.1
Construction	10	0.55	0.43	0.3
Wholesale Trade	35	0.76	0.81	0.3
Retail Trade	33	0.85	0.7	0.4
Accommodation, Cafes and Restaurants	2	0.97	0.97	0
Transport and Storage	8	0.83	0.81	0.1
Communication Services	8	1.44	1.21	0.8
Finance and Insurance	30	0.69	0.68	0.4
Property and Business Services	32	1.05	0.87	0.7
Health and Community Services	4	1.03	1.05	0.5
Cultural and Recreational Services	25	1.41	1.22	0.7

Figure 9 compares the distributions of Tobin's Q between listed industrial and listed mining firms. As the figure shows, the distribution for listed mining firms is more spread out relative to the distribution for listed industrial firms. For public listed industrial firms, 80 per cent have a Tobin's Q between 0.5 and 1.5. For listed mining firms this figure falls to 59 per cent. This could be a reflection of the greater uncertainties facing mining companies. Even for non-mining companies it is important to note the wide variation in Tobin's Q. This suggests that the use of book value of assets, for example to calculate return on assets, is unlikely to be a consistent measure of performance across firms.

Figure 9 Histograms of Tobin's Q for listed industrial and listed mining firms (average 1995-96)

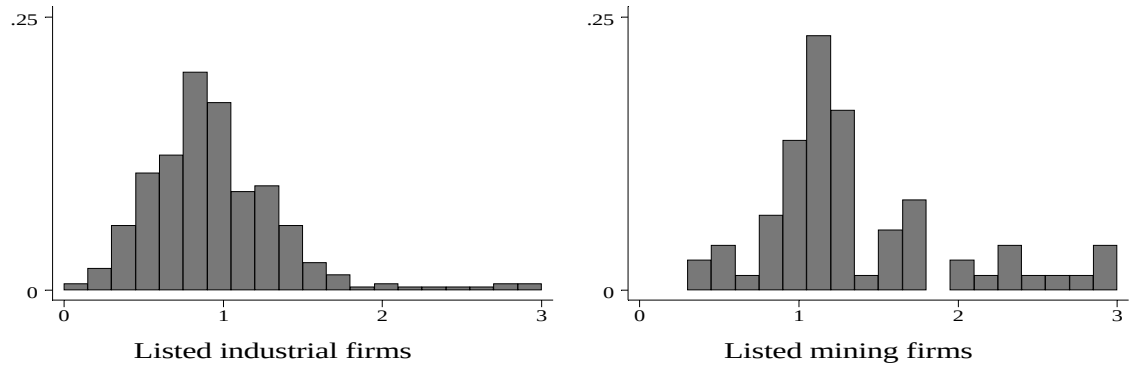


Table 21 shows an analysis of the variance based on an industry classification. The result suggest that industry differences are quite important in explaining Tobin's Q. This reflects the industry differences shown in Table 20.

Table 21 Analysis of variance across industries (Tobin's Q)

Industry level	*Obs*	*d.f.*	R^2	*f statistic*
2-digit	446	35	0.172	2.44
3-digit	347	70	0.205	1.02
4-digit	244	67	0.437	2.04

Note: see Table 7

8. Debt to Equity

The debt to equity ratio is an indicator of the capital structure of a firm. It is calculated here as the ratio of total liabilities to shareholders' funds. A high ratio implies a high reliance on debt finance and thus a vulnerability to interest rate changes. Conversely, a lower ratio implies a lower risk for creditors and, possibly, lower costs when a company borrows.

Table 22 shows that the median debt to equity ratio of private firms fell annually from over 151 per cent in 1993 to 134.6 per cent in 1996 (the trimmed mean ratio indicates a similar trend although it increases in 1996). Note also that the debt to equity ratio exhibits a very large standard deviation.

Table 22 The debt to equity ratio of Australian private firms (aver. 93-96)

Year	Debt/Equity Ratio (%)		
	Median	Trimmed mean	s.d.
1993	151.3	275.3	1545.7
1994	142.7	261.1	1063.5
1995	134.8	235.7	795.8
1996	134.6	243.1	1013.1

Table 23 provides a comparison of the debt to equity ratio between different types of private firm. The results indicate that foreign firms have a much higher debt to equity

ratio than Australian owned firms (over twice as high for the trimmed mean). Non-manufacturing have a much higher median and trimmed mean than manufacturing firms. Non-listed firms have a trimmed mean debt to equity ratio of over three times the comparable ratio for listed firms. This result might be expected given that listed firms have better access to equity markets. In addition, the ratio is higher for public listed industrial firms than for public listed mining firms. Table 23 also indicates that the smaller firms in the panel have a higer debt to equity ratio than larger firms. Again, smaller firms are less likely to be listed and face higher relative costs in raising equity than large firms.[7]

Table 23 Debt to equity by private firm (average 1993-96)

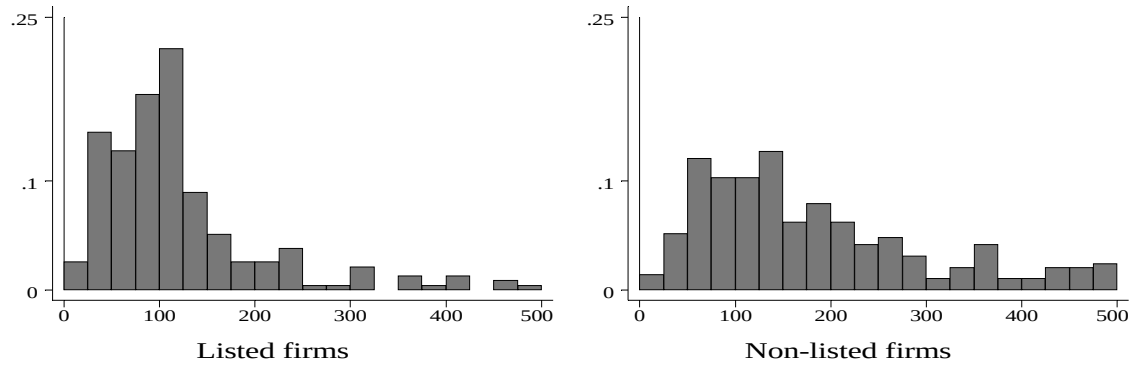
Company Type	Debt/Equity Ratio (%)		
	Median	Trimmed mean	s.d.
Foreign owned	195.5	360.9	1474.6
Australian owned	108.6	156.9	546.1
Manufacturing	113.9	144.2	543.3
Non-manufacturing	170.1	363.1	1382.1
Listed	98.5	118.1	385.5
Non-listed	195.3	362.9	1399.3
Public listed Industrial	104.6	129.4	411.7
Public listed mining	59.6	64.3	48.8
>1000 employees	126.7	196.9	1089.2
<1000 employees	152.7	313.9	1175.8

Figure 10 compares the distribution of the debt to equity ratio for listed and non-listed firms. A noticeable difference is that the distribution is much more clustered for the listed firms in the panel, with 75 per cent of listed firms (compared to 38 per cent of non-listed firms) having a mean debt equity ratio of between zero and 150 per cent.

[7] This may not be true at the small and medium enterprise level where family, friends or 'business angels' may provide equity finance. All the firms in the panel, however, are probably too large for such sources to be of importance.

For non-listed firms, 47 per cent of firms have a debt equity ratio exceeding 200 per cent compared to only 13 per cent for listed firms.

Figure 10 Histograms of debt to equity ratio for listed and non-listed firms (average 1993-96)



As before, we also undertake an analysis of variance based on industry dummy variables. Table 24 shows that industry factors explain between 13% and 25% of the variance of the debt to equity ratio.

Table 24 Analysis of variance across industries (debt equity ratio)

Industry level	*Obs*	*d.f.*	R^2	*f statistic*
2-digit	2527	42	0.128	8.68
3-digit	2154	101	0.283	8.04
4-digit	1483	156	0.247	2.79

Note: see Table 7

9. Conclusions

This paper has provided a broad overview of the performance of large Australian-based firms over the period 1993 to 1996. A sample of 653 firms are used from the IBIS data base. These firms account for around 40% of Australia's private sector (see Table 4). Additional data on intellectual property applications, market capitalisation and exports is merged with the IBIS data base. The overview considers four aspects of performance: profitability, growth of revenue, export intensity and innovation.

The profitability section considered three different measures of profitability: return on assets, return on equity and the EBDIT margin. An important characteristic of these measures is that the distributions have high variance driven, to a large extent, by the presence of extreme values. The return on equity exhibits the largest variance of the three measures. This wide variation causes problems in summarising differences in profitability between companies, since commonly used statistics like the mean can be misleading. One result that is relatively robust is that manufacturing firms tend to have higher profitability than non-manufacturing firm. Another result is that the distribution of profitability for non-listed firms tends to be more dispersed than listed firms (Figure 2). The variation in profitability across firms does not appear to be due to industry differences. An analysis of variance using 4-digit ANZSIC codes as the categorical variable only explains around 15% of the variance of return on assets and equity. In contrast, around 35% of the variance in EBDIT margin is explained by a 4-digit ANZSIC classification (see Table 7).

In terms of revenue growth, an important result is the wide range of average annual growth rates, with around 22% of firms experiencing either negative growth, or growth above 50% per annum (Figure 4). Although some of this variance is likely to be due to merger and takeover activity (something we cannot investigate), it appears as though the private sector contains relatively high rates of change (something that is hidden in macro level variables).

To analyse export performance, this paper uses data from a private survey that collates export information. Given this, we are not confident that the export data is fully representative. Of the 653 firms in the sample, 140 have export data (21%) (Table 10). For these firms we find that a typical export intensity (exports to revenue) is around 20% (Table 11).

Innovation activity by large firms in Australia is assessed by the level of R&D expenditure and intellectual property applications in the single year 1996. As has been discussed in Rogers (1998), only a small subset of firms conduct innovation *as proxied by these measures*. Around 27% of firms in the sample undertook R&D, 17% made at least one trade mark application and 4% made at least one patent application (Table 14). Listed firms are more likely to do R&D (listed firms are also, on average,

larger); however, the proportion of listed firms with high R&D intensity (greater than 1%) is lower than non-listed firms (Figure 8 and preceding discussion).

Understanding the performance of firms is complex and related to a wide range of firm, industry and economy wide characteristics. In the last two sections of the paper we consider two firm characteristics that are related to performance. The first is Tobin's Q (the ratio of market value to book value) which can be defined for listed firms only. Tobin's Q is, in fact, used as a performance measure in a range of studies since a higher Tobin's Q indicates a firm with higher *expected* future performance. Another aspect of Tobin's Q is that it draws attention to the potential problems of using the book value of assets (for example, as the denominator in the return on assets). A high Tobin's Q may be due to high future expected profits or simply because the book value of assets is relatively low, perhaps because the accounts do not record the level of intangible assets accurately. The analysis of Tobin's Q show that the typical value varies across industries (manufacturing firms have a mean of 1, whereas communications has a mean of 1.4) and also within industries (Table 20). The mining industry shows the highest mean value and also the highest standard deviation, implying a wide range in market expectations over the future of mining companies and/or large variations in accounting procedures.

Section 8 considers the debt to equity ratio. This shows that non-manufacturing firms have a much higher relative level of debt, as do foreign owned companies. As expected, non-listed companies also have a higher debt to equity ratio. Again, a great deal of the variation in the debt to equity ratio occurs within industries: around 25% of the total variance is explained by an analysis of variance model with a 4-digit ANZSIC categorical variable.

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