2010 International Conference on Economics, Business and Management
IPEDR vol.2 (2011) © (2011) IAC S IT Press, Manila, Philippines

Concentration and Stock Returns: Australian Evidence

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Abstract—We argue that not only the standard risk factors (size, book-to-market ratio) affect the average stock returns, but also the structure of the product market itself. We address the issue of competition on the Australian stock market, comparing it to the US stock market. In contrast o the US market, we find a significant evidence that companies operating in highly concentrated industries generate higher risk-adjusted returns than those operating in less concentrated (more competitive) industries. Regarding the standard risk factors, we find that average returns are positively related to the size of the company, and negatively related to book-to-market, which is the opposite to the US stock market as documented in previous studies.

Keywords: concentration, stock returns

I. Introduction

Starting with the asset pricing models of [16], [14] and [2], the typical approach to explaining average stock returns has been to consider various risk-specific characteristics which proxy various risks embodied in the expected returns. These include for example firm size as documented in [17], the book-to-market ratio (B/M), the earnings-to-price ratio (E/P), the cash flow-to-price ratio (C/P), leverage and liquidity, see [7], [3], and [4]. Several studies found a significant relation between security returns and the above listed risk factors, see [1], [15], [17], [7] and [8].

The behavior of Australian stocks returns is less well documented. As reported in [12], there is a positive premium for small size and high B/M stocks, whereas findings documented in [5] and [6] indicate a significantly negative, rather than positive premium for small firms. The results regarding a strong small firm effect presented in [12] are partly confirmed in [10]. Finally, as shown in [11], the model by [7] performs less satisfactory in pricing assets in Australia. Our study examines the Australian market between 1993 and 2007. It shows that average returns tend to be positively related to size and negatively to B/M. In addition, motivated by [13], we study the link between concentration and average returns. In contrast to the US market, we find significant evidence that companies operating in highly concentrated industries generate higher risk-adjusted returns.

II. Data

We use historical Australian Stock Exchange (ASX) data from the Share Price & Price Relative (SPPR) database, which contains historical share prices for all Australian listed companies with fully paid shares. We consider 25 major industries classified into 11 industry sectors. The accounting information is taken from the Aspect Huntley (ASPECT) database. To assure that accounting information is reflected in stock prices, we merge the return data from July of year t to June of year t + 1 with the accounting information of year t-1, as proposed in [7] and [13]. The final data sample covers the period from 1993 to 2007. We use a firm's market equity at the end of December of year t-1 to compute its B/M and leverage ratios for year t-1, and its market equity for June of year t to measure its size. All together, the accounting ratios used in the analysis include: E/A (earnings before interest divided by assets); E/S (earnings divided by sales); B/M (book equity divided by market equity, which is calculated as SPPR stock prices times shares outstanding); V/A (market value of firm divided by total assets); D/B (ratio of dividends to book equity); R&D/A (ratio of R&D expenditure to total assets); leverage (ratio of book liabilities, computed as total assets minus book equity, to total market value); beta (post-ranking beta as in [7]).

III. Concentration Measure

The Herfindahl Index is used to measure concentration in an industry. For industry j the Herfindah index H_j is computed as

$$H_j = \sum_{i=1}^{I} s_{ij}^{\ 2}$$

where s_{ij} denotes the market share of company i in the industry j, calculated alternatively based on net sales, total assets, or book value of equity. The respective index is denoted by H(Sales), H(Assets) and H(Equity). Large values of Herfindahl indicate a high degree of concentration. Following [13], we perform calculations of the concentration measures every calendar year for each industry, and then average these over the past three years to make the results more robust against large fluctuation in Herfindahl.

IV. Summary Statistics of Industry Concentration

Summary statistics of industry concentration measures are reported in Table 1. In addition, Figure 1 represents the associated box-plots. The box contains 50% of observations belonging to the range between the low and

the upper quartile (interquartile range). The extremes of the lower and the upper whisker correspond to 2.5%-quantile and 97:5%-quantile, respectively. From the Table 1 and the box-plots we observe that H(Sales) is on average higher than H(Asset) and H(Equity) and exhibits a higher standard deviation. H(Sales) ranges between 0.09 (indicating a high degree of competition) and 0.90 (indicating strong concentration). The last three columns represent Pearson (above main diagonal) and Spearman (below main diagonal) correlation coefficients. H(Assets) and H(Equity) are very highly correlated (correlation greater than 0.9), while H(Sales) exhibits correlation with two other measures of approximately 0.7. For the analysis below we group industries into quintiles based on H(Sales).

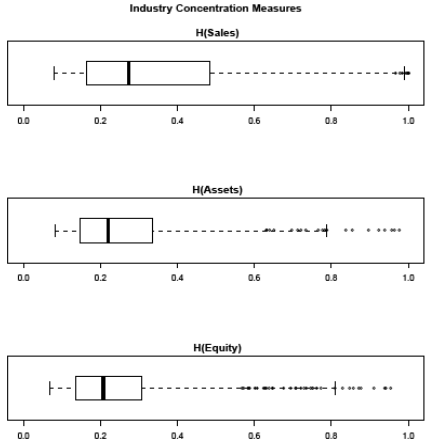

Figure 1. Box-plot for the summary statistics of industry concnetration measures.

V. Time-Varying Concentration Measure

Figure 2 shows the evolution of H(Sales) over the period from 1993 to 2007. We observe a decrease in H(Sales) for the following industry sectors, indicating that these become more competitive over time: industrials (rapid decrease for transportation to moderate decrease for commercial services and supplies, and nearly constant low concentration for capital goods); health care (healthcare equipment and services concentration declines steadily over the whole period whereas pharmaceuticals and biotechnology and life sciences concentration decreases over the period from 1993 to 2001 and increases afterwards). H(Sales) indices for telecommunication and utilities experience similar patterns: they decrease rapidly from 1993 to 2000 (indicating an increase in competition over this period), slightly increase afterwards towards the peak in 2004, with a further minor decrease from 2005 to 2007. The financial industry appears to be the most volatile regarding the concentration measure: H(Sales) decreases from 1995 to 1999 pointing towards an increase in competition, increases from 1999 to 2002 and decreases slightly afterwards for all financials except the group of diversified financials where it decreases slightly after 1999. Note that data for banks is available only from 2001 on and thus, the Herfindahl index can only be computed starting in 2003. It decreases from 2003 to 2007 indicating less concentration. For the remaining industries, except miscellaneous industrials, we observe either no variation or a slight decrease in H(Sales) over the period from 1993 to 2007.

VI. Average Return and Industry Characteristics

The main focus of our study is to investigate a relationship between industry (firm) average return and industry (firm) average characteristics. Table 2 shows the results from regressing industry average returns on industry H(Sales), ln(Size), ln(B/M), momentum, beta and leverage. The regressions are run monthly. Time-series average estimates are reported together with their t-statistics. We observe a positive and highly significant relationship between concentration and average stock returns. Furthermore, average stock returns are significantly positively related to firm size, and negatively related to the B/M. In addition, there is a negative relationship between the average stock returns and beta in a single regression, which becomes insignificant after controlling for size, B/M and momentum. Finally, average stock returns are only insignificantly related to momentum and leverage. We conclude, that concentrated industries with a high market power are dominated by large companies with high market values (and therefore, the B/M ratios), and have higher returns than the competitive industries shared by many small companies. In Table 3, when running the cross-sectional regression on the firm level, we observe quantitatively similar results to the industry-level regression, that is, average stock returns increase with concentration; and are positively related to size and negatively to the B/M ratio.

VII. Return for Concentration-Sorted Portfolios

To confirm the results reported in Table 2 and Table 3 regarding positive relationship between average stock returns and concentration, we report in Table 4 monthly average stock returns computed based on H(Sales) for the quintile portfolios Q1 (least concentrated) to Q5 (most concentrated) with associated t-statistics. Quintile returns are measured by either equally weighting the firm returns in each concentration quintile (firm level returns), or by first averaging the returns within each industry, and then equally weighting industry returns in each concentration quintile (industry level returns). In Panel A of Table 4 the first raw represents (on a firm level) the average return in percent within the quintile, calculated by equally weighting firms within each concentration portfolio. The least concentrated Q1 industries have an average return of 0.87% per month. This increases to 1.36% for the firms in the most concentrated quintile Q5. The spread between Q5 and Q1 is 0.49% (t-statistic: 2.61), or approximately 5.8% per annum. The average return calculated on the industry level nearly doubles from 0.95% for Q to 1.99% for Q5.

This confirms the earlier results from regressing returns on industry average characteristics, namely the average stock returns increase with concentration. In Panel B of Table 4 we perform the same calculations for the risk-adjusted returns obtained by subtracting the return on a characteristics-based benchmark (constructed as in [3] and [13]) from the individual firm's return, and then averaging within the given concentration quintile. Then, a triple-sorting is performed every month on all firms in our sample: first into size quintiles, then within each size quintile into book-to-market quintiles, and finally within each of these 25 portfolios based on the 12-month performance. We subtract from each individual stock's return the benchmark return calculated by averaging individual returns within each of these 125 portfolios. Again, risk-adjusted average stock returns increase with concentration. The spread calculated on the firm (industry) level between the most concentrated Q5 and the least concentrated Q1 industries decreases from 0.49 (1.04) to 0.14 (0.85), compared to the spread in the average raw returns. The spread Q5-Q1 remains significant at the industry level, but is insignificant at the firm level.

VIII. Conclusion

This paper examines economic determinants of the cross-sectional stock returns on the Australian stock market. We argue that not only the standard risk factors such as the company size or its book-to-market value affect the average stock returns, but also the structure of the product market itself. Motivated by the study of [13], we address the issue of competition on the Australian stock market. We find that the average stock returns are positively related to the size of the company and negatively related to the book-to-market ratio. In contrast to the US stock market, we find a significant evidence that companies operating in the high concentrated industries generate higher risk-adjusted returns. The spread between the most concentrated quintile and the most competitive quintile is 0.49% per month corresponding to the economic magnitude between the high and the low concentrated industries of approximately 6% per annum. In addition, we have found that there is an interaction between concentration and size, and concentration and book-to-market premium, which could be investigated further in details. In addition, more explanation on how market structure effects differences in the expected returns is required. Finally, it would be of interest to further investigate other (than concentration) market features which might affect average stock returns.

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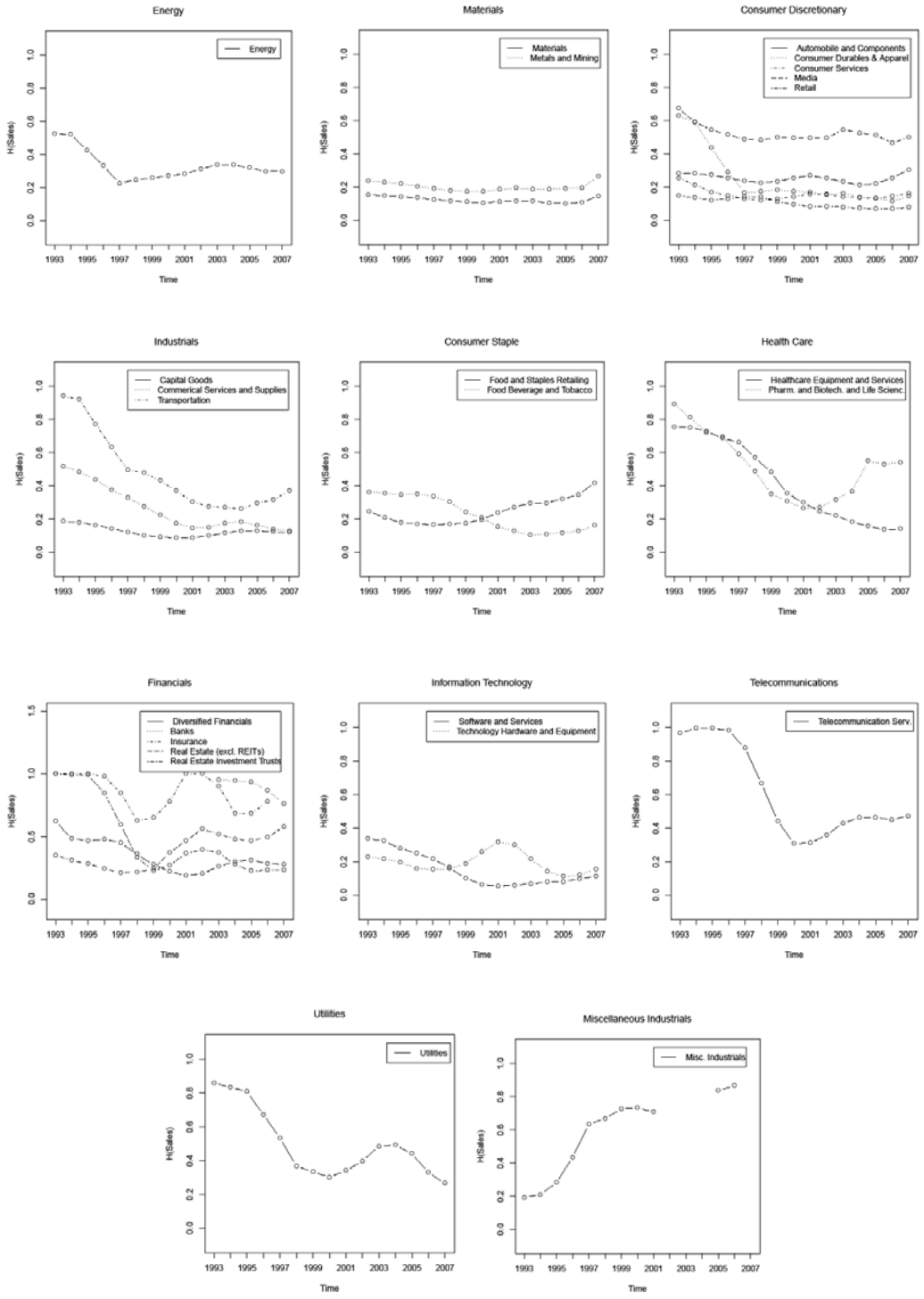

Figure 2. Industry concentration measure H(Sales) for sectors energy, materials, consumer discretionary, industrials, consumer staple, health care, financials, information technology, telecommunications, utilities and miscellaneous industrials plotted yearly from 1993 to 2007. H(Sales) is calculated as the sum of squared sales-based market shares of all firms in each industry in a given year and the averaging over the past three years.

TABLE I. SUMMARY STATISTICS OF INDUSTRY CONCENTRATION MEASURES.

Industry Concentration measures										Spearman-Pearson Correlation		
	mean	*media*	*std.dev.*	*max*	*min*	*20%*	*40%*	*60%*	*80%*	*H(Sales)*	*H(Asset)*	*H(Equity)*
H(Sales)	0.349	0.292	0.231	0.90	0.09	0.15	0.22	0.35	0.550	1.000	0.677	0.626
H(Assets	0.277	0.219	0.173	0.71	0.08	0.14	0.18	0.26	0.432	0.714	1.000	0.958
H(Equity	0.267	0.208	0.178	0.75	0.07	0.12	0.17	0.24	0.409	0.660	0.906	1.000

TABLE II. FAMA-MACBETH REGRESSION OF AVERAGE INDUSTRY-LEVEL RETURNS ON H(SALES) AND INDUSTRY AVERAGE CHARACTERISTICS.

H(Sales)	ln(Size)	ln(B/M)	Momentum	Beta	Leverage
		Industry-Level Regression			
0.03387					
(5.16077)					
	0.00066				
	(4.43113)				
		-0.01699			
		(-4.53758)			
			2.29221		
			(0.81159)		
				-0.01715	
				(-2.01277)	
					0.00383
					(0.40652)
	-0.00040	-0.01191	-29.6329	-0.01472	0.02179
	(-0.24516)	(-2.97717)	(-1.20444)	(-1.25735)	(1.73392)
0.02141	0.00087	-0.00527	-33.3265		
(3.52900)	(0.73256)	(-1.74332)	(-1.10681)		
0.00953	-0.00081	-0.01158	-23.1697	-0.01488	0.02168
(1.90278)	(-0.50315)	(-3.03625)	(-1.15317)	(-1.23944)	(1.85970)

TABLE III. FAMA-MACBETH REGRESSION OF FIRM-LEVEL RETURNS ON H(SALES) AND FIRM CHARACTERISTICS.

H(Sales)	ln(Size)	ln(B/M)	Momentum	Beta	Leverage
		Firm-Level Regression			
0.03463					
(3.90015)					
	0.00180	-0.01627	5.77656		
	(2.58674)	(-13.1099)	(0.37214)		
0.00819	0.00182	-0.01618	3.15806		
(2.32445)	(2.87296)	(-13.3963)	(0.19807)		
				-0.00209	
				(-0.57727)	
					-0.03854
					(-8.69819)
	0.00320	-0.01574	-3.19226	0.01430	-0.00269
	(5.32532)	(-13.2598)	(-0.17523)	(4.75361)	(-0.68259)
0.00812	0.00321	-0.01565	-5.31462	0.01431	-0.00250
(2.27526)	(5.34595)	(-13.4406)	(-0.28145)	(4.71630)	(-0.64000)

TABLE IV. INDUSTRY CONCENTRATION AND THE CROSS-SECTION OF AVERAGE STOCK RETURNS.

	Firm-level returns						**Industry-level returns**					
	Quintile						***Quintile***					
	Q1	Q2	Q3	Q4	Q5	Q5-Q1	Q1	Q2	Q3	Q4	Q5	Q5-Q1
	Panel A: Raw returns											
Av.ret.	0.871	0.737	1.574	1.581	1.360	0.489	0.952	0.698	1.220	1.307	1.990	1.038
t-stat.	10.19	8.451	14.15	12.12	8.175	2.615	5.346	3.262	5.917	6.308	5.453	2.555
	Panel B: Risk-adjusted returns											
adj.Av.Ret	-0.106	-0.095	0.185	0.166	0.037	0.143	-0.170	-0.028	0.141	0.064	0.682	0.852
adj.t-stat.	-1.517	-1.387	2.071	0.1574	0.263	0.915	-1.705	-0.215	1.004	0.442	2.568	3.003